ACTION TIGER

4th Edition

Tiger Action Plans of 13 Tiger Range Countries

Compiled by
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The Wildlife Trust of India (WTI) is a non-profit conservation organization committed to conserve nature, especially endangered species and threatened habitats, in particular with communities and government.

Its vision is to secure the natural heritage of India.

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Ministry of Agriculture & Forests
Tashichhodzong, Thimphu : Bhutan

ཇོ་དཔོན།
MINISTER

15th January 2019

Message from the Chair

The "National Tiger Action Plan" (NTAP), demonstrates the commitment of tiger range countries to secure the survival of tiger, its habitat and prey across tiger range countries (TRCs). As done in the past, the Global Tiger Forum (GTF), along with its collaborator, the Wildlife Trust of India, has compiled the fourth edition of this important document. It is my privilege and pleasure to share this with all tiger range countries and others.

Since the last edition of the NTAP, many Tiger Range Countries have taken innovative steps to strengthen the conservation of the endangered wild tiger in their country. I extend my compliment to all for their untiring efforts and commitments. However, lot more needs to be done to address emerging challenges, some of them being specific to range countries. I am confident that TRCs and collaborators, along with the GTF, would leave no stone unturned to address gaps while strengthening the tiger agenda.

The endangered tiger is an iconic umbrella species, indicating the wellbeing of ecosystem services and adaption towards climate change through locked up carbon in its forests. Its survival is crucial for mankind.

I thank TRCs for their inputs in the NTAP. As Chairman of the GTF it is my privilege to facilitate the tiger agenda through this only inter-governmental, international platform.

(Yeshey Penjor)
Chairman, Global Tiger Forum
Minister, Ministry of Agriculture and Forests
Royal Government of Bhutan

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GLOBAL TIGER FORUM

An Intergovernmental International Organization for the conservation of tiger in the wild

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FOREWORD

The "Action Tiger" is a compilation of Action Plan and ongoing efforts of tiger range countries to conserve the endangered tiger. This is the basis for the National Tiger Recovery Programme (NTRP) which factors into the Global Tiger Recovery Portfolio.

The present edition contains updated information from some tiger range countries in South Asia (Nepal, Bangladesh and Bhutan). In an ongoing manner, updation would be done, as and when additional information is obtained from other Tiger Range Countries (TRCs).

In the present century, urbanization and pressures of development have fragmented the wilderness and Tiger Range Countries (TRCs) are no exceptions. Broadly, paucity of wild prey, loss of habitat and its connectivity and anthropogenic pressures continue to threaten wild tigers across their natural range. Thus, wild tiger survival has become a function of several sectors, warranting mainstreaming with a landscape approach. Though some overarching issues like demand for body parts and derivatives of tiger, human tiger interface conflicts, habitat loss remain overarching to TRCs, there are country specific issues requiring sovereign efforts. Thus, a differentiated strategy is the need of the hour, with commitment for interventions at three levels from a TRC, viz. site, national and transnational. This results in distinct action portfolios covering enabling legal and policy regime, sovereign funding and donor support, policy for engaging with local people, modernizing ground level protection infrastructure, deployment and developing the capacity of field frontline, ensuring a gainful portfolio for local people to reduce forest resource dependency along fringes and corridor, proactive human tiger interface strategy, state of the art tiger monitoring and country level assessment, avoidance and smart green infrastructure, apart from active transnational engagements through bilateral instruments.

The GTF appreciate the sincere efforts of TRCs for securing an assured future for the wild tiger, when the going is not all that smooth. The forum and its partners like WTI and IFAW are committed to handhold TRCs in this regard.

Rajesh Gopal
Secretary General
Global Tiger Forum

IFAW
International Fund for Animal Welfare

PREFACE

It is with distinct pleasure and keen enthusiasm that I am given the opportunity to introduce *Action Tiger*, the 4th edition compilation of the National Tiger Action Plans. As part of the Global Tiger Forum, this edition includes plans from the 13 tiger range countries of the world, including newly updated versions for the nations of Bangladesh, Nepal and Bhutan.

Though the iconic tiger benefits from being the subject of global conservation efforts, the pressures and immense dangers it continues to face present challenges to the species that escalate year over year. These critical dangers include increasing conflict between humans and wildlife, the continued threat of poaching driven by the desire for tiger body parts, and the rapid depletion and fragmentation of critical habitat.

Action Tiger serves as a fundamental blueprint through which these tiger range countries can continue to combat poaching and implement effective programs to preserve vital populations and protect their habitats. This 4th edition of *Action Tiger* is the result of dedicated collaboration between governments as well as the international conservation and animal welfare communities to share both a deep understanding of and the requirements for seeing tigers thrive once again. Such cooperation to date has led to a positive increase in the tiger population in various tiger range countries and serves as proof that collaboration yields action which in turn leads to positive results.

I am especially excited about this year's edition and thankful to the nations of Bangladesh, Nepal and Bhutan for providing updated versions of their plans. This edition improves upon its predecessor by continuing to provide the most recent and thought-provoking action plans needed by governments and dedicated non-governmental organizations such as the International Fund for Animal Welfare (IFAW) and its partner, Wildlife Trust of India (WTI), both of whom remain steadfast in their cooperation with and support of the Global Tiger Forum and the 13 tiger range countries.

which provides a critical holistic approach and an enriched perspective through which we can ultimately continue to unite our global efforts to save the wondrous tiger.

Azzedine T. Downes
President and CEO
January 2019

EDITOR'S NOTE

The International Fund for Animal Welfare's (IFAW) and its partner Wildlife Trust of India's (WTI) association with Global Tiger Forum (GTF) began in 2005 and our commitment to boost the population of tigers across the global range continues to be strong.

The primary focus of the "Action Tiger" is to compile the National Tiger Action Plans (NTAPs) of 13 Tiger Range Countries (TRCs) so as to provide the stakeholders an insight into the respective conservation needs and priorities to be used effectively as guidance to implement the conservation intervention and monitoring programs to reach the goal of increasing the tiger populations by 50 percent by 2022. The document presents the strategic and planned efforts of the TRCs to safeguard and conserve the majestic tiger and its habitat in their respective countries. The ultimate goal of the "Action Tiger" is to maintain a viable interconnected population of breeding tigers globally, a population existing predominately on wild prey with minimal conflict with humans. The First Edition of the "Action Tiger" comprising 12 National Tiger Action Plans was published in 2007. This was updated with the publication of the Second Edition in 2011 with the inclusion of NTAP of Lao PDR. The Third Edition of the document was released in 2014 updating the Tiger Action Plans of India and Vietnam.

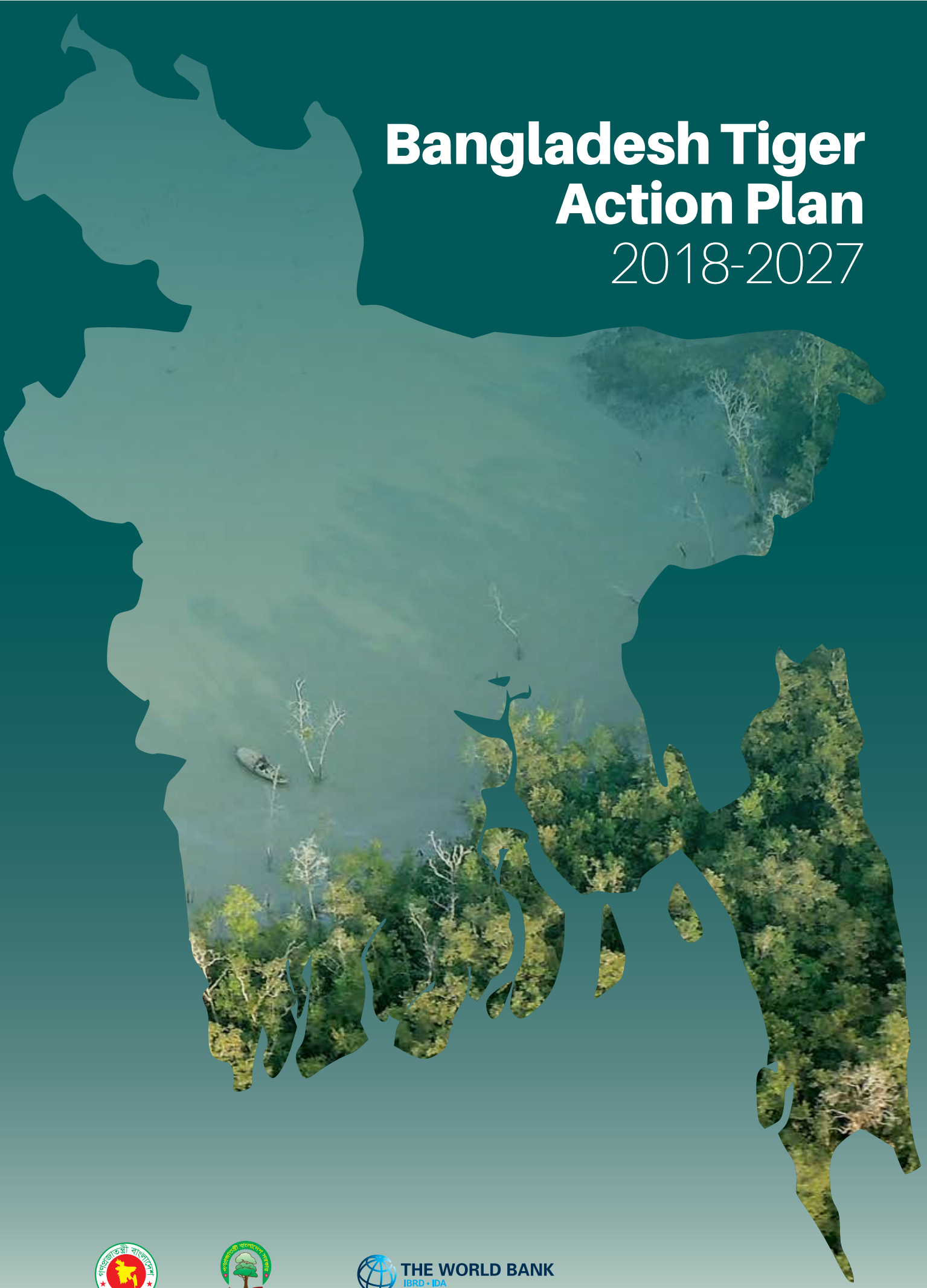
"Action Tiger" is a 'living' document, which we will continue to update to ensure its objectives are met in the context of a world that is constantly growing and changing. It is a practical instrument linking conservation ideals to giving wild tigers a future; a real future that will stretch beyond the next century. The document shall serve as a tool to promote the integration of and collaboration with all stakeholders including non tiger range countries, NGO community and individuals in reaching the vision of conservation excellence.

We are happy to bring out the Fourth Edition of "Action Tiger" which has new and updated plans for Bangladesh, Bhutan and Nepal. We hope that this is a useful document for governments and civil societies alike in their quest to conserve the tiger.

Vivek Menon
Executive Director and CEO
Wildlife Trust of India

Bangladesh Tiger Action Plan
2018-2027

Bangladesh Tiger Action Plan
2018-2027



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MESSAGE

The majestic wild animal Bengal Tiger is our national pride. This animal attracts people around the world. For the conservation of this charismatic big cat Bangladesh Forest Department has taken steps to conserve it. For supporting the tiger conservation in the country, a policy document titled Bangladesh Tiger Action Plan (BTAP) was prepared for the period 2009-2017. Huge number of activities were mentioned in that action plan. Among those Bangladesh Forest Department has completed tiger population estimation by camera trapping. The result is published and highly appreciated by the scientists, academia and tiger range countries. However, new issues have been emerged. To address those new issues the Bangladesh Forest Department has updated the Bangladesh Tiger Action Plan for the period of 2017-2027.

I am highly elated that an updated policy document for tiger conservation has been prepared. I do believe that this document will create a new era of tiger conservation in the country. Ministry of Environment and Forests is highly committed to conserve our tiger through effective collaboration, capacity enhancement, research and monitoring. I firmly that we will be able to save our tiger for the generations to come.

(Anwar Hossain Manju, M.P)

বাংলাদেশ সচিবালয়,ঢাকা। ফোন ঃ ৯৫৪০৫৮৭, ৯৫৭৩৩০৩ (অফিস), ফ্যাক্স ঃ ৯৫৪৫১৬৬, ই-মেইল ঃminister@moef.gov.bd

بسم الله الرحمن الرحيم

Abdullah Al Islam Jakob, M.P
Deputy Minister
Ministry of Environment and Forests
Govt. of the People's Republic of Bangladesh

আবদুল্লাহ আল ইসলাম জ্যাকব, এম.পি
উপ-মন্ত্রী
পরিবেশ ও বন মন্ত্রণালয়
গণপ্রজাতন্ত্রী বাংলাদেশ সরকার

MESSAGE

I appreciate the initiatives taken by the Bangladesh Forest Department that it updated the *Bangladesh Tiger Action Plan* for the period 2017-2027. With this pragmatic effort, the country will be able to step forward for the tiger conservation in the country. In fact, this publication would be meaningful when all of the activities of the plan are implemented with heartfelt sincerity and commitment. I congratulate all of the stakeholders including Bangladesh Forest Department for updating tiger action plan. I really feel proud for being a part of such pleasing policy document of tiger conservation in our beloved country.

(Abdullah Al Islam Jakob, MP)

MESSAGE

Secretary

Tiger is the magnificent wild animal in the world and plays a crucial role in balancing the ecosystem where they live. This keystone species is not only our national animal but also a symbol of power, strength and courage of our culture. Like all other tiger range countries of the world this iconic species is facing grave threats from poaching, prey depletion and habitat degradation. These threats are also posing an adverse impact on the entire ecosystem of the Sundarbans. Once tigers growled in many forests of the country but now this majestic species took their refuge only in the Sundarbans. However, for the conservation of tiger the Bangladesh Government prepared first Tiger Action Plan in 2009 which is valid up to 2017. In the meantime many new issues emerged. To address those new issues a new **Bangladesh Tiger Action Plan, 2018-2027** has been prepared by the Forest Department with the support from the Ministry of Environment and Forests. This action plan bagged actions for the effective conservation of the flagship species. The effective conservation of this big cat is highly dependent on the dedication, fortitude and alliance among all the stakeholders and development partners including local community.

Though Bangladesh is the most densely populated country in the world yet our government is committed to conserve tiger against all odds. I believe that this action plan will be meaningful when the tiger will growl freely in their habitat and will be able to live carefree. This action plan would certainly play a vibrant role in the conservation of tiger in our country. I would like to extend necessary support for the proper and timely implementation of the activities guided by this action plan.

Istiaque Ahmad
Secretary in Charge
Ministry of Environment & Forests

MESSAGE

Chief Conservator of Forests

Bangladesh Forest Department is entrusted with the biodiversity conservation of the country. This department is engaged with the inherent strength of biodiversity conservation of the country with its due diligence. The *Bangladesh Tiger Action Plan, 2017-2027* is a policy document which provides us a strategic vision of the tiger conservation in the country. My heartfelt thanks go to the stakeholders whose sincere effort made this document rich. I am really grateful to all of the participants who enriched this document by providing with valuable suggestions and comments.

The updated *Bangladesh Tiger Action Plan, 2018-2027* has captured a number of tasks and activities to address threats and challenges. Effective and timely implementation of those activities can only make our tiger live carefree in their wild habitat. This is only possible when there would be an effective collaboration, cooperation and support from key stakeholders.

Md. Yunus Ali
Chief Conservator of Forests
Bangladesh Forest Department

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Preface

Bangladesh once offered a number of habitats which harbored tiger. Today, however, the population of tiger has been squeezed to an alarming condition and only confined in the Sundarbans of the country. The anthropological dependency on the forests for their livelihood coupled with illegal tiger and prey consumption has created a heavy pressure on the tiger population. This species has been listed in CITES Appendix I and in Bangladesh it is critically endangered and also is enlisted in the Wildlife (Conservation and Security) Act, 2012 in Schedule I. The tiger in Bangladesh has been facing some serious threats and challenges which are needed to be addressed properly for the sake of its conservation. This updated action plan is mainly based on the previous action plan which was prepared for the period of 2009-2017. This action plan has three main Chapters. The Chapter one is about the importance of tiger conservation and status in the country, the Chapter two describes about the threats and challenges of the tiger and prey, and Chapter three describes the activities to fulfill the objectives. The updated action plan also emphasises on the collaboration among national and international stakeholders, research, capacity building and proper implementation of the activities.

This updated action plan is an outcome of the sub-project titled, **Implementation of National Tiger Recovery Programme (NTRP)** under the Strengthening Regional Cooperation for Wildlife Protection Project financed by the World Bank. The updated action plan is prepared through a series of field level and national level workshops and this document incorporated the suggestions and comments obtained from the stakeholders. However, I am really glad that finally this action plan is published and all of my thanks go to all the concerned.

Abdul Mabud
Project Director
Strengthening Regional Cooperation for Wildlife Protection Project

Acknowledgement

The authors of this policy document are highly grateful to the authors of previous **TigerAction Plan 2009-2017**. The authors are also very much thankful to the Strengthening Regional Cooperation for Wildlife Protection Project of Bangladesh Forest Department, Ministry of Environment and Forests which was the mother project of the sub-project, 'Implementation of National Tiger Recovery Program'. The writers are also highly indebted to the World Bank for their wonderful support during the project tenure ship.

Our deepest gratitude go to Mr. Md. Yunus Ali, Chief Conservator of Forests of Bangladesh Forest Department who always play very important role in updating the action plan by giving very thoughtful suggestions and directives.

Our heartfelt thanks go to all of the participants of the field workshops, regional workshop and national level workshops who gave logical and effective comments and suggestions. We are also grateful to Mr. Zahir Uddin Ahmed, Conservator of Forests who were beside us in formulating and planning the workshops. He played such a wonderful role in implementing the sub-project.

Our sincere thanks go to Dr. Y.V. Jhala, the renowned big cat specialist of Wildlife Institute of India for his suggestion and comments which really enriched this document.

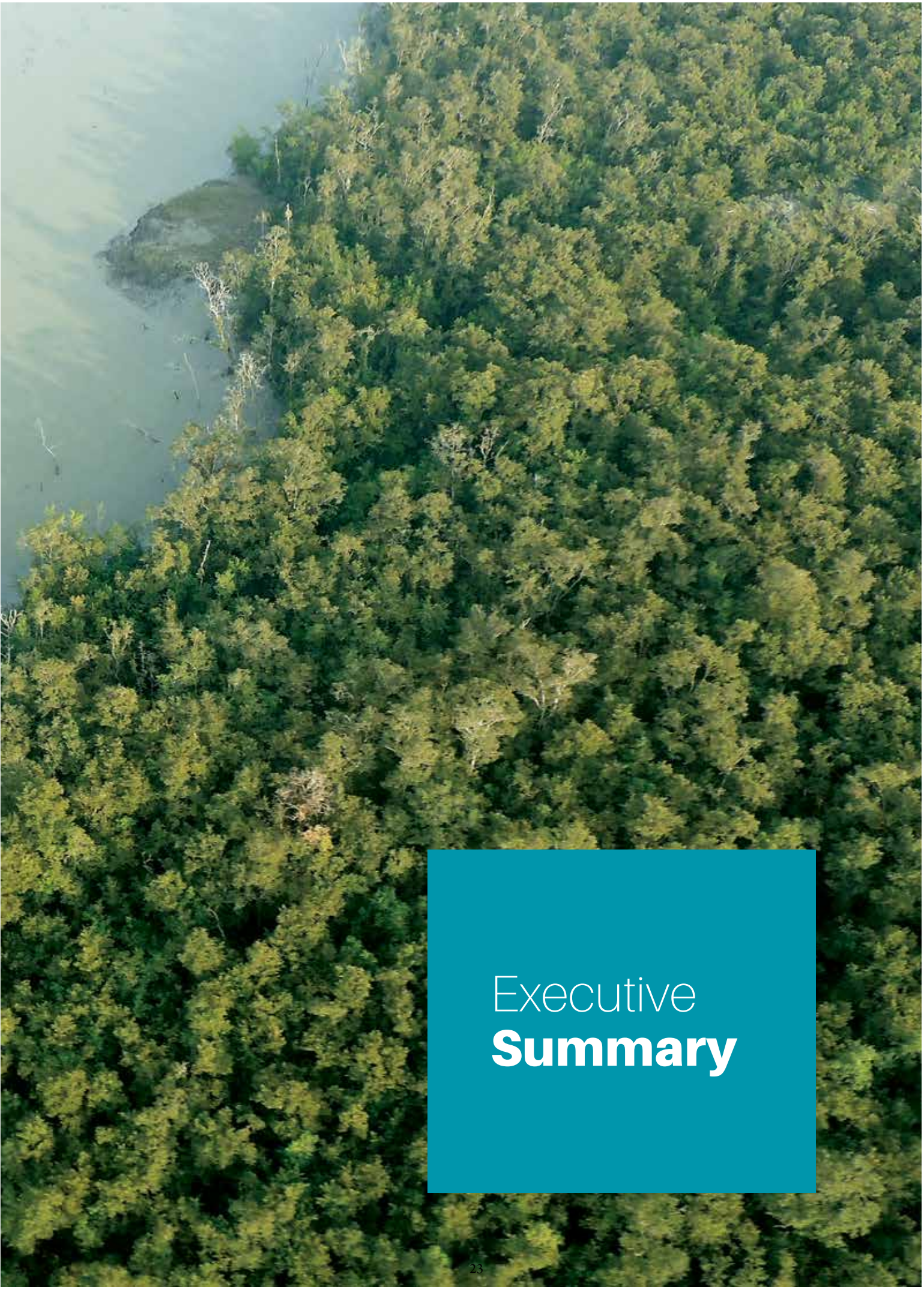
Finally our heartfelt and sincere gratitude goes to Dr. Tapan Kumar Dey, Md. Jahidul Kabir and Mr. Hoq Mahbub Morshed who conceived the idea of updating this action plan and helped in adopting this sub-project.

Authors

Acronyms

ACF	Assistant Conservator of Forests
BCCSAP	Bangladesh Climate Change Strategy and Action Plan
BFD	Bangladesh Forest Department
BNCS	Bangladesh National Conservation Strategy
BTAP	Bangladesh Tiger Action Plan
BWCMP	Bangladesh Wildlife Conservation Master Plan
CBD	Convention on Biological Diversity
CCF	Chief Conservator of Forests
CF	Conservator of Forests
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
DFO	Divisional Forest Officer
ECA	Ecologically Critical Area
FTRT	Forest Tiger Response Team
GIS	Geographic Information System
GoB	Government of Bangladesh
GPS	Geographic Positioning System
MoEF	Ministry of Environment and Forests
NGO	Non-Governmental Organisation
NTFP	Non-timber Forest Product
PA	Protected Area
SDG	Sustainable Development Goal
SMART	Spatial Monitoring and Reporting Tool
TCCC	Tiger Conservation Coordination Committee
TCL	Tiger Conservation Landscape
THC	Tiger-Human Conflict
VTRT	Village Tiger Response Team
WC	Wildlife Centre
WCCU	Wildlife Crime Control Unit
WFL	Wildlife Forensic Laboratory
WNCC	Wildlife and Nature Conservation Circle

Photo credit: Dr. Sandeep Sharma



Executive **Summary**

Executive **Summary**

The tiger (*Panthera tigris*) is the iconic National Animal of Bangladesh. The association and interactions between the tiger and the human is almost as old as human civilisation in Asia. Sitting at the top of the food pyramid tigers require large areas of land to support viable populations, and so act as an umbrella species for securing the future of other species that share their habitat. Furthermore, tiger of the forests provide a range of ecological services vital to our own existence. Tigers are also a valuable part of human culture and a focal point of many tourist's visits to Asia. Equally important is the tiger's intrinsic right to survive irrespective of the needs of mankind.

With only about 3,900 individuals left in the wild, the tiger is severely threatened throughout its range. The mangrove forests of the Sundarbans support a relatively healthy and viable tiger population of about 106 individuals, or 2.7 individuals per 100 sq km of land area, and a few tigers in the Chittagong Hill Tracts bordering India, Myanmar and Bangladesh, therefore, has an opportunity to contribute significantly to the conservation of tigers and to benefit from their continued presence. Tigers, however, are threatened in Bangladesh by:i) direct loss, ii) prey depletion, and iii) habit at loss and degradation. Tigers are directly threatened by poaching to supply the increasing demand for tiger products. In addition, Bangladesh suffers high levels of tiger-human conflict, manifested in human-killing, livestock depredation and ultimately the retribution killing of tigers by affected local communities. Poaching of prey further reduces the capacity of the forest to support tigers, and unsustainable forest use and climate change, coupled with growing pollution and anthropogenic disturbance, threaten to reduce the area

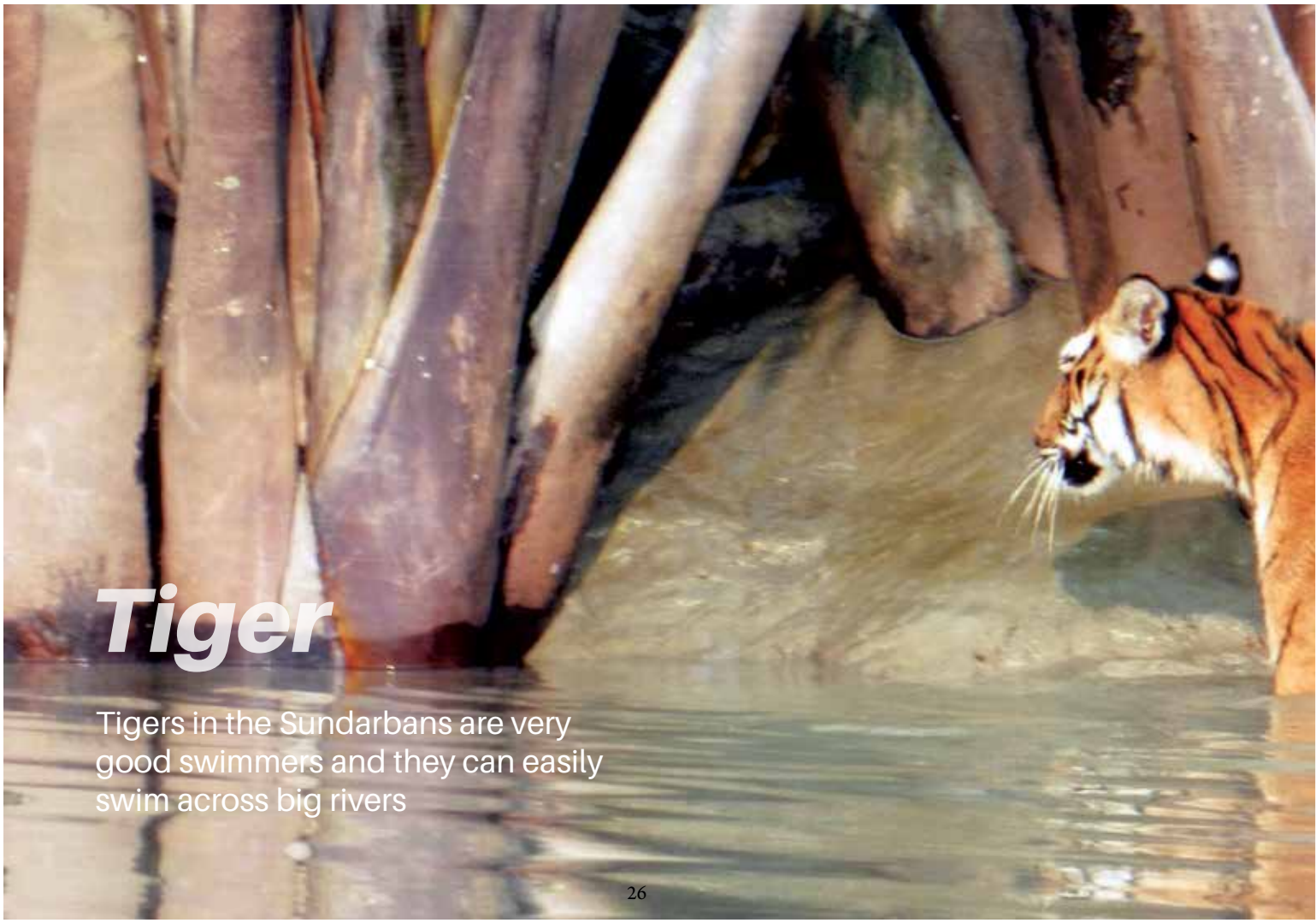
Protected tiger landscapes in Bangladesh. Where wild tigers thrive at optimum carrying capacities so as to perform their ecological role, and which continue to provide essential ecological services to mankind

Executive **Summary**

The implementation of this BTAP will ensure that the nation attempts to sustain the current tiger occupancy in **6,017 sq km** and increase the density in the Sundarbans from the current **2.17** to **4.50** tigers per 100 sq km within the next ten years

in which tigers can live. There are also a range of challenges in successful tiger conservation that need to be dealt with, which are relating to: i) national policy, ii) institutional development, iii) forest protection and law enforcement, iv) education, awareness and community involvement, v) research and monitoring, and vi) collaboration.

The Bangladesh Tiger Action Plan (BTAP) is a policy-level document that offers a structured approach to achieving long-term conservation of tigers in Bangladesh. The first version of BTAP was for the period 2007-2017 and this updated version is for the period 2018-2027. It provides a vision, goals and objectives to guide an integrated and focused tiger conservation programme. The vision is to ensure 'protected tiger landscapes in Bangladesh, where



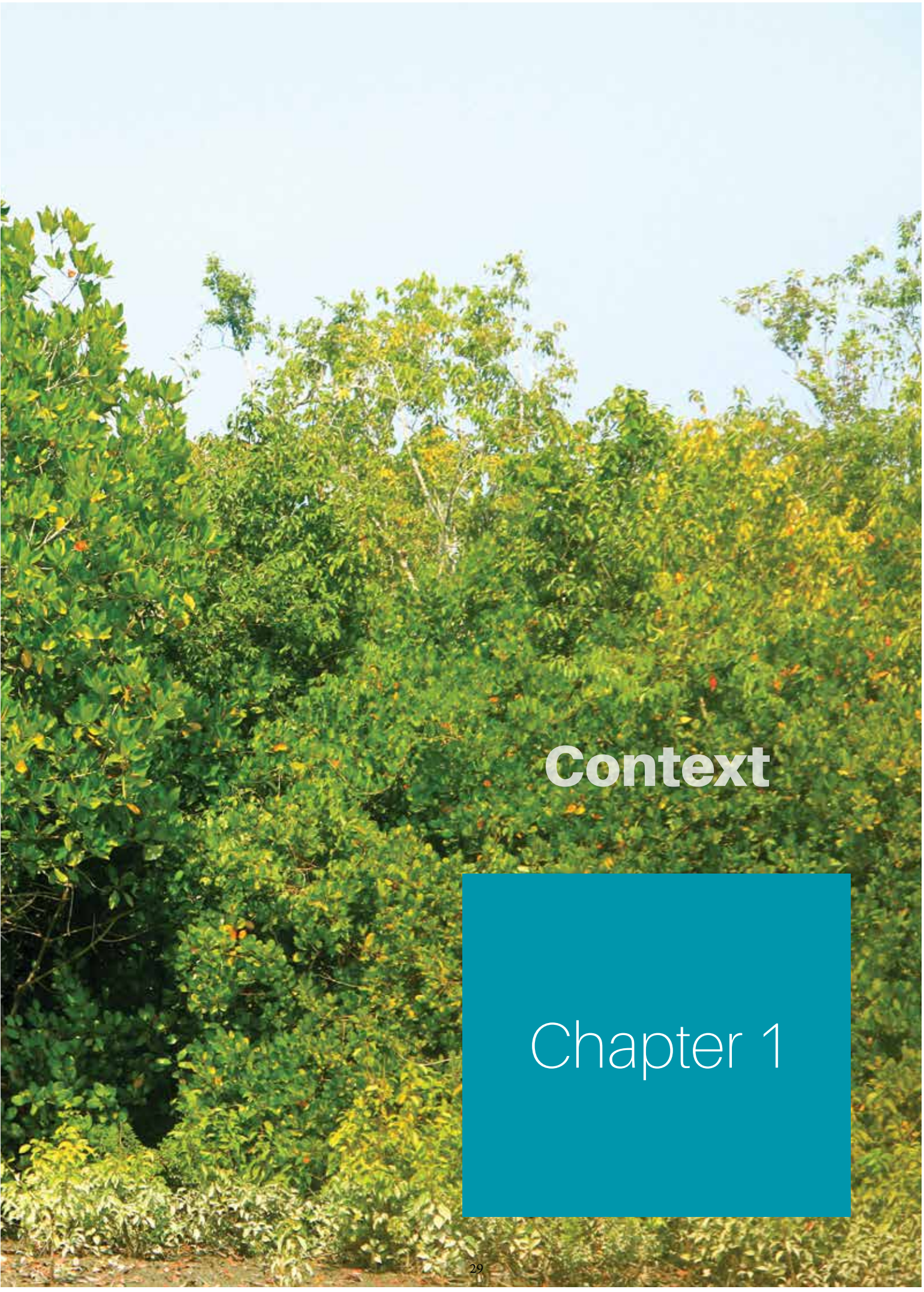
Tiger

Tigers in the Sundarbans are very good swimmers and they can easily swim across big rivers

wild tigers thrive at optimum carrying capacities so as to perform their ecological role, and which continue to provide essential ecological services to mankind'. The main goals to address threats are to increase the current tiger population, maintain sufficient prey and habitat, and ensure a suitable tiger population in the Chittagong Hill Tracts, and to address challenges are to improve conservation capacity, improve law enforcement, build capacity and proper mechanism for awareness and education programmes as well as community involvement, build capacity to conduct tiger conservation research and monitoring, and encourage collaboration.The implementation of this BTAP will ensure that the nation attempts to sustain the current tiger occupancy in over 6,017 sq. km. and increase the density in the Sundarbans from the current 2.17 to 4.50 tigers per 100 sq km within the next ten years, thereby contributing to the GTRP commitments by the country. Systematic monitoring and evaluation of progress against the BTAP goals will be done to enable the adaptation of conservation activities. The Bangladesh Forest Department, under the Ministry of Environment and Forests, is the primary custodian of the forest and its wildlife, but the immense task of tiger conservation necessitates support and expertise outside the normal regime of forest management. Therefore, the establishment of a Bangladesh Forest Department-led platform that facilitates collaboration for the implementation of conservation activities will be fundamental to its success.

Photo credit: Md. Modinul Ansan

Photo credit: Md. Mojmul Ansan



Context

Chapter 1

Chapter 1

Context

1.1 IMPORTANCE AND URGENCY OF TIGER CONSERVATION

The tiger (*Panthera tigris*) is the iconic National Animal and the key natural heritage of Bangladesh. This magnificent creature is admired, feared and respected by humans for its beauty, grace, strength, as well as various supernatural qualities that have been attributed to it (Tamang 1993). As the largest predator, the tiger has been revered as a cultural icon throughout much of its former and present range (Weber and Rabinowitz 1996). The association and interactions between the tiger and the human is almost as old as human civilisation in Asia. The tiger is an integral part of much of the remaining Asian forest ecosystems, which in turn supply the ecological services essential to human existence. As an umbrella species, the tiger can help secure the future of the biodiversity that make up the tiger's forest home (Ahmad *et al*. 2009). As the top predator, the tiger helps to regulate the prey population, which in turn impacts forest structure, composition and regeneration (Ale and Whelan 2008, Wegge *et al*. 2009). Hence the loss of tigers may reduce ecosystem's integrity and ability to adapt to changing environmental conditions. The sheer presence of tiger in a forest attracts a large number of tourists and helps to develop the local economy (Leslie 2001).

Irrespective of their use to mankind, as a product of millions of years of evolution, tigers should also be given the chance to exist in their own right. The disappearance of tigers from the wild as a result of human actions would be unforgivable and a sad reflection on our role as guardians of the natural world. If we cannot save the tiger, this will surely be a signal for the demise of thousands of other species and wild places.

Tigers are categorised as Endangered because there are only about 3,900 individuals left in the wild, and three of the eight subspecies are now extinct (IUCN 2015, WWF 2016). The remaining populations continue to be imperiled by poaching, depletion of their prey, and destruction of their habitat. A summary of tiger status worldwide suggests they are living in only seven percent of their former range (Dinerstein *et al*. 2007). The remaining tiger populations are spread across 13 Asian countries, and often in forests too small and isolated for their long-term persistence. The way forward is to identify landscapes that can support tigers, prioritise them in terms of their contribution to the species' survival, and then protect those areas (Sanderson *et al*. 2006, Carter *et al*. 2015).

In addition to protecting a unique array of biodiversity, saving the Sundarbans will secure essential ecological services such as: i) trapping of sediment and land formation, ii) protection of human lives and habitation from regular cyclones, iii) acting as a nursery for fish and other aquatic life, iv) oxygen production, v) waste recycling, vi) timber production, vii) supply of food and building materials, and viii) carbon cycling (Biswas *et al*. 2007, Islam and Peterson 2008, Haque and Aich 2014). Such services are of global, regional and national importance, and fundamental to the livelihoods of the local people living along the Sundarbans border. Notably, several million people directly depend upon the collection of timber, fuel wood, fibres, fish, shells, wax, honey, and other non-timber forest products (Haque and Aich 2014). This resource extraction feeds both local needs and industry, with the forest producing almost half of the total timber and fuel wood for Bangladesh (Canonizado and Hossain 1998).

According to the BFD records, more than 100,000 tourists visit the Sundarbans every year and the number is, in general, rising (Figure 5). A large proportion of it make day trips to Karamjal, a tourist spot in the northern part of the Sundarbans where tourists can take short walks in the forests and view captive animals such as spotted deer (*Axis axis*), rhesus macaque (*Macaca mulatta*), and estuarine crocodiles (*Crocodylus porosus*). A handful of tour operators also run trips lasting few nights that go deeper into the forests to visit key sites.

Recognising that Asia's most iconic animal faces imminent extinction in the wild, the leaders of the 13 tiger-range countries, together with conservation partners, had gathered in a summit at St. Petersburg, Russia, in 2010, which was the highest level of summit ever organised for tigers. The leaders agreed to strive to double the number of wild tigers across their range by 2022 by doing everything possible to effectively manage, preserve and enhance habitats; work collaboratively to eradicate poaching and illegal trade, engage with indigenous and local communities, explore and mobilise domestic as well as international funding, convene high-level meetings on a regular basis to review the progress, and build tiger conservation awareness by celebrating Global Tiger Day annually on 29 July. The leaders welcome the adoption of the Global Tiger Recovery Program (GTRP) and the National Tiger Recovery Programs (NTRPs). As a party to the GTRP, Bangladesh has produced its NTRP and gradually taking initiatives to strengthen the tiger conservation activities in the country

In 2014, Bangladesh hosted the 2nd Stocktaking Conference to review the implementation of the GTRP. The Conference ended up with Dhaka Recommendations (see annex) on Advancing

Implementation of the GTRP. Building on the pledges of the St. Petersburg Declaration (see annex), the Thimphu Affirmative Nine-Point Action Agenda, which emerged from the 2nd Asian Ministerial Conference on Tiger Conservation, held in Bhutan in 2012, outlines areas to be targeted for intensified efforts by the TRCs and partners. The conference participants agreed on some actions, viz. i) strengthen frontlines, ii) conserve habitat, iii) engage communities, iv) enhance collaboration, v) launch restoration, vi) increase the flow of funds, develop new partnerships with business and industry, vii) build comprehensive awareness and reduce illicit demand, viii) monitor tigers, prey and habitat, ix) monitor GTRP implementation. Adoption and issuance of the Dhaka Recommendations will move us significantly closer to achieving the goal of doubling the number of wild tigers globally by 2022, and ensuring the integrity of tiger conservation landscapes.

In Bangladesh the tiger was once found in all of the forests and even in some village groves. The population and distributional range have been drastically declined due to poaching, prey depletion and habitat loss, and this species has been identified as Critically Endangered (IUCN-Bangladesh 2015) in Bangladesh. At present the only stable population of the tiger is found in the Sundarbans (ca. 6,000 sq km; Figure 1), and the population is isolated from the nearest tiger populations by about 300 km of agricultural and urban land (Figures 2 and 3). According to the latest estimate based on camera-trap survey in the Sundarbans of Bangladesh, the tiger population is estimated at 106 (Dey *et al*. 2015) (Table 1). There are reports of tiger sightings by the hill people in the Chittagong Hill Tracts, but the status is still unknown (Khan 2011, Chakma 2015).

Table 1.Tiger population in the Sundarbans of Bangladesh estimated at different times following different methods. [N.B. Some methods were not scientifically valid.]

Tiger Population	Method	Authority
350	Interviewing	H. Hendrichs 1975
450	Pug-mark study	Bangladesh Forest Dept. and Dept. of Zoology, Univ. of Dhaka, 1982
359	Interviewing	Bangladesh Forest Dept. 1992
362	Pug-mark study	K.M. Tamang 1993
440	Pug-mark study	Bangladesh Forest Dept. 2004
200	Camera-trap survey and carrying capacity (prey density)	M.M.H. Khan 2007
335-500	Telemetry of two females	A.C.D. Barlow 2009
106	Camera-trap survey	Bangladesh Forest Dept. 2015

(Note: this table is given only for information, not to make comparison)

Tiger

Picture captured during camera trapping survey in the Sundarbans, 2014

Photo credit: Forest Department

Tiger summit in St. Petersburg, Russia, 2010

Photo credit: Dr. Mahendra Shrestha

Second Global Tiger Stocktaking Conference in Dhaka, 2014

Photo credit: Forest Department

Unveiling joint tiger status report of Bangladesh and India in Delhi, April 2016

National workshop on updating Bangladesh Tiger Action Plan in Dhaka, November 2016

Photo credit: Dr. Monirul H.Khan

1.2 TIGER DISTRIBUTION AND STATUS IN BANGLADESH

It was mentioned earlier that the tigers were once widespread in Bangladesh and even up to the 1930s they were reportedly present in 11 out of 17 districts (Mitra 1957). However, widespread hunting and forest depletion have reduced the tiger's range and numbers. Now the largest remaining population of tigers is in the Sundarbans, although there are also reports of tigers in the Chittagong Hill Tracts (Khan 1986; Khan 2004, 2011; Reza *et al.* 2004) (Figures 1, 2 and 3). An area of forest near Teknaf was included as a survey landscape by Sanderson et al. (2006), but there have not been any reports of tiger presence there in recent decades (M.M.H. Khan pers. obs.).

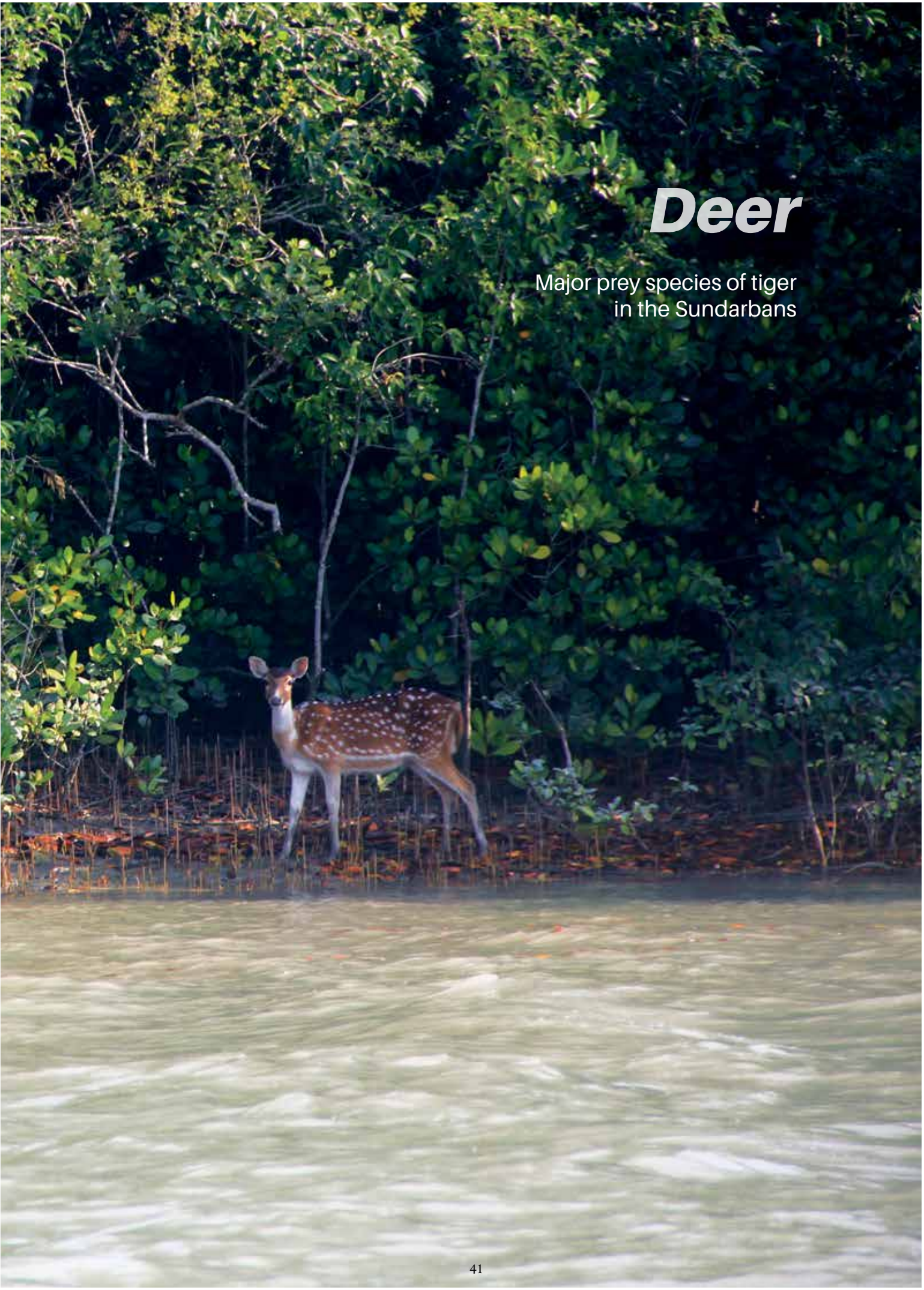
The Sundarbans has been identified as a Class 3 TCL of Global Priority (Sanderson *et al.* 2006),and at approximately 10,000 km^2, the Sundarbans of Bangladesh and India is the largest mangrove forest in the world. This Bangladesh Tiger Action Plan (BTAP) addresses tiger conservation in about 6,000 km^2 of the Bangladesh Sundarbans, referred to hereafter as 'the Sundarbans'. Although some work has been published on tigers of the Sundarbans (e.g. Hendrichs 1975, Seidensticker and Hai 1983, Blower 1985, Khan 1987, Tamang 1993, Bangladesh Forest Department 2004; Khan 2004, 2011, 2012; Reza *et al.* 2004; Khan and Chivers 2007; Barlow et al. 2008; Barlow 2009), relatively little is known about their ecology and status compared to better studied populations in Nepal, India, and Russia (e.g. Smith and McDougal 1991, Carroll and Miquelle 2006, Karanthet al. 2006). Tigers are known to be present through out the Sundarbans, with higher concentrations found in the south and west compared to the north and east (Barlow et al. 2008, Dey *et al.* 2015) (Figure 4). According to the latest estimate based on camera-trap survey covering 26.2% of the tiger occupied habitat in the Sundarbans of Bangladesh, the population is estimated to be 83-130, with a midpoint of 106, or 2.17 tigers per 100 sq km of land area (Dey *et al.* 2015).


Photo credit: Forest Department

Tiger

Tiger in its natural habitat in the Sundarbans of Bangladesh

Photo credit: Md. Modinul Ahsan



Deer

Major prey species of tiger
in the Sundarbans

In the Chittagong Hill Tracts there are reports of tigers in the mixed evergreen hill tract valleys of Kassalong-Sajek and Sangu-Matamuhuri, which are contiguous with forests in India and Myanmar respectively (Khan 2004, 2011; Chakma 2015, S.C. Rahman pers. comm.) (Figure 2). Both of these sites are within an area classified as a Tiger Restoration Landscape, contiguous with the Northern Forest Complex-Namdapha-Royal Manas Global Priority Tiger Conservation Landscape (TCL) (Sanderson *et al.* 2006) (Figure 1). But the status of tigers in the Chittagong Hill Tracts is still unknown and presumably there is a small population with frequent trans-boundary movements of tigers. Therefore, the main focus of this updated BTAP is on the tiger population in the Sundarbans.

Satellite image of the Bangladesh and Indian Sundarbans (dark area)

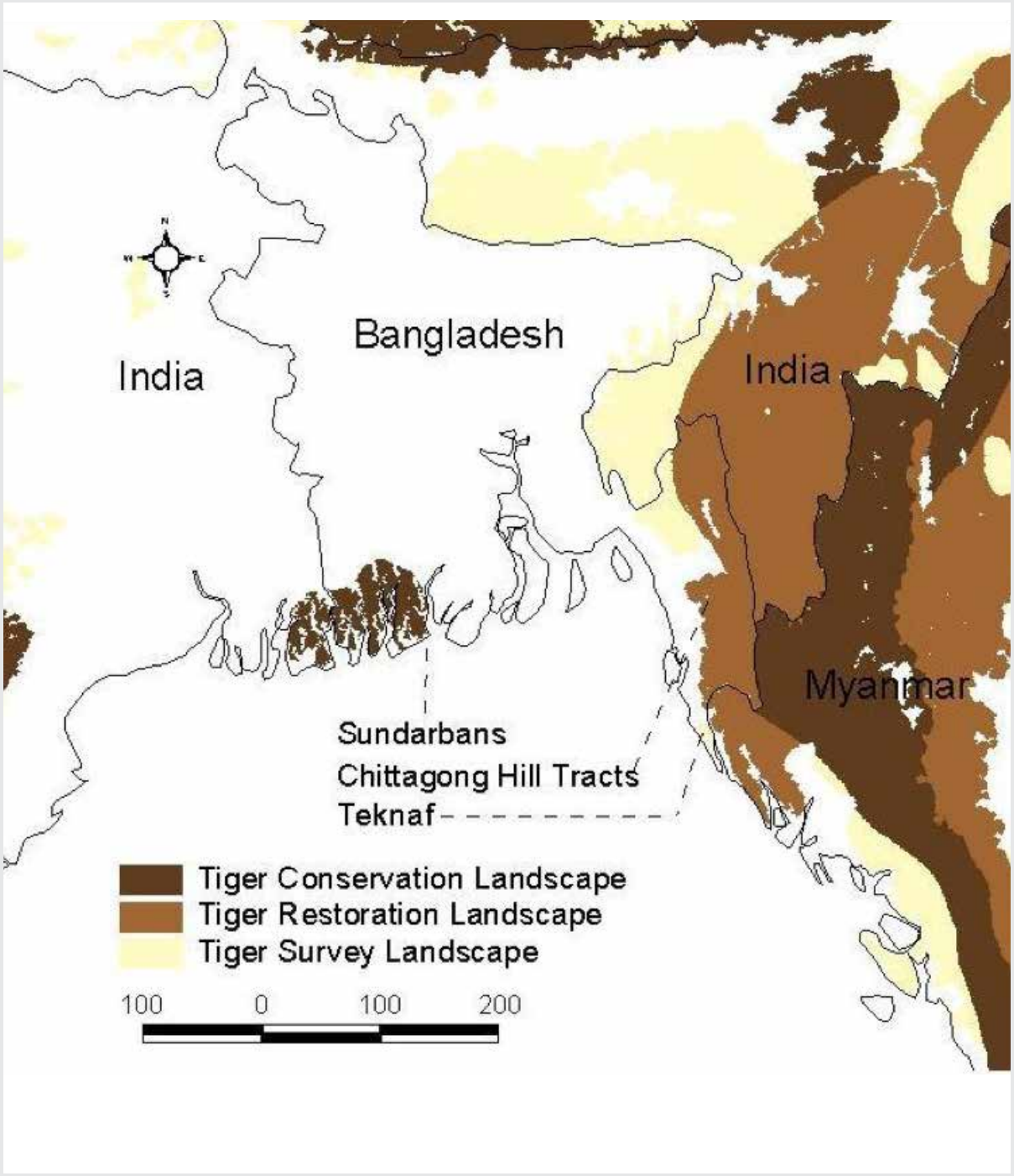


Figure 1.Tiger conservation areas in and around Bangladesh (Sanderson et al. 2006).

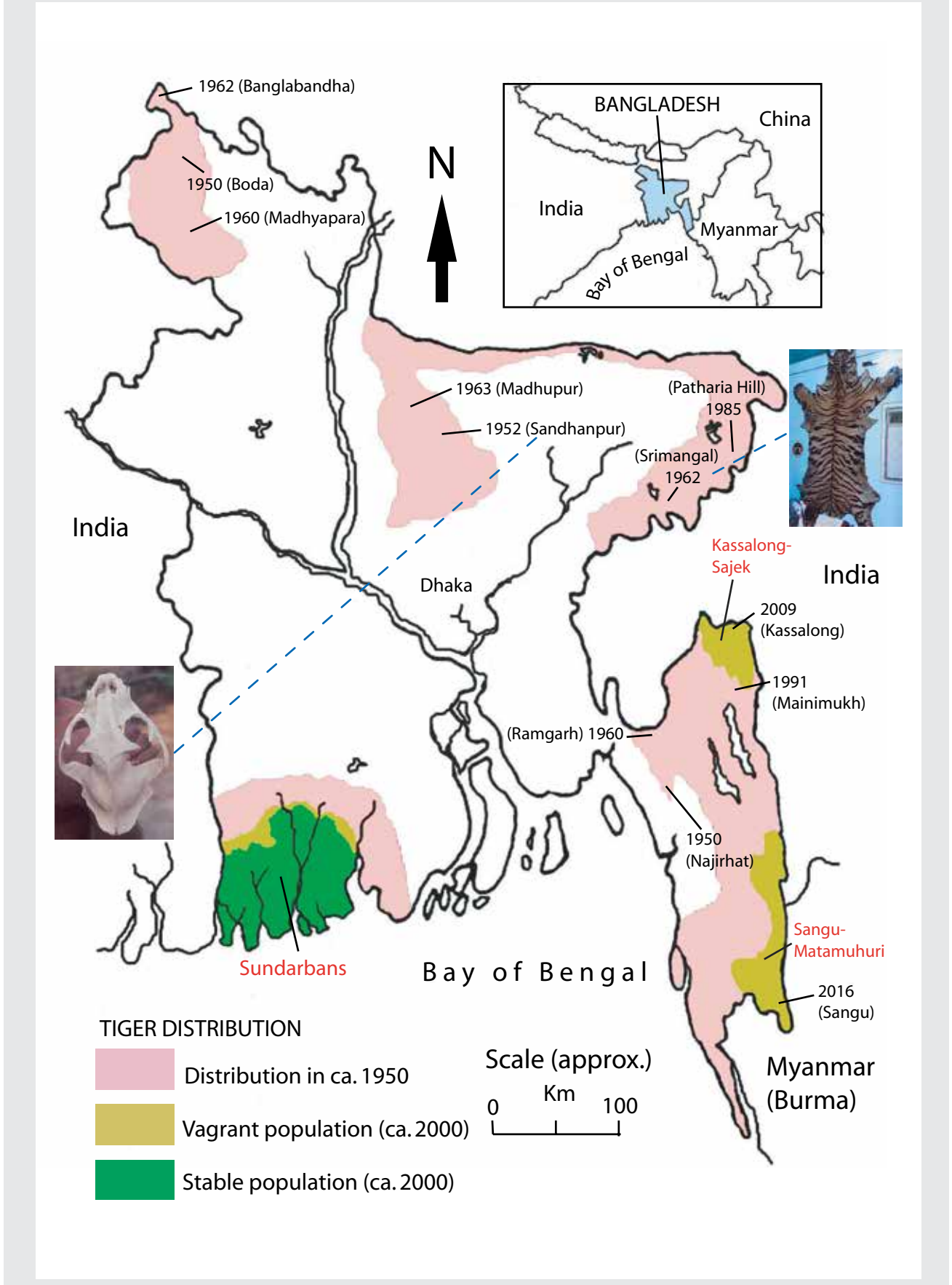
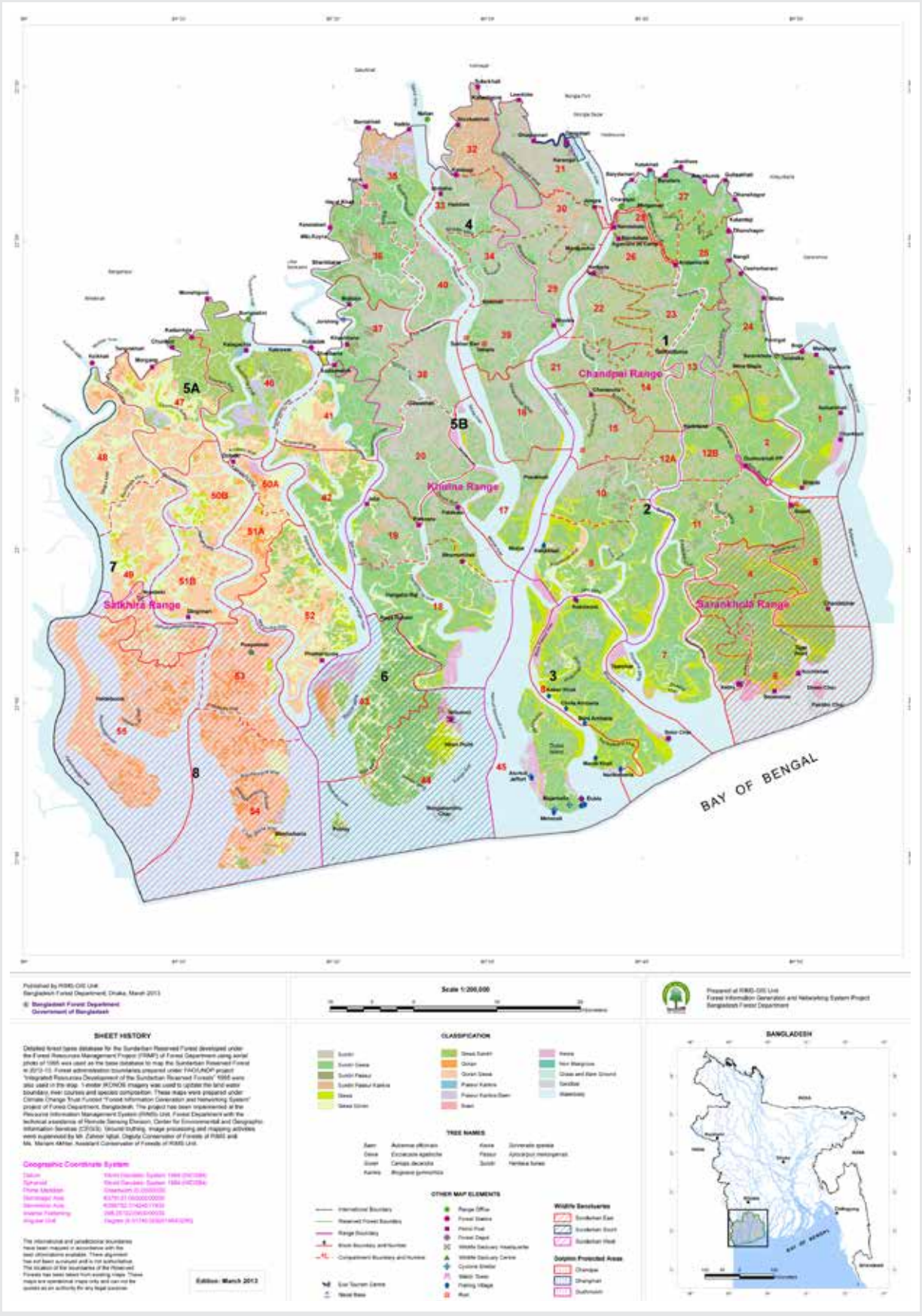
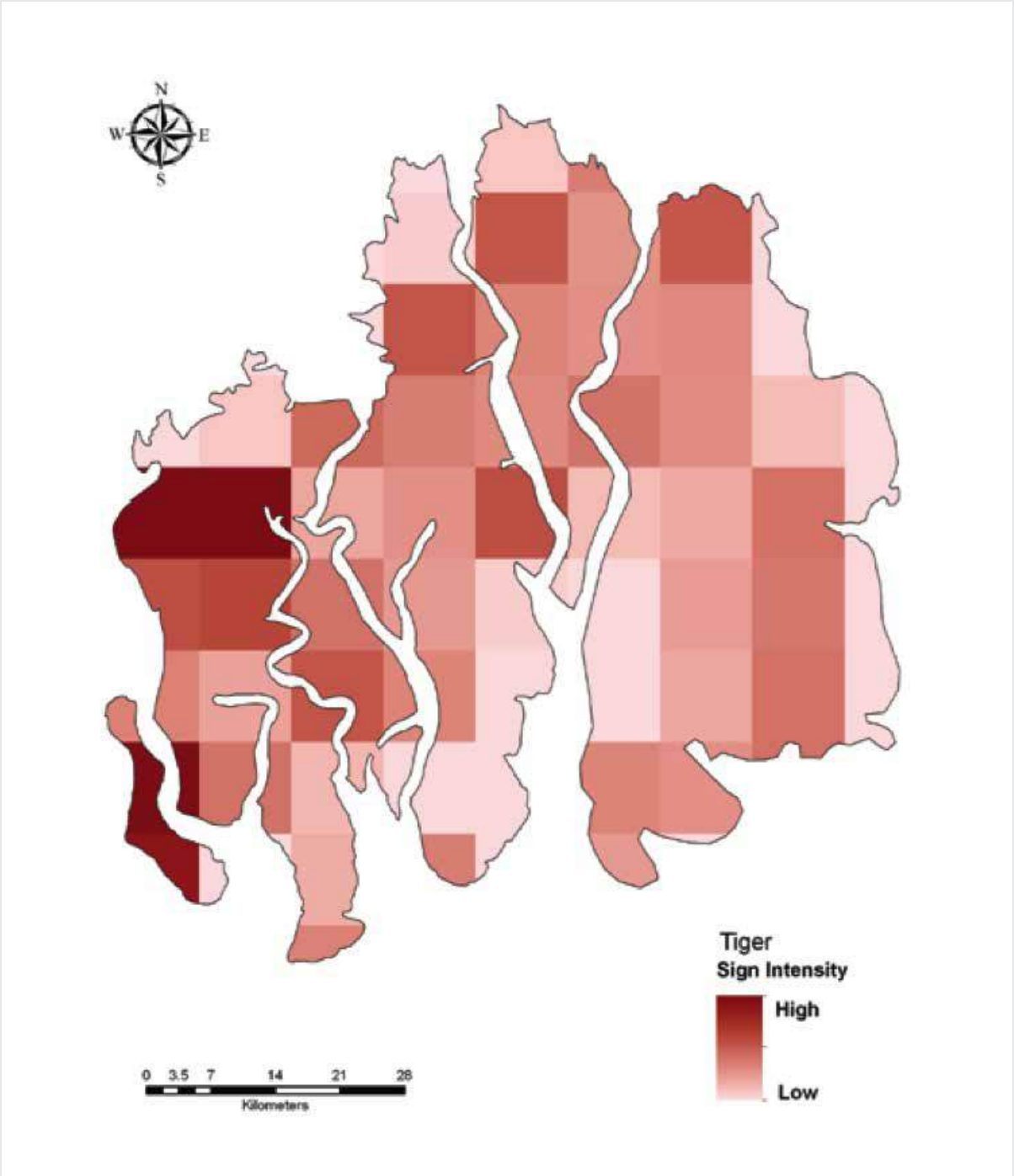


Figure 2. Tiger distribution in Bangladesh in ca. 1950 and ca. 2000 (Khan 2011).



Courtesy: RIMS Unit, BFD

Figure 3.Sundarbans of Bangladesh showing the different vegetation types, Bangladesh Forest Department outposts and three main protected areas (together form the World Heritage Site).



Courtesy: WMNCD, Khulna

Figure 4.Encounter rate of tiger signs across the Sundarbans in 2014-2015 (Dey et al. 2015).

Wild boar

Photo credit: Dr. Sandeep Sharma

1.3 SUNDARBANS ECOSYSTEM AND ITS MANAGEMENT

Bangladesh lies in the vast fertile delta of three of the largest rivers in the world: the Ganges (Padma), the Brahmaputra (Jamuna), and the Meghna. The rate of water flow through Bangladesh's river system is second only to the Amazon river system in South America (IUCN-Bangladesh 2000). The Sundarbans mangrove forest is found at the lower end of the delta where it meets the Bay of Bengal. The Sundarbans continues to be shaped by huge amount of sediment deposited by the rivers and ocean currents, and changes in human land use (Allison *et al.* 2003). The Sundarbans represents nearly half of the remaining forests of Bangladesh and is dominated by halophytic tree species such as sundri (*Heritiera fomes*), gewa (*Excoecaria agallocha*), goran (*Ceriops decandra*), baen (*Avicennia officinalis*), and keora (*Sonneratia apetala*). It is in habited by some 41 mammal, 339 bird, 58 reptile, 10 amphibian and 237 fish species (Hussain *et al.* 2014). The 15 globally threatened wildlife species occur in the Sundarbans are Ganges river dolphin (*Platanista gangetica*), Indo-Pacific finless porpoise (*Neophocaena phocaenoides*), tiger, fishing cat (*Prionailurus viverrinus*), Oriental small-clawed otter (*Amblonyxcinereus*), smooth-coated otter (*Lutrogale perspicillata*), lesser adjutant (*Leptoptilos javanicus*), greater spotted eagle (*Aquila clanga*), Pallas's fish eagle (*Haliaeetus leucoryphus*), white-rumped vulture (*Gyps bengalensis*), spoon-billed sand piper (*Eurynorhynchus pygmeus*), masked

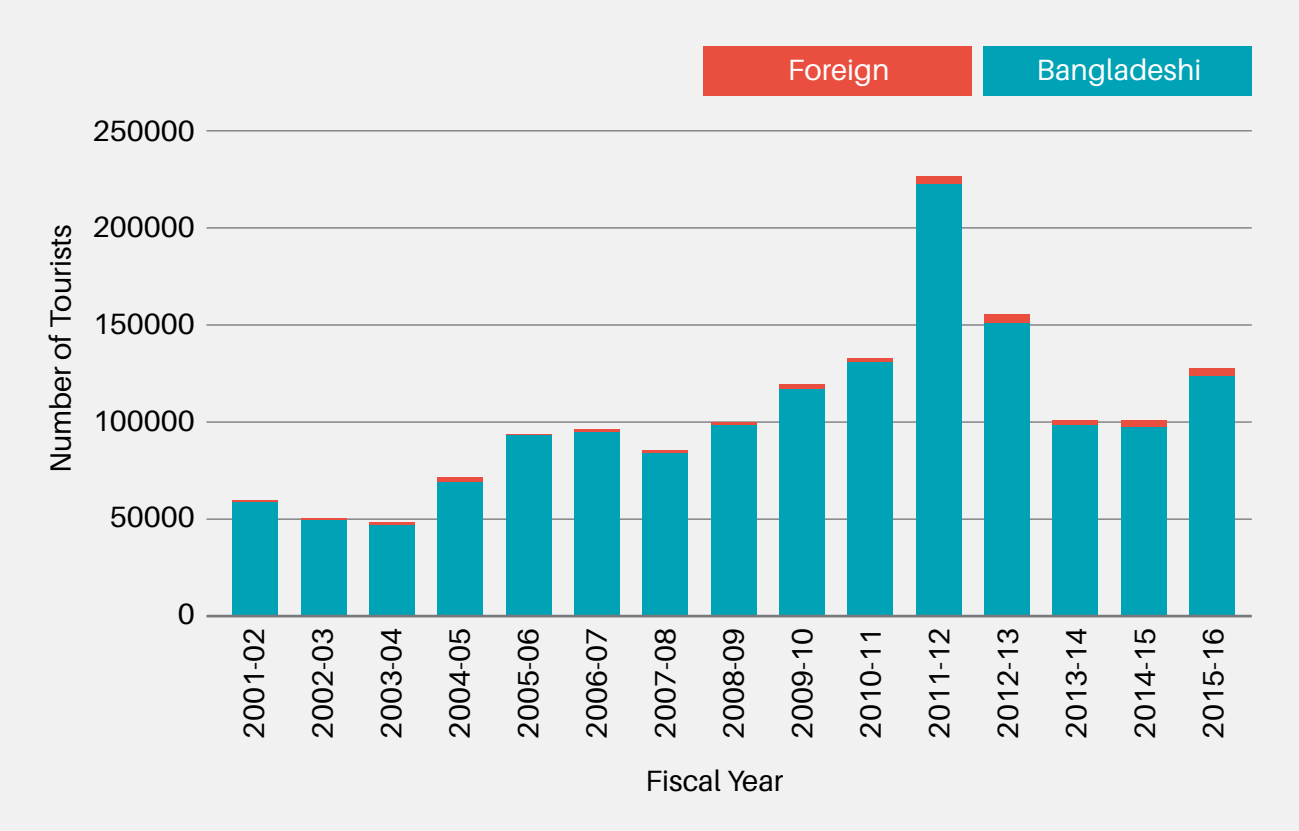


Figure 5.Growing number of Bangladeshi and foreign tourists in the Sundarbans.

finfoot (*Heliopais personata*), olive ridley turtle (*Lepidochelys olivacea*), river terrapin (*Batagur baska*) and king cobra (*Ophiophagush annah*) (M.M.H. Khan pers. obs., Hussain *et al.* 2014). However regulation of resource extraction, tourism, revenue collection and law enforcement is carried out by the Bangladesh Forest Department (BFD), under the Ministry of Environment and Forests. The Sundarbans used to provide 50% of the forestry sector's revenue (Tamang 1993), but following the ban on many natural resource harvest the annual revenue has gone down to BDT 50-70 million (Figure 6). For management purposes, the forest and its waterways have been delineated into four ranges and 55 compartments, guarded by over 90 BFD posts. The Sundarbans is classified as a Reserved Forest, in which some forms of resource extraction are allowed, but it is illegal for anyone to live, cultivate land, or graze livestock in the forest. In order to ensure additional protection for wildlife habitat and natural resources, three areas within the forest have been designated as Wildlife Sanctuaries: Sundarbans West (715 sq. km), Sundarbans South (370 sq. km), and Sundarbans East (312 km^2). These Wildlife Sanctuaries are closed to any extraction of vegetation or wildlife and have been collectively declared a UNESCO World Heritage Site (Figure 7) (Iftekhar and Islam 2004). Moreover, three riverine Wildlife Sanctuaries (Chandpai 5.6 sq. km; Dudhmukhi 1.7 sq. km; and Dhangmari, 3.4 sq. km) have been designated, mainly for the conservation of the Ganges river dolphin (Khan 2014). The border between the Bangladesh and Indian sides of the forest is patrolled by the Border Guard Bangladesh (BGB) servicemen, and the Navy and Coast Guard patrol the coastal waters.

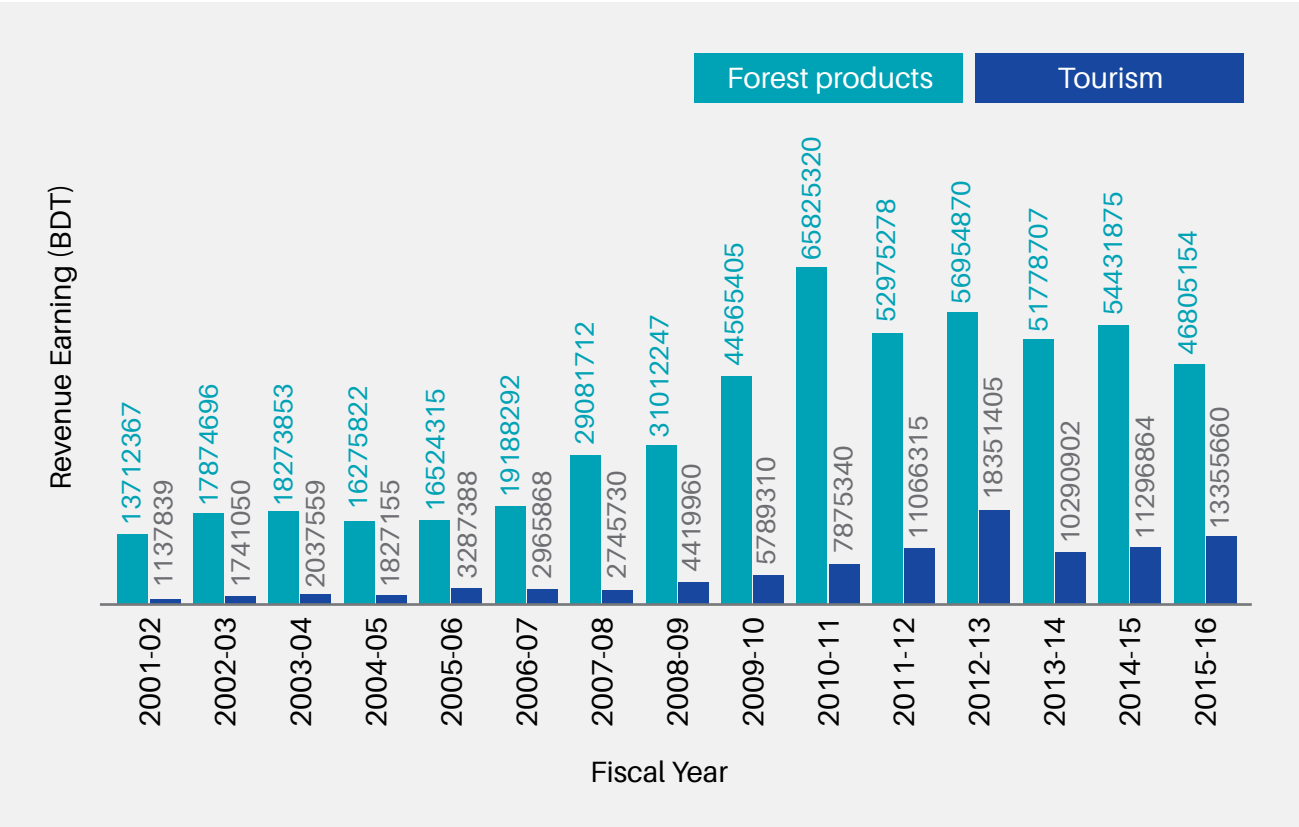
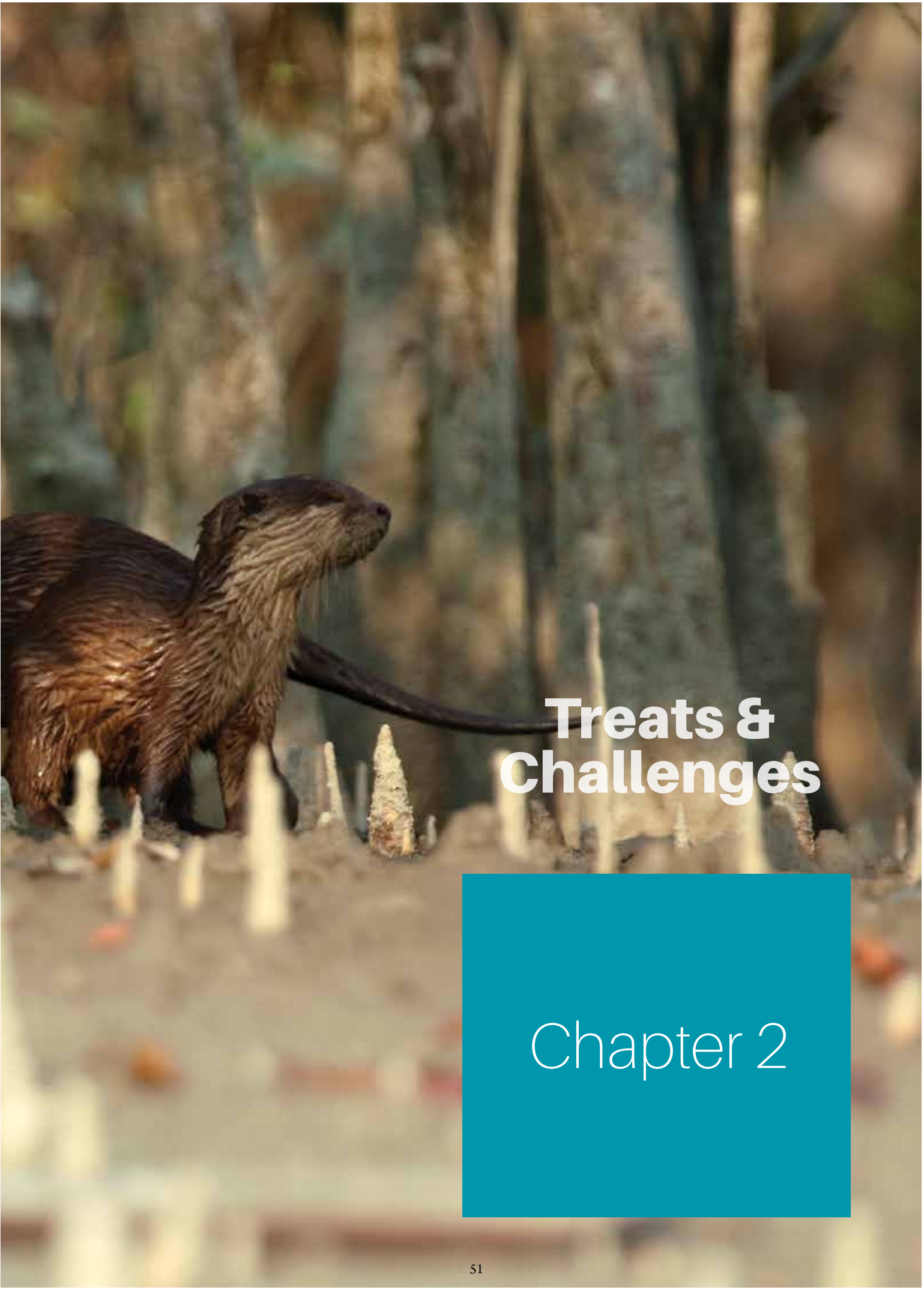


Figure 6.Revenue earning from the Sundarbans.

Otter

Photo credit: Dr. Sandeep Sharma



Treats & Challenges

Chapter 2

Chapter 2

Threats & Challenges

2.1 THREATS

Tigers, their prey and their habitats are all threatened in Bangladesh. This section outlines the current understanding about the nature, scale, and cause of these threats. There is a dearth of information across all threats, so it is inevitable that some are poorly defined and others have yet to be identified. In addition, the inferences regarding causality may be weak because often they are not based on empirical research. Further research and subsequent monitoring of threats are urgently needed so that the threats can be controlled.

2.1.1 Direct Tiger Loss

Tiger poaching and associated trade have potential to decimate a population over a short period of time (Kenny et al. 1995, Chapron *et al*. 2008). Little is known about tiger poaching in Bangladesh (Saif 2016, Saif *et al*. 2016), with cases only being documented from opportunistic arrests or seizures by the authorities. According to the BFD records, at present there are low numbers of poaching incidents reported from the Sundarbans, with up to two incidents each year, but the majority of incidents are unlikely to be detected due to the covert and illegal nature of this activity. Moreover, little is known about the national demand for tiger parts, although a 1997 survey reported substantial trade in tiger skins, teeth, and claws (Nowell 2000). What is known is that there is a high regional demand for tiger products and an established international trade (Nowell 2000, Nowell and Xu 2007), so it is unlikely that Bangladesh will be overlooked as a source of tiger parts, particularly as other tiger populations dwindle. The geographical position of Bangladesh between India and Myanmar, countries that experience rampant poaching, may further increase the vulnerability of tigers in the Sundarbans (Nowell and Xu 2007). The shipping route through the Sundarbans, and the international port in Mongla in the immediate upstream of the Sundarbans, offer easy export of tiger parts to other countries.

According to the TRAFFIC report published in November 2016 (Stoner *et al.* 2016), there were reported 20 seizures of tiger from Bangladesh during 2000-2015, accounting for 2.4% of the total number of seizures in the tiger range countries. The majority of these were for just one commodity type (skin), with only four seizures involving more than one tiger. Overall, an estimated minimum of 41 tigers and a maximum of 55 tigers have been seized in Bangladesh, accounting for 2.2% of the global total. Bangladesh reported the highest number of seizures in 2015, consisting mainly of tiger skins. This is consistent with overall trends, as skin is the most commonly seized commodity in Bangladesh, making up 46% of the total of items seized. Skin was present in 12 of the 20 seizures that took place.

In the villages along the Sundarbans some tigers are killed through retribution killings associated with tiger-human conflict. Records show that up to three tigers are killed each year (Khan 2004, Barlow 2009). These retribution killings are a result of bad feelings towards tigers due to human- or livestock-killing incidents or simply because the tiger is perceived as a threat when it strays into a village (Khan 2004, 2011; Barlow 2009). Large carnivores are generally unpopular with the people that share their range as they are blamed for loss of lives and livestock (Schaller and Crawshaw 1980). Carnivores' protein-rich diet and large home ranges draw them into recurrent competition with humans, who have somewhat similar needs (Treves and Karanth 2003). Tiger-human conflict creates negative attitudes in local communities towards tigers, making achievement of long-term conservation objectives difficult (Madhusudan 2000, Nyhus and Tilson 2004, Sangay and Vernes 2008) (Box 1). There is always the potential for tigers to die from disease, but there has been no research in this area. Furthermore, it is

The Sundarbans

The largest single mangrove forest on earth and the only mangrove forest where wild tigers survive

likely that tigers that die from disease will do so undetected unless the population is subject to intensive study. Captive tigers have died from Avian Influenza, and captive and wild tigers have died from Canine Distemper (Appel and Summers 1995, Myers *et al*. 1997, Keawcharoen *et al*. 2004, Goodrich *et al*. 2005). Feline Immunodeficiency virus is also widespread amongst wild felids and has been found present in tigers (Olmsted *et al*. 1992). Other potential tiger diseases include Feline Chlamydophila, Dirofilaria, Feline Calicivirus, Feline Coronavirus, Feline Leukaemia Virus, Feline Herpes Virus, Feline Parvovirus, Tuberculosis, Pseudo-rabies, Rabies, and Sarcoptic Mange (J. Lewis pers. comm.). Indiscriminate disposal of litter by visitors and release of domestic chicken and goats in the Sundarbans by the local people (in order to please the spirit of the Sundarbans) can serve as the bridge to spread the diseases (M.M.H. Khan pers. obs.). Another potential threat to the isolated Sundarbans population is inbreeding depression, but this may not be a high priority issue considering the relatively large size of the population.

Overall, an estimated minimum of **41** tigers and a maximum of **55** tigers have been seized in Bangladesh, accounting for **2.2%** of the global total. Bangladesh reported the highest number of seizures in 2015

Photo credit: Md. Modinul Ahsan

Tiger skins

Tiger skins seized from poachers
near the Sundarbans

Photo credit: A.N.M. Hossain

Box 1. Tiger-human conflict in the Sundarbans

The Sundarbans suffers the highest level of human-killing by tigers in the world (Khan 2004, 2011; Barlow 2009), and surveys suggest that livestock-killing and retaliatory killings of tigers are also acute problems (Rahman *et al.* 2009, Saif 2016, Saif *et al.* 2016). Based on the official records of 2008-2015, an average of 23 humans were killed by tigers every year (Figure 7), which is much less compared to the historical records (Curtis 1933, Hendrichs 1975). The total number of cases is probably higher than reported because some people who are injured but later succumb to their wounds are not recorded, and some non-permit holders killed might not be reported to the BFD (Jagrata Juba Shangha 2003; Khan 2004, Barlow 2009).It is essential to find solutions to minimise tiger-human conflict in order to reduce the misery inflicted on local communities and secure their support for tiger conservation.

According to the official records, an average of three tigers used to be killed several years ago (Khan 2004, 2011; Barlow 2009), but in recent years (2008-2015) the average number has declined to one per year (Table 2), which might correspond to the decline of tiger population. Moreover, straying of tigers into the villages is a common phenomenon around the Sundarbans (Table 2). If tigers are found in villages or neighbouring fields, they are often killed by the villagers who surround the tiger and beat it to death with sticks. Poisoning, shooting, or snaring may also be used in retribution killings, but the extent or effect of these practices is unknown. This additional source of tiger loss could have a sizeable impact on the long-term viability of the tiger population (Chapron *et al.* 2008; Goodrich *et al.* 2008).

Livestock depredation occurs in many villages along the forest boundary, particularly in the east. Results from surveys suggest that about 80 livestock are killed every year (Rahman *et al.* 2009), but the causes and potential solutions for livestock depredation have yet to be identified.

The first steps to reduce the conflict are being piloted by the BFD and partners in the forms of Village Tiger Response Teams (VTRTs) and Forest Tiger Response Teams (FTRTs). The village-based response teams are being formed in the bordering village are as to deal with stray tigers and monitor livestock killing. The teams are reached through a Tiger Hotline number publicised in BFD posts and villages (Green wood 2009). Moreover, packs of domestic dogs controlled by leashes by their handlers, together with some additional people with sticks, were found effective in driving the stray tigers from the village to the forest (Khan 2008). The forest-based response teams are boat-based teams to tackle human-killing inside the forest by providing medical assistance, transporting victims, retrieving bodies, and patrolling areas where human-killers are active. Moreover, the compensation scheme for death and injury from tiger and crocodile attacks, launched in 2010, has started to contribute to reducing the conflict and changing hostile behaviour of the local people towards the tiger and other wildlife. Under this programme BDT 1,00,000 per victim is paid in case of death and BDT 50,000 per victim is paid in case of injury. During 2011-2016, the Sundarbans

East Forest Division has paid BDT 1,50,000 for two victims of tiger and BDT 4,00,000 for four victims of crocodile, whereas the Sundarbans West Forest Division has paid BDT 46,00,000 for 51 victims of tiger. Some good practices from the Indian side of the Sundarbans could also be tried, e.g. the use of fishing net fences along the village-forest interface, which have reduced the incidence to tiger straying into villages with fences by almost 90%.

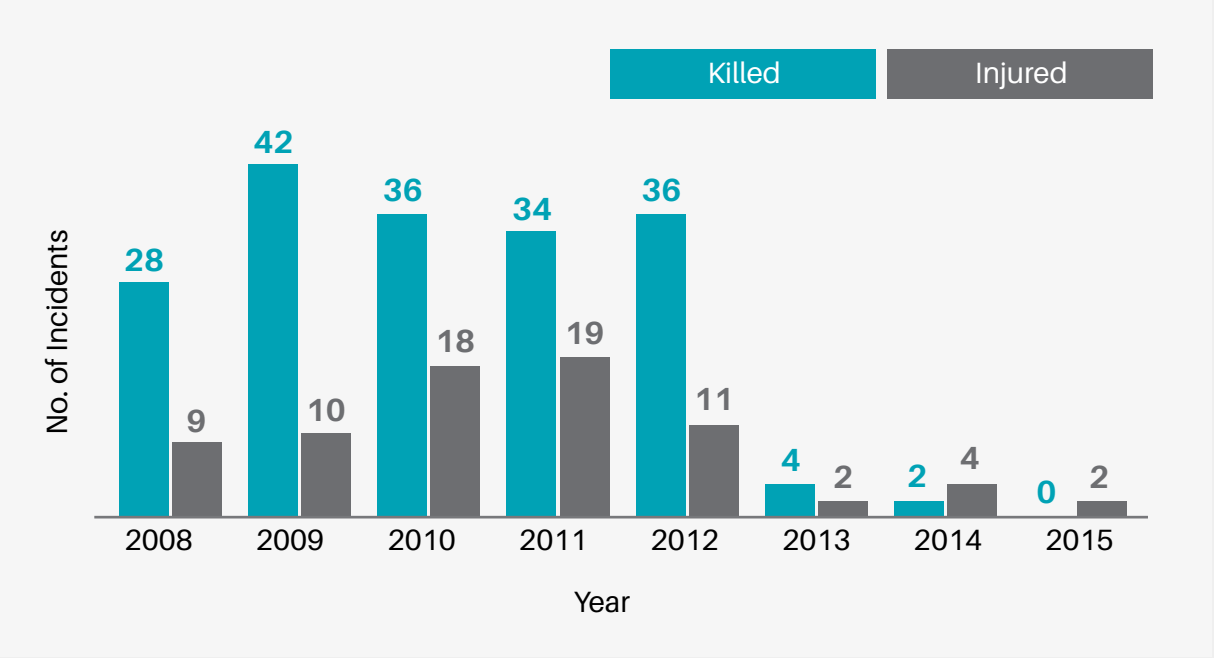


Figure 7. Official number of people killed and injured by tigers in and around the Sundarbans.

Table 2. Official number of tigers killed and injured by people in and around the Sundarbans, and tigers strayed into the villages around the Sundarbans

Year	Killed	Injured	Strayed
2008	1	0	0
2009	2	0	4
2010	2	0	14
2011	1	0	2
2012	2	0	73
2013	0	0	16
2014	0	1	5
2015	0	0	6

2.1.2 Prey depletion

The number of tigers that an area can support is largely dependent upon the number of suitable prey. Tiger and prey numbers show strong positive correlation in any undisturbed area and, as a thumb rule, the large prey density should be at least 500 times higher than the tiger density to sufficiently sustain the tiger population (Schaller 1967, Smith et al. 1987, Karanth *et al.* 2004, Khan 2011). The main prey for tigers in the Sundarbans is spotted deer (*Axis axis*) and to a lesser extent wild boar (*Sus scrofa*) (Reza *et al.* 2001, Khan 2004). Barking deer (*Muntiacus muntjak*) is also present in low numbers, and may fall prey to tiger (Khan 2004). Earlier studies reported a more diverse range of prey species including swamp deer (*Cervus duvauceli*), hog deer (*Axis porcinus*), and wild water buffalo (*Bubalus bubalis*), but these are no longer present in the Sundarbans (Curtis 1933, Seidensticker and Hai 1983, Blower 1985).

Prey depletion is a serious threat to any tiger population and there are signs that it is occurring in the Sundarbans, with snaring apparently the most common practice (Jagrata Juba Shangha 2003). This technique can also kill non-target species such as tigers. Preliminary investigations suggest that many forest users poach deer as a secondary activity to support their own food requirements while working in the forest, and to supply friends and family when they return to their communities (Mohsanin *et.al.* 2012. data). The nature and scale of specialist poaching efforts are unknown, but the market for wild meat consumption is thought to be largely local (Khan 2004).

Prey could also be depleted through disease introduced by domestic animals; in some northern parts of the forest, deer share habitat with cows and goats which graze illegally inside the forest (*Rahman unpubl.* data). No research has been carried out to understand disease occurrence in the prey population. Disease can also spread through the domestic chicken and goats that are released in the Sundarbans for spiritual reason (i.e. to please Gazi) (M.M.H. Khan pers. comm.).

2.1.3 Habitat loss and degradation

Habitat loss and degradation imperil tigers by reducing, thinning, and fragmenting the area in which they can live and reproduce. The Sundarbans shares many threats to habitat in common with other tiger habitats, but also has a variety of factors unique to the socio-political landscape in which it is embedded and the particular dynamics of a mangrove ecosystem (Seidensticker and Hai 1983).

The Sundarbans is approximately half the size it was 200 years ago, because the colonial rulers had decided to clear a large portion of the mangroves in order to expand the agricultural lands (Curtis 1933; Biswas *et al.* 2008, Khan 2011). However, despite being situated in the most densely populated country in the world, the current boundaries of the forest have been maintained since the early 1900s (Curtis 1933, Iftekhar and Islam 2004, Biswas *et al.* 2008). Studies suggest that coverage and density of larger diameter trees, canopy closure, and diversity have declined over the last 100 years or so (Canonizado and Hossain 1998, Iftekhar and Islam 2004, Iftekhar and Saenger 2007). However, the amount and rate of change is unclear as the studies have been based on past forest inventories

which used a variety of methodologies, making comparisons to assess long term change over time problematic (Iftekhar and Saenger 2007).

There are a number of potential threats to the Sundarbans, perhaps the most immediate of which is the illegal exploitation of natural resources (Hossain *et al.* 2016). The burgeoning population along the Sundarbans periphery have few alternative livelihood options and have little choice but to depend upon the forest for their survival; thousands of people enter the forest on a daily basis to harvest the natural resources of the Sundarbans. The most economically valuable wood species is Sundri, a hardwood generally used for building houses, making boats, anchor posts and fuelwood (Canonizado and Hossain 1998). The legal harvest of Sundri has been suspended since 1990 due to declining stock, but some illegal felling continues (Canonizado and Hossain 1998). Gewa is the second most valuable timber species. It was cut for paper production in government owned newspaper mill until their closure in the early 2000s when that became a losing concern. Gewa continues to be used for building materials, out rigging for boats, fishing materials, and fuelwood (Canonizado and Hossain 1998). Goran trees are cut extensively for fuelwood, used by local communities and industries such as brick manufacturing. Goran bark is rich in tannins which are used to preserve fishing nets and sails. Other tree species are Keora, Kankra (Bruguiera spp.), Baen, Dhundal (*Xylocarpus granatum*), passur (*Xylocarpus mekongensis*), and singra (*Cynometra ramiflora*), which are used as substitutes for sundry and gewa. Golpatta palm (*Nypa fructicans*) and sungrass (Imperata sp.) are also collected for thatching materials (Canonizado and Hossain 1998). Honey and wax are collected by specialist teams of honey hunters hired by businessmen who then sell the products in the market. Fishermen also enter the mangroves to gather fish, crabs, and other marine life. The BFD licenses fishing and maintains records of this activity, but there is no scientific monitoring or management of fish stocks (Canonizado and Hossain 1998).

The impact of current extraction levels on the overall ecosystem has not been quantified, but short term studies undertaken in the 1980s and 1990s suggest this may be the main cause of the mangrove's continued degradation (Iftekhar and Islam 2004). The Integrated Forest Management Plan for the Sundarbans Reserved Forest compared the inventories carried out in 1959, 1983 and 1996, highlighted a rapid decline in Sundri and Gewa growing stock, and prescribed immediate regulatory measures and a strict 20 year felling schedule (1998-2018) to ensure sustainable extraction (Canonizado and Hossain 1998). However, the lack of resources for forest protection together with demand from expanding communities and industry undermine the regulation of harvesting levels. Sustainable resource extraction will, therefore, only be realised through improved forest protection, alternative livelihoods and alternative sources of essential forest products.

There is no human habitation permitted inside the forest other than BFD, coast guard, and navy camps. Infrastructure within the forest is generally limited to the buildings of these camps and some tourist facilities such as walkways and watch towers. However, there are some semi-permanent fishing communities operating at the southern edge of the forest. These fishermen use forest materials for fuelwood and in the constructions of their jetties, shelters, and fish drying beds (Canonizado

and Hossain 1998). The impact of these encampments on the forest, tigers, and prey has not yet been quantified. Some forest areas close to the villages in the north and north east appear to be degraded from local wood collection, and there is also illegal grazing of domestic livestock which could reduce the available food for prey (Rahman *et al*. 2009).

Other threats are more difficult to quantify or even identify because their effects are less visible and might only be measurable over the long-term, and they may originate outside the forest. For example, there is little information about the presence of disease and its potential impact on the forest. There are some studies on a condition known as 'Top Dying' in sundri trees, but its impact and causes are not clearly understood (Canonizado and Hossain 1998,Iftekhar and Islam 2004). The type and distribution of invasive species has been investigated; 23 invasive plants were identified and the rate of invasion was notably higher near river banks and some areas close to human habitation (Biswas *et al*. 2007). This 2007 study concluded that, whilst control of invasive species is only successful if undertaken before the plants become well-established, invasive species in the Sundarbans were still at a manageable level due to the ecosystem constraints. However, monitoring and management intervention activities are not in place, and the impact on tiger and prey habitat is not fully understood.

Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss

Pollution of the rivers from industrial, shipping, tourism, urban, agricultural, and aquaculture sources may be damaging the Sundarbans. However, except for preliminary identification of some toxins, little work has been published on the extent and impact of pollution (Hussain 2014). The increase of ship and cargo vessel navigation through the Sundarbans pose accidental damage risk, particularly if those are loaded with toxic chemicals. The industrialisation along the northern boundary of the Sundarbans is causing the increase of pollution in the Sundarbans. Large-scale mineral and gas exploration and extraction has not been carried out so far in the Sundarbans, and its potential impact on the ecosystem, in terms of pollution and habitat destruction, has not been assessed.

Sea-level rise caused by climate change has been noted as a serious threat to habitats in the Sundarbans, with current predictions suggesting substantial land loss from increased inundation over the next 50 years (Agrawala *et al*. 2003). These predictions do not take into account the changes in compensatory factors such as sedimentation rate and mangrove adaptation (Stanley and Hait 2000, Allison *et al*. 2003); the coastal areas of Bangladesh are currently growing by about 20 km^2 per year (Inman 2009), and mangroves in other areas are known to have flourished despite sea-level rises of at least 3.8 mm a year (Hendry and Digerfeldt 1989). Although improved understanding of this issue is required, some current estimates of sea-level rise are over 1 m by 2100 (Hansen 2007, Rahmstorf 2007, Pfeffer et al. 2008), so it is prudent to go for mitigation solutions following the Bangladesh Climate Change Strategy and Action Plan (BCCSAP), 2008.

Tropical cyclones are a regular occurrence in the region with approximately one cyclone per year hitting Bangladesh (Islam and Peterson 2008). Climate change is expected to increase cyclone frequency, which may be an additional source of stress to the forest. On the contrary, the forest may be one of the best methods of protecting the coastline of Bangladesh from the effects of climate change, and expansion of the coastal greenbelt through mangrove afforestation is a component of the BCCSAP of 2008. Freshwater flow into the Sundarbans may also be affected by climate change-induced alterations in rainfall and melting of Himalayan snows (Agrawala *et al*. 2003; BCCSAP, 2008). Dry season freshwater flows have fallen due to extraction of water from the upper reaches of the Ganges for irrigation, navigation and industry. The building of the Farakka barrage in 1975, for example, has been directly linked to the reduction of freshwater flow into Bangladesh and the Sundarbans (Iftekhar and Islam 2004). Embankments and diversion of water for irrigation within Bangladesh also reduce freshwater flows. The combined impact of increased inundation from the sea and decreased freshwater flow may increase salinity levels, particularly in the dry season, which could change vegetation patterns (Agrawala 2003), and thus effect the distribution of tigers and prey.

2.2 CHALLENGES

An effective tiger conservation effort is challenging and complex, requiring a holistic approach that can be swiftly adapted to changing conditions and the emergence of new information. Carrying out such an approach will require a substantial increase in capacity to develop and carry out conservation activities. Capacity requirements can be grouped into five areas: institutional development and policy, forest protection and law enforcement, education and awareness, research and monitoring, and collaboration. This section outlines the current state of each area with suggestions for improvements.

2.2.1 National policy

Whilst the importance of the Sundarbans and its tigers is recognised, their conservation needs to be integrated into the GoB development agenda to ensure complimentary policy and action. Implementation of BTAP will contribute to the implementation of the Bangladesh National Conservation Strategy (BNCS, 2016), National Biodiversity Strategy and Action Plan (NBSAP, 2016), and the Sustainable Development Goals (particularly the SDG 15) by the year 2030.

The SDG 15 is 'Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss', which is directly linked with the BNCS and BTAP. In Bangladesh the biodiversity is key to human lives and livelihoods, because a large proportion of the population depend on natural resources for their survival. The overall goal of the BNCS is to ensure the conservation of the country's resources of all sectors, and ensure the sustainable and equitable use of the resources in order to ensure the sustainable socio-economic development. As a party to the Convention on Biological Diversity (CBD), Bangladesh is committed to achieve the five strategic goals of Aichi Biodiversity Targets during 2011-2020, which can be achieved by implementing BNCS and BTAP. Notably, Article 13 of the CBD calls for each Contracting Party *'to promote and encourage understanding of the importance of, and the measures required for, the conservation of biological diversity, as well as its propagation through media, and the inclusion of these topics in the education programmes ….'*. Bangladesh has the obligation to address Article 13 and other relevant Articles of the CBD by producing the necessary strategy and policy documents, and implementing them. Therefore, Bangladesh produced the first version of the NBSAP in 2006, which was updated in 2016. Since the tiger and the Sundarbans are the key natural resources of Bangladesh of global renown, implementation of BTAP will ensure the implementation of a major part of the NBSAP.

The first-ever national master plan for wildlife conservation, i.e. Bangladesh Wildlife Conservation Master Plan (BWCMP) 2015-2035 has produced in 2015, which will guide the future conservation of wildlife, including the tiger, for the next 20 years. The vision and strategies of this plan are based on an analysis of the key values of the country's wildlife and its threats. It elaborates the broad, long-term strategies of the key plans and strategies prepared, such as the National Biodiversity Strategy and Action Plan and Bangladesh Tiger Action Plan. The overall goal of the BWMP is to ensure the

sustainable conservation of the wildlife of Bangladesh as an asset for the benefit of the current and future generations. The specific objective is to realise essential conditions for sustainable wildlife management in Bangladesh. The objectives are operationalised in 12 priority intervention areas matching the policy guidelines of the conservation policy, which are: i) species programmes, ii) habitat management, iii) ecological network, iv) land use planning, v) protected area management, vi) institutional development and capacity building, vii) policy and legal framework development, viii) international and regional cooperation, ix) supporting communities in wildlife zones, x) nature based tourism development, xi) communication, awareness and education, xii) wildlife research.

An economic assessment of the Sundarbans ecosystem services, together with identification of conservation-friendly revenue generation schemes, is also needed, which would help to mainstream Sundarbans and tiger conservation into development policy and action. Raising cross-ministry and national awareness of the importance of the Sundarbans and its tigers is needed to further garner the political support for development and integration of a tiger-friendly policy.

2.2.2 Institutional development

The BFD is the primary custodian of wildlife and forests for the entire country, and in recent years is strengthening its commitment to biodiversity conservation. The BFD was formed in 1864 during the colonial period and is responsible for the management of the Sundarbans and all other forests in Bangladesh. It has a number of territorial divisions that are responsible for the prevention of illegal activities, regulation of legal extraction, permit issuance and revenue collection. Within the BFD a Wildlife and Nature Conservation Circle (WNCC) was formed in 2001, which established dedicated posts to safeguard wildlife, primarily in the protected areas (Mitchell et al. 2004). The WNCC does not yet have sufficient institutional presence or resources to fully carry out its intended role. In the Sundarbans the territorial DFOs, rather than WNCC staff, currently administer both the reserved forest and the wildlife sanctuary areas. Furthermore, staff are regularly transferred between wildlife and territorial posts and also between forests, hampering the development of wildlife or ecosystem conservation specialists. Indeed, the majority of BFD staff have forestry-related backgrounds so additional biodiversity conservation skills across all staff could be developed. Retaining staff within the WNCC would enable those personnel with interest and experience on wildlife and conservation, and to receive specialised training. In addition to protected area management, responsibilities of the WNCC should extend to wildlife monitoring, wildlife crime investigation and human-wildlife conflict mitigation. A large number of wildlife is found outside the protected areas, and WNCC staff would therefore need appropriate resources and jurisdiction. For example, high densities of tigers, tiger-human conflict incidents and wildlife crimes are found outside the three wildlife sanctuaries of the Sundarbans. Specialists could also be retained in specific forests, for example, tiger and mangrove specialists in the Sundarbans.

BOX 2

Box 2. Legislation, conventions and national policies related to tiger conservation

a. National legislation

- The Bangladesh Government has given highest priority in the conservation of natural resources of Bangladesh including wildlife by the 15th Amendment (in 2012) of her constitution (http://bdlaws.minlaw.gov.bd) under the title "Protection and improvement of environment and biodiversity".

  According to the Section 18 A of Bangladesh Constitution: ***The State shall endeavour to protect and improve the environment and to preserve and safeguard the natural resources, bio-diversity, wetlands, forests and wild life for the present and future citizens.***

- ***Forest Act, 1927 (Amended in 2000):*** This Act makes provision for reserved forests; it prohibitsthe carrying of guns, grazing of cattle, felling of any tree, removal of any forest produce, and setting fire to and clearing of land for cultivation or any other purpose.
- ***Bangladesh Wildlife (Preservation) (Amendment) Act, 1974, and Wildlife (Conservation and Security) Act, 2012 and Bangladesh Wildlife Order, 1973:*** The tiger and the spotted deer are defined as 'protected animals' in Schedule 3 of the Order 1973. The Order was refined and enacted as Act in 1974. The three Sundarbans wildlife sanctuaries were set up under this Act. In 2012, the new Act replaced the previous one and retained tiger and spotted deer as protected species under Schedule, and also increased imprisonment and fine for killing tigers.
- ***The Bangladesh Environment Conservation Act, 1995:*** This deals with cases of environmental degradation. In 1999 under the 1995 Act, Bangladesh declared the 10 km of land adjoining the Sundarbans as an Ecologically Critical Area (ECA). The ECA rules prohibit a number of activities from damaging natural trees, animals and fish, and to establishing factories that pollute soil, water and air. However, this area was already converted to agriculture and aquaculture, and heavily populated before the ECA was declared. Moreover, there are instances of establishing factories within the ECA.

BOX 2

Box 2. Legislation, conventions and national policies related to tiger conservation

b. International conventions

- ***Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES):*** The trade of tiger parts is prohibited under Appendix I of the CITES. Bangladesh acceded to CITES in 1982.
- ***Convention on Biological Diversity (CBD):*** Signed by Bangladesh in 1992, the objective of this treaty is the conservation of biodiversity which is identified as being essential to socio-economic development. This BTAP will contribute to meeting such obligations through its aim to secure the future of the Sundarbans and its tigers.
- ***Ramsar Convention:*** The Sundarbans has been designated as a Wetland of International Importance under this convention, which Bangladesh ratified in 1992. The Ramsar Convention provides a framework for the conservation and wise use of wetland resources.
- ***United Nations Framework Convention on Climate Change (UNFCCC):*** As a major climate change affected country, Bangladesh is a party to UNFCC since in entered into force in 1994. The UNFCCC objective is to stabilise greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. The framework set no binding limits on greenhouse gas emissions for individual countries and contains no enforcement mechanisms. Instead, the framework outlines how specific international treaties may be negotiated to set binding limits on greenhouse gases. Notably, the Sundarbans represents an important carbon sequestration site for the country.
- ***UNESCO World Heritage Convention:*** The three main wildlife sanctuaries of the Sundarbans were declared a UNESCO World Heritage Site in 1997, drawing national and international attention to this unique ecosystem.

BOX2

Box 2. Legislation, conventions and national policies related to tiger conservation

c. National strategies and plans

- ***Integrated Forest Management Plan for the Sundarbans Reserved Forest, 1998:*** This plan provides a comprehensive report on current forest stocks and defines sustainable extraction levels for the next 20 years.
- ***Integrated Resource Management Plan (IRMP):*** This Integrated Resources Management Plans (IRMP), developed based on in-depth analyses of the current resources status and management situation, provides for ten-year ten strategic programs with specified goals and objectives, targeted outcomes/outputs with verifiable success criteria, framework activities, and appropriate guidelines for sustainably managing the Sundarbans Reserved Forests (SRF) and its interface landscape.
- ***National Biodiversity Strategy and Action Plan, 2006 and 2016:*** To fulfill the obligations of the Convention on Biological Diversity, the first NBSAP was prepared in 2006. Later on in 2016, the updated version was produced.
- ***Bangladesh Capacity Development Action Plan for Sustainable Environmental Governance, 2007:*** This document identifies obligations under conventions including the CBD and Kyoto, and outlines a national plan for capacity development for biodiversity conservation and climate change adaptation.
- ***Bangladesh Climate Change Strategy and Action Plan, 2008:*** This plan was developed by the Department of Environment, MoEF. Under this plan, activities directly relevant to the BTAP include: expansion of the coastal greenbelt through mangrove afforestation, development of monitoring systems to evaluate changes in ecosystem and biodiversity in all important and sensitive ecosystems and climate change scenario modeling.
- ***Bangladesh Tiger Action Plan (BTAP), 2009-2017 and 2018-2027:*** With the vision of 'Protected tiger landscape in Bangladesh, where wild tigers thrive at optimum carrying capacities and which continue to provide essential ecological services to mankind' the first BTAP (2009-2017) was launched in 2009. This BTAP (2018-2027) is the updated version of the previous one.
- ***Bangladesh Wildlife Conservation Master Plan (BWCMP), 2015-2035:*** The BWCMP was produced in 2015. The overall goal of the BWCMP is to ensure the sustainable conservation of the wildlife of Bangladesh as an asset for the benefit of the current and future generations. The specific objective is to realise essential conditions for sustainable wildlife management in Bangladesh.
- ***Bangladesh National Conservation Strategy (BNCS), 2016-2031:*** The NCS was launched in 2016. The overarching goal of the BNCS is to foster development in the country through the conservation, development and enhancement of natural resources in the country within the framework of sustainable development, particularly as envisioned under the Sustainable Development Goals (SDGs).

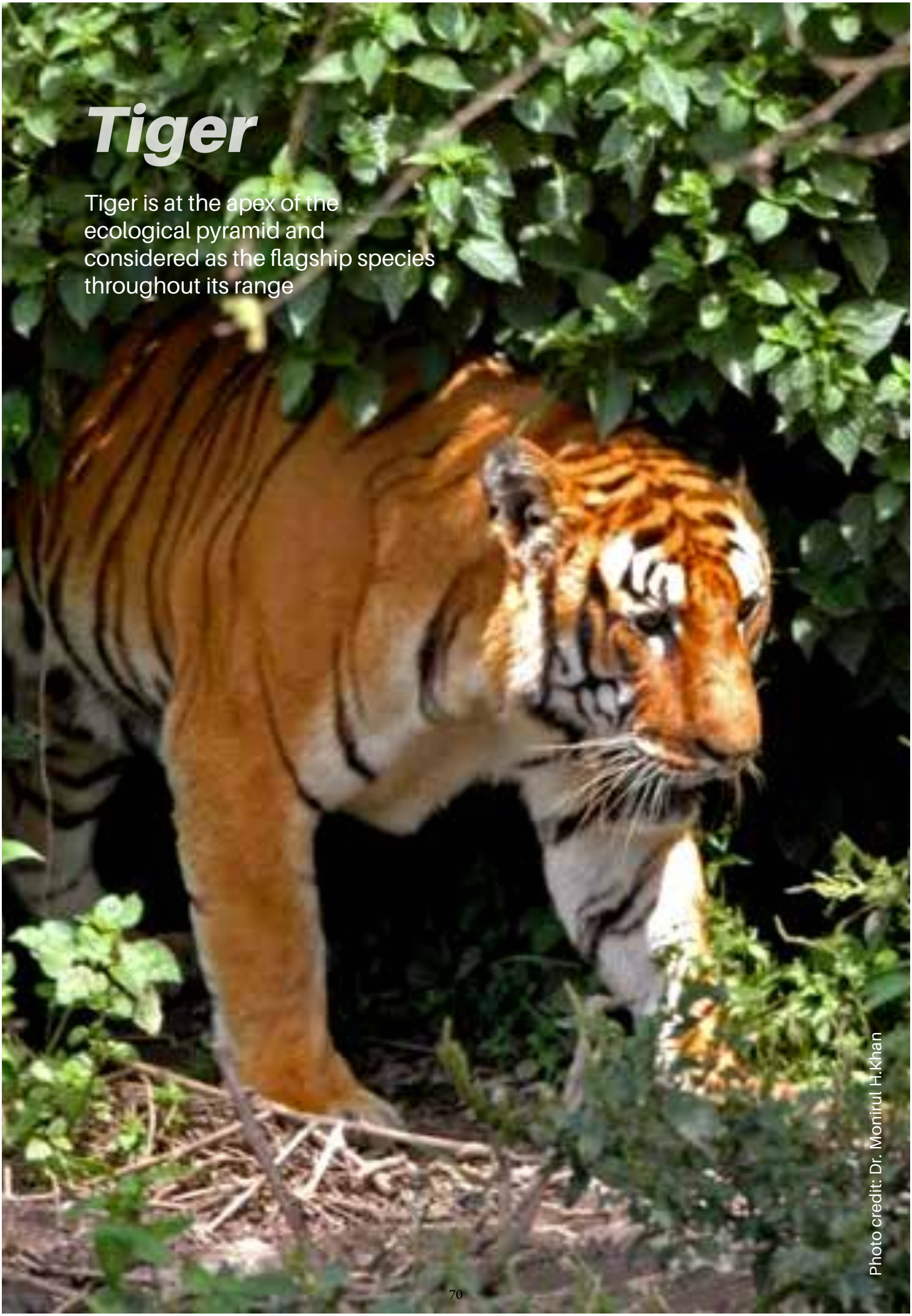
In 2013, the BFD established the Wildlife Centre (WC) that is expected to serve as the hub of wildlife related training, monitoring and research by the BFD staff and other partners. Although the WC is still at its infancy, it has great potential to contribute to human resource development and archiving information on wildlife. Moreover, general biodiversity conservation and protected area management training can also be provided to the territorial divisions to build on their production forestry skills. A staff review process that measures performance based on wildlife abundance and habitat condition as well as wildlife crime detection and control, would strengthen the impact of these organisational changes and foster a professional approach to the conservation and management. Furthermore, conservation of the Sundarbans requires development of fisheries and wetlands management skills.

There should be a focal person in the BFD to monitor and report the BTAP implementation progress to the Tiger Conservation Coordination Committee (TCCC) in the bi-annual meetings. Notably, in 2013 the Ministry of Environment and Forests (MoEF) formed the TCCC to strengthen coordination in tiger conservation efforts in Bangladesh. The detailed Terms of Reference of the TCCC should be made, so that it can effectively coordinate and monitor tiger conservation in Bangladesh. As an initial step and to progress BTAP implementation, WNCC staff could be assigned to coordinate BTAP activities. Duties would include the development of a BTAP implementation plan; design of a monitoring and evaluation approach; liaison with decision-makers in the BFD, MoEF and other ministries; and the creation of a platform to facilitate collaboration. Selected BFD staff of the Sundarbans can be trained to deal with tiger-human conflict incidents (particularly tranquilisation, handling and translocation of tiger and other wildlife), wildlife crime investigation, and tiger, prey and habitat monitoring activities. Associated incentives are needed that provide benefits for working on BTAP activities, such as the opportunity to undertake specialist training and further study.

2.2.3 Forest protection and law enforcement

In addition to the development of institutional biodiversity conservation capacity, an effective BFD patrolling force is essential for the prevention of illegal and damaging activities such as poaching or unsustainable harvesting of natural resources. There is an urgent need to improve human resources, infrastructure and patrolling efforts. In 2015, the BFD initiated Spatial Monitoring and Reporting Tool (SMART) patrolling, side by side with the traditional patrolling, in the Sundarbans and the SMART patrolling was found significantly more effective than the traditional patrolling. However, the problem with SMART is that it requires more resources and trained manpower. The SMART patrolling is supported by some projects, but it should be continued and flourished, at least in the Sundarbans, in order to improve the forest and wildlife management.

Field observations suggest that BFD resources are insufficient for carrying out effective patrolling. Some patrol posts do not have boats, and many that do have slow wooden vessels and inadequate budget for maintenance or fuel. Accommodation conditions are basic and medical facilities are extremely limited. There are normally two or more guns assigned to each guard post, but some of these weapons and associated ammunition are very old. In any case, staff rarely use their arms as existing laws do not provide them enough protection if someone is killed or injured. There are also problems with drinking water and food supplies for some forest posts. In addition, there is no risk allowance to compensate for the unique dangers faced by BFD staff in the Sundarbans. Two BFD staff were killed by tigers in 2005 and one staff member was killed by a cyclone in 2007. In 2009, two more BFD staff were killed in confrontations with dacoits (local term for robbers and pirates). There is



Tiger

Tiger is at the apex of the ecological pyramid and considered as the flagship species throughout its range

Photo credit: Dr. Monirul H.Khan

also no budget set aside to cope with emergency situations such as periodic cyclones. Cyclone Sidr struck in November 2007 and destroyed many guard posts in the eastern side of the Sundarbans. A disaster recovery process is needed to ensure that patrolling levels are returned to normal as quickly as possible after these devastating storms.

Prior to 1973, tiger hunting in Bangladesh was legal, and bounties were offered as an incentive. The Bangladesh Wildlife (Preservation) (Amendment) Act of 1974 defines the tiger and the spotted deer as 'protected animals' and killing or capturing is a punishable offence. In case a tiger becomes a threat to human life, the animal can be officially notified by the Chief Conservator of Forests (CCF) for capturing or killing. The Act does not apply to any wildlife products in transit through Bangladesh as long as the products are accompanied by a transit customs document. This provision may be taken advantage of, because it is difficult for customs officials to confirm the source of wildlife products and authenticity of transit documentation. In 2012, a new Act, i.e. Wildlife (Conservation and Security) Act, replaced the previous act and increased the penalties for killing tigers: non-bailable and subject to imprisonment for minimum two years and maximum seven years as well as a fine of minimum BDT 100,000 and maximum 1,000,000. If the same person commits the crime again after releasing, the maximum level of imprisonment will be 12 years and the maximum fine will be BDT 1,500,000. The conversion rate of USD 1 was BDT 78.5 at the time of preparation of this document. Notably, there are provisions of imprisonment and/or fine for illegal killing or capturing of other wildlife as well, including the prey animals.

Three areas in the Sundarbans were declared as three Wildlife Sanctuaries (Sundarbans East, West and South) under the Wildlife Act, the first in 1960 and the second and third in 1996 (Figure 3). In these

Bangladesh Forest Department staff engaged in planning for setting camera-traps in the Sundarbans

Photo credit: Forest Department

areas the Act prohibits the entry of people, cultivation of land, damage or destruction of vegetation, hunting or capturing wild animals, introduction of exotic species, straying of domestic animals, causing of fires, and water pollution. The total area (1,397 sq km) of these three Wildlife Sanctuaries were also declared a UNESCO World Heritage Site in 1997. In 2012, three areas of rivers of the Sundarbans were declared Wildlife Sanctuaries, mainly for the conservation of dolphins. The entire Sundarbans (6,017 sq km) is a Reserved Forest and was declared a Ramsar Site in 1992. Moreover, a number of other national and international legislative initiatives have been established to offer some level of protection to the tiger, its habitat, and prey (Box 2).

In order to control the ecological degradation and pollution due to human activities, the 10 km periphery (area covering 292,926 ha) outside the boundary of the Sundarbans was declared as Ecologically Critical Area (ECA) in 1995 under the Bangladesh Environment Conservation Act of 1995. The Department of Environment, together with the local administration are responsible for implementation of the ECA. Since the entire region is low-lying, with frequent flood and tide, an impact zone of up to 20 km periphery outside the boundary of the Sundarbans should be maintained by the BFD (Sundarbans Divisions and Social Forestry Divisions), with proper legal instruments, so that it can serve as a buffer area for the Sundarbans. There should be a collaborative effort to make sure that there is no industrialisation and big infrastructure in the ECA or impact zone.

Setting of a camera-trap by Bangladesh Forest Department officials for monitoring tiger population in the Sundarbans

An assessment is required to investigate legislative gaps (e.g. lack of power of arresting wildlife offenders, problemmes in filing cases under the Wildlife Act of 2012), the sufficiency of existing penalties (particularly for prey poaching), the perceived risk of being punished, weak prosecution documentation and reporting, and barriers to prosecution. The Wildlife Crime Control Unit (WCCU) and Wildlife Forensic Laboratory (WFL) were established by the BFD in 2012 and 2016, respectively. These units can significantly strengthen the enforcement by creating improved capacity to investigate domestic crime and illegal international trade. A review can also be undertaken to ensure Sundarbans management strategies adhere to international conventions and protocols. A revision of forest zonation may also be needed to account for the current distribution of tigers and human use patterns across the landscape.

2.2.4 Education, awareness and community involvement

Without political support the BTAP and biodiversity conservation will continue to remain low on the government's agenda and separate from economic development plans and poverty reduction agendas. Support is also needed across a wide range of parties, from industry and private companies to public organisations and local communities. Without if the BFD is not supplied with the resources or legislative tools necessary to protect the forest, partners will not step forward to join in the tiger conservation challenge, and there will be little motivation to conserve and use natural resources sustainably.

Effective use of education and awareness raising programmes can support changes in knowledge, attitudes and behaviour to help achieve conservation objectives. A tiger conservation education and awareness strategy is needed to guide the development of carefully targeted and measurable campaigns that are integrated with other BTAP programmes. Successful campaigns need to be creative in their messages and use targeted methods to engage different audiences (Hesselin*k et al*. 2007). Training is needed to develop conservation communication and social marketing specialists in Bangladesh, who will then be able to design, implement, and evaluate campaigns. The main target groups are the communities living around the Sundarbans. Tiger and Sundarbans conservation issues can be added in the school curricula. In many cases, however, education and awareness alone may not be enough to change the behaviour and must be used in conjunction with other conservation strategies. For example, forest users of the Sundarbans may know that they are using the forest unsustainably, but their immediate needs make it a matter of survival, in which case, education and awareness could be used to support other initiatives such as the development of alternative livelihoods.

The long-term survival of the tiger in the Sundarbans cannot be ensured without the active participation of the local communities. Bulk of the local people are directly or indirectly dependant on the natural resources of the Sundarbans and some have rather hostile relationships with the tiger. Therefore, involving the local people in tiger conservation will require some sort of mechanism so that the local people can get the direct benefits of conservation, such as sharing of revenue generated from tourism, development of cottage industry and marketing, and continuation of effective compensation mechanism for tiger victims. Moreover, alternative income generation scheme should be taken, especially for tiger victim families, so that more local people participate in tiger conservation activities.

2.2.5 Research and monitoring

Information is vital for policy formulation, development of adaptive strategies and monitoring of tiger, prey, and habitat levels as indicators of overall success. Without basic understanding of a species or the ecosystem in which it lives, it is not possible to assess the impact of various threats or predict and evaluate the outcome of management activities. Equally, without understanding the socio-economic context, which is often the underlying cause of many of the threats, little headway will be made in the development of long-lasting solutions. This information is lacking for most tiger landscapes, and the Sundarbans is no exception (Sanderson *et al.* 2006).

The information that could be obtained on Sundarbans tigers and the threats they face is infinite, but only some has the potential to guide conservation actions. A prioritised national BTAP research and monitoring agenda would help direct research activities in line with management needs. It is unrealistic for the BFD to collect all of the required information, so independent researchers and research organisations need to be engaged. It is also a good practice to involve independent bodies in monitoring activities to ensure transparency in interpretation of results. However, currently there are few biological, ecological and social studies being carried out that can directly inform conservation strategies and only a small number of people are involved in tiger conservation research.

The universities and research organisations generally do not have enough funds to give national students and young researchers the opportunity to undertake often costly fieldwork in the Sundarbans. Scholarships would increase the number of students able to undertake research on tiger and other biodiversity in the Sundarbans and build a new generation of tiger conservationists for the country. A research cum wildlife rescue centre could be established close to the Sundarbans by BFD where the universities and research organisations facilitate research activities on tigers and the Sundarbans. This would encourage collaborative efforts with BFD and innovative research by various bodies. There is also a need to improve the availability of national conservation biology undergraduate and graduate training, and the involvement of students and professionals with social science backgrounds.

The BFD has made major progress in standardising the monitoring protocols for tigers, other major fauna, human impacts and habitat for the Sundarbans. Simple yet effective formats for data collection were developed in collaboration with the Wildlife Institute of India. The BFD staff working in the Sundarbans were trained in their implementation and systematic data were collected across the Bangladesh and Indian Sundarbans to infer statistically robust estimates of occupancy of major fauna as well as tigers (Jhala *et al.* 2016). The camera-trapping protocols too have been standardised and implemented across the Bangladesh and Indian Sundarbans (Das *et al.* 2012, Dey *et al.* 2015, Roy *et al.* 2016, Jhala *et al.* 2016). These protocols need to be implemented on a regular basis to assess the success of conservation investments in terms of species occupancy and abundance response to management actions.

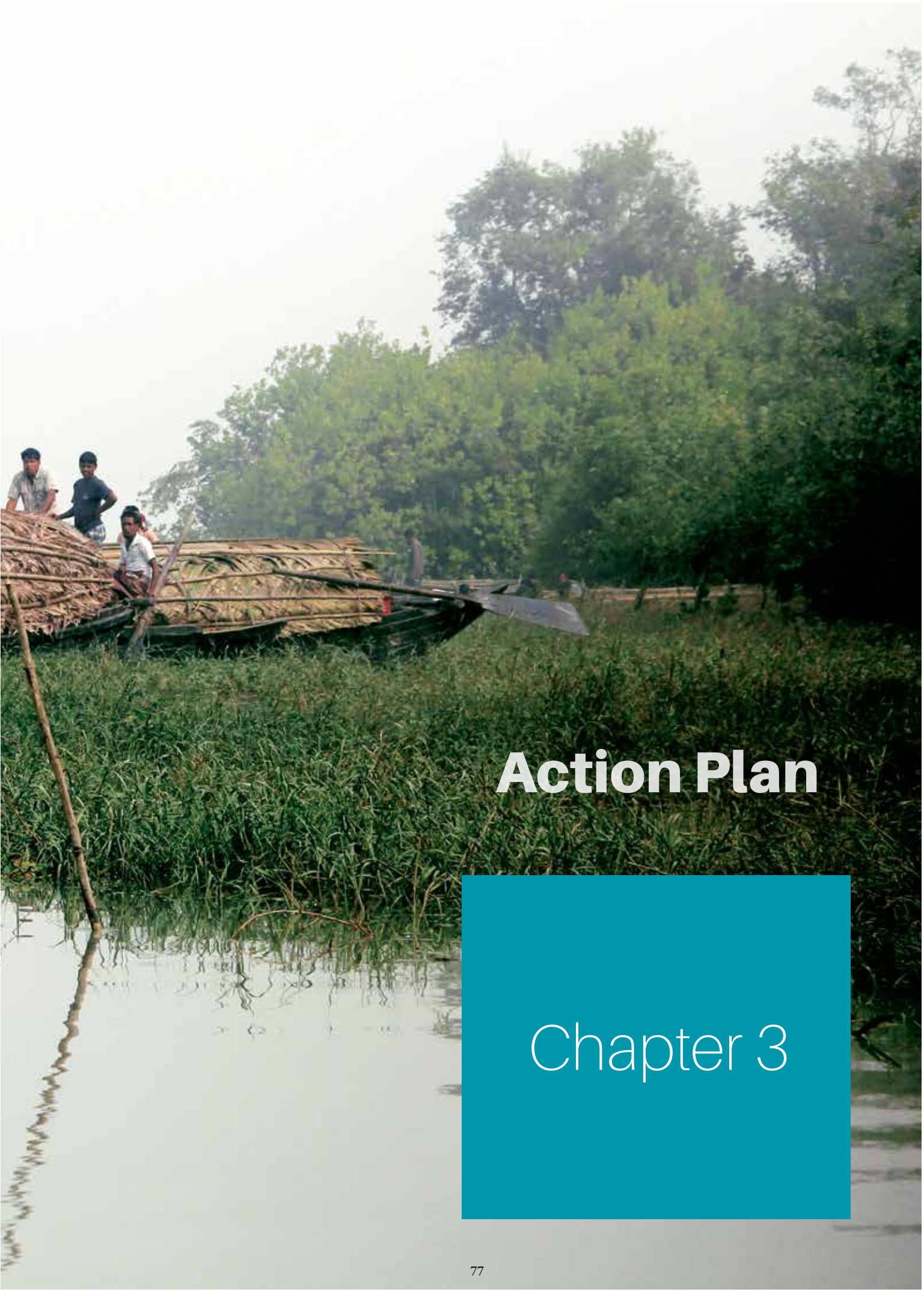
2.2.6 Collaboration

The immense scale and multifaceted nature of tiger conservation requires a wide array of skills and resources. Although the primary responsibility of tiger conservation lies to the BFD, collaboration with other government departments, academic institutions, national and international NGOs, private sector and local communities is needed to develop a successful tiger conservation effort. A platform should be formed to engage the relevant organisations and coordinate an integrated tiger conservation programme. An BFD-led alliance could facilitate this, which can be guided by the TCCC. This would also provide a platform for the BFD and collaborators to support one another in securing funding to carry out BTAP activities.

It is also essential to engage with the people who directly rely upon the resources of the Sundarbans for their economic wellbeing and those whose lives are directly affected by THC. Integration of these communities into forest management will shift the overall paradigm from top-down policing to a more inclusive and mutually beneficial approach. This would build on previous and ongoing BFD activities such as the social forestry initiatives, alternative income generation and co-management (Mitchell *et al*. 2004). The co-management framework specific to the Sundarbans would facilitate the development of conservation activities, including alternative livelihood options and solutions to deal with THC. There may also be opportunities to involve other GoB bodies in initiatives for tiger and Sundarbans conservation.

Furthermore, conserving the Sundarbans tiger population will require the creation of a trans-boundary approach with neighbouring India. In 2011 the Governments of Bangladesh and India have signed a memorandum of understanding (MoU) on conservation of the Sundarbans, and a protocol on conservation of the tiger in the Sundarbans. Both countries have agreed that the biodiversity, particularly the tiger, of the Sundarbans must be conserved by joint actions and none of the two countries will do anything that might threaten the Sundarbans. Under these two mutual agreements a number of strategic actions have been proposed to be done in collaboration such as joint research and monitoring (on tiger, prey and other biodiversity), adoption of joint management, sharing of relevant information and technical knowledge (e.g. on THC) between the concerned officials of the two countries, execution of patrolling along the respective borders of the two countries to prevent poaching and illegal trade, and capacity building by exchanging personnel for training and promotion of education. The collaboration between Bangladesh and India needs to be strengthened in terms of joint monitoring, patrolling, and sharing information on poaching and illegal trade. Notably, the Sundarbans tiger population between Bangladesh and India forms a single population and its viability in the long-term is enhanced only if it is managed as s single large population. Therefore, active collaboration for joint strategies to maintain ecological integrity, population assessment and monitoring are essential. For the Chittagong Hill Tracts the continued habitat connectivity with the populations in neighbouring India and Myanmar is vital for tiger occupancy and presence in the region. Moreover, Bangladesh can open dialogues with other countries to help combat the illegal trade in tiger parts.

Photo credit: Md. Modinul Ahsan



Action Plan

Chapter 3

Chapter 3

Action Plan

3.1 OVERVIEW

This action plan for tiger conservation in Bangladesh will be followed over the next ten years (July 2017 to June 2027). The ten year term is chosen because the main constraint of tiger conservation in Bangladesh is not to have updated strategy document, but poor implementation of it, as evident during the tenure of the first BTAP (Box 3). Programmes and projects to implement the BTAP, however, need to be taken urgently. It is essential to first know the status of tigers and subsequently monitor the change in status to assess the success of conservation investments. During the tenure of the first BTAP the baseline essential to monitor success was not available, now with the use of modern scientific tools we know with reasonable certainty the status of tigers in Bangladesh. The goals of the current BTAP can now be assessed against a standard benchmark.

The plan provides a vision for the future of tigers in Bangladesh and a set of goals to guide all conservation efforts. For each goal there are a set of objectives and a range of strategic actions to combat the threats and challenges. As a strategy document, the BTAP does not contain a detailed implementation plan including activities, responsibilities, and budgets. Subsequent planning and mobilisation sessions should follow the contents of the BTAP, turning these into prioritised project concepts, and developing the necessary collaboration needed to ensure their implementation.

This action plan will be reviewed in the middle of the tenure of the plan (e.g. 2022). This is to track the activities mentioned in the plan and to evaluate the real progress.

Road to Updating BTAP 2018-2027

The Bangladesh Tiger Action Plan (BTAP) is a policy-level document that offers a structured approach to achieving long-term conservation of tigers in Bangladesh. The first version of BTAP was for the period July 2007 to June 2017 (Ahmad *et al*. 2009) and this updated version is for the period January 2018 to December 2027. It provides a vision, goals and objectives to guide an integrated and focused tiger conservation programme. The updating process involved extensive consultation and debate in workshops at three levels: four range level workshops Chandpai, Satkhira, Khulna and Sarankhola Ranges in September 2016; one regional workshop in Khulna in October 2016, and two national workshops in Dhaka in November 2016.

Photo credit: Md. Modinut Ahsan

3.2 VISION AND GOALS

Vision

Protected tiger landscapes in Bangladesh, where wild tigers thrive at optimum carrying capacities* so as to perform their ecological role, and which continue to provide essential ecological services to mankind

Goals

Goals to address threats

- Increase the current tiger density in the Sundarbans from 2.17 to 4.50 per 100 sq km
- Maintain sufficient prey base (i.e. large prey density at least 500 times higher than tiger density) to support the tiger population in the Sundarbans
- Maintain sufficient habitat and habitat diversity to support the tiger and prey populations in the Sundarbans
- Ensure a suitable tiger population in the Chittagong Hill Tracts

Goals to address challenges

- Mainstream tiger conservation into the GoB's development agenda
- Improve conservation capacity in the BFD and its partners
- Improve law enforcement to ensure protection of tiger, prey and habitat
- Build national capacity to implement education and awareness programmes, and community involvement
- Build capacity to conduct tiger conservation research and monitoring
- Encourage collaboration to support the BFD in implementation of the BTAP

*Carrying capacity is defined as the maximum population size that the environment can sustain over the long-term, considering the available resources. Currently there is insufficient information to determine the optimum carrying capacity of tigers in the Sundarbans, and therefore no way to know if we are currently at, near, or below that level. Furthermore, when determining the desired future states of tiger, prey, and habitat, it must be taken into account that the Sundarbans supports both tiger and human needs.]

BOX 3

Box 3. Experience of Bangladesh Tiger Action Plan 2009-2017 implementation

During eight years (2009-2017) of the first phase of Bangladesh Tiger Action Plan (BTAP) implementation, majority of the objectives could not be achieved due to lack of programmes and projects focusing on the implementation of BTAP, although there were sporadic programmes and projects with some success. The lack of constant flow of funding, especially from the Government's revenue budget, was a major obstacle in BTAP implementation. As a consequence, the rise of poaching was evident, causing the decline of tiger number in the Sundarbans.

There are, however, some success stories that partially achieved BTAP objectives. The BFD had no record of translocating strayed tigers, but in 2011 a tiger was successfully tranquilised in the forest-village boundary of Satkhira Range, which was transported and released to the deeper part of the forest named Dobeki. This was an apparently healthy tiger that started to visit the villages to hunt cattle. In 2012, a stray tiger, with one leg missing, was tranquilised in the forest-village boundary of Khulna Range and was sent to Bangabandhu Sheikh Mujib Safari Park in Gazipur where it is living in captivity. In a similar case a tiger with snare injury in one leg was captured alive by a box-trap from forest-village boundary of Chandpai Range and was sent to the Safari Park, but soon after it died in captivity.

In 2015, the BFD published it's first-ever estimate of tiger population (total 106 tigers in the Bangladesh Sundarbans), which was based on rigorous scientific study using the camera-traps. None of the previous population estimates by the BFD had followed any scientifically valid method, so this result was taken as the baseline for future monitoring. During this study the relative densities of tigers and prey were also studied and mapped.

Raising awareness among the mass people is a key requirement to ensure successful conservation of the tiger following broad-based approach where the people can participate in tiger conservation activities. Following the St. Petersburg Declaration, Bangladesh nationally celebrates the Global Tiger Day annually on 29 July, organised by the BFD. This was started in 2010 and has significantly contributed to awareness raising at the national and local levels. Moreover, the Tiger Caravan (a caravan mimicking the tiger with a team of young people performing awareness programmes in different areas) of USAID-funded Bagh Project of the Wild Team was very successful in awareness raising for tiger conservation.

Tiger Caravan's awareness raising programme for tiger conservation

Photo credit: Wildteam

Translocation of a strayed tiger from forest-village boundary of Khulna Range to Bangabandhu Sheikh Mujib Safari Park at Gazipur

Photo credit: A.N.M. Hossain

3.3 OBJECTIVES AND STRATEGIC ACTIONS

The current knowledge on threats and status of tigers makes it possible, at least at the basic level, to develop and implement SMART strategies to mitigate threats

This section outlines a set of objectives and strategic actions to achieve the threats and challenges goals (Table 3 and 4), which are based on the information presented in Part B. The current knowledge on threats and status of tigers makes it possible, at least at the basic level, to develop and implement SMART (specific, measurable, achievable, relevant and time bound) strategies to mitigate threats. However, an increase in baseline information is needed to improve definition of the threat objectives. Achievement of the challenge objectives, on the other hand, is more straightforward because, in most cases, success can be measured by the completion of the strategic actions (Table 3 and 4).

Photo credit: Dr. Sandeep Sharma

3.4 PRIORITISATION

The threats need to be prioritised in terms of their potential impact, and the current and desired states of tiger, prey and habitat (Saif 2016, Hossain *et al.* 2016). Based on the existing knowledge and information it is obvious that poaching is the biggest threat to tigers of the Sundarbans. Therefore, tiger conservation activities need to address this on priority basis. Retribution killing of tigers due to THC is common in the villages around the Sundarbans, which also need to be addressed urgently. Systematic exercise to identify priorities will be carried out in the first two years of this BTAP. In the meantime, tiger conservation activities will continue following the threat priorities based on existing knowledge. Moreover, a second process will be carried out to prioritise strategic actions under each objective. A balance must be struck between resources spent on more research versus the need for immediate mitigation activities (Wilhere 2002). Actions can be ranked based on criteria such as their potential benefit, cost, feasibility and leverage. This threat prioritisation and activity selection process will result in the formation of an overall BTAP implementation plan containing milestones and strategic actions grouped into project concepts. Collaboration will be needed for both the development of this prioritisation process and the subsequent implementation plan.

3.5 MONITORING AND EVALUATION

There was no systematic monitoring and evaluation of progress of the previous version of the BTAP (2009-2017), but considering the work that was done against the goals and targets the implementation was not satisfactory. Therefore, the main thrust is to focus on implementation of this version of the BTAP (2018-2027), which will require collaborative effort, particularly inter-ministerial, between the Government and NGOs as well as with other Governments and international conservation partners, and constant flow of funding. Systematic monitoring and evaluation of progress against the BTAP goals will be done, which will provide a way of measuring the success of the tiger conservation efforts and enable the adaptation of conservation activities based on lessons learnt, new information and changing conditions. The implementation of this BTAP will ensure that the nation attempts to sustain the current tiger occupancy in over 4,000 sq km and increase the density in the Sundarbans from the current 2.17 to 4.50 tigers per 100 sq km within the next ten years, thereby contributing to the GTRP commitments by the country. The target of increasing the tiger density is at 4.50 per 100 sq km, because this is the known density in the high density areas of the Sundarbans (Khan 2012, Das et al. 2012, Naha et al. 2016).

Monitoring of tiger, prey and habitat levels will be carried out every two years to assess the achievement of progress against the goals to address threats (Box 4). Likewise, a two yearly monitoring approach will be devised to evaluate progress against the goals to address challenges. A process will also be developed for the evaluation of progress of strategic actions and achievement of their associated objectives. In the light of completed activities and changing conditions at the end of its ten year term the BTAP will be updated for its next term.

Best practices

Several practices are being adopted and considered BEST in many tiger range countries of the world. Those practices are being prescribed by the tiger expert and scientists. The Best Practices are:

- Efficient Protection by SMART Patrolling
- Community based tiger-human conflict mitigation
- Camera Trapping for tiger monitoring and genetic barcoding
- Khal Survey for measuring tiger relative tiger abundance
- Ecotourism
- Forensic lab establishment
- Collaboration and coordination national and international organizations
- Coordination with law enforcement agencies
- Research, monitoring and evaluation

BOX 4

Box 4. Monitoring changes in the status of tigers, prey and habitat

It is difficult to monitor changes in the status of tiger's prey and habitat in the Sundarbans due to inaccessibility and dense vegetation, but there are scientifically valid methods that are applied and proved to be effective. There have been a number of unsuccessful attempts to count absolute numbers of Sundarbans tigers based on short field visits, interviews with forest workers, and the pugmark method (Seidensticker 1987; Tamang 1993; Jalil 1998; Bangladesh Forest Department 2004). The pugmark method is based on identifying individual tigers from their pugmarks, but this is no longer considered scientifically sound by authorities in India and international scientists (Karanth et al. 2003; Project Tiger 2005). Camera-trapping has become a popular way of estimating tiger abundance, although the sheer size of the Sundarbans and the lack of identifiable tiger travel routes make this technique a bit challenging for tracking changes in the whole population. Camera-trapping has been carried out in the Sundarbans to investigate tiger and prey density with success (Khan 2007, 2012; Dey et al. 2015). A tiger monitoring system has been locally developed to measure changes in relative tiger abundance (rather than absolute numbers) in the Sundarbans (Khan 2007, 2012; Barlow et al. 2008, Hossain 2011). This survey works by counting the number of tiger tracks along khal (small river) banks in a systematic way across the forest. It is based on the assumption that in areas with more tracks, there are more tigers. If track numbers decrease in an area of the forest, then it will be assumed that tiger numbers have fallen, and management action will be taken. It does not try to identify unique tigers from their tracks, rather it counts the total number of tiger tracks per kilometre of khal to produce a map showing the densities of tiger tracks across the whole forest.

Monitoring systems need to be developed to track the changes in the prey population and also in habitat cover and composition. A system of prey monitoring using pellet counts to determine absolute abundance was experimented with some success (Dey 2007, Ahmed et al. unpubl. data). However, the method that was proven effective and convenient in the Sundarbans context is counting prey animals, recording habitat features and human disturbance to habitat (Dey et al. 2015, Hossain et al. 2016). With regards to habitat monitoring, previous studies to assess habitat change were based mainly on one-off forest inventories devised using different methodologies, which made comparisons to work out change over time problematic (Iftekhar and Saenger 2008). Therefore, a standardised long-term habitat monitoring programme needs to be developed, which can be remote sensing supported by ground truthing.

3.6 HOW TO GET INVOLVED

Tiger conservation is a big challenge that cannot be achieved by the BFD alone. The BFD welcomes collaboration at all levels to support implementation of the BTAP. Those interested in becoming involved can get in touch with the BFD to get further information on current tiger conservation work in Bangladesh and opportunities for collaboration. Website of the BFD (www.bforest.gov.bd) can be browsed to get the basic information, conservation programmes and projects and the contact address.

BTAP objectives, strategic actions, outcomes and perfomance indicators

Table 3. Threat objectives and strategic actions of the BTAP

BTAP Goals, objectives, actions and possible source of funding		Short Term (1-3 yrs) (2018-2020)	Mid Term (3-6 Yrs) (2021-2023)	Long term (7-10 yrs) (2024-2027)	Indicative Resource Requirement in million BDT	Manpower/ Human Resources	Possibe source of funding	Outcomes	Performance Indicator
3.3.1 DIRECT TIGER LOSS									
THREAT GOAL: Increase tiger density in the SRF									
Threat objectives	**Strategic action**								
Continue to evaluate tiger population status, connectivity and occupancy Medium Priority	Continue to monitor tiger population status and occupancy	X	X	X	200.00	BFD/donor supported organization's manpower	Fund from the Government (development fund) / Fund from Development Partner	Tiger population, status and occupancy known	Periodic report on tiger popualtion and occupancy of tiger
	Develop methods for assessing connectivity		X	X				Methods of connectivity developed	Connectivity report
	Model trends in tiger occupancy, connectivity and population size under various threat and management scenarios			X				Model of trends in tiger occupancy, connectivity and population size under various threat and management scenarios developed	Occupancy survey report

Photo credit: Md. Modinul Ahsan

BTAP Goals, objectives, actions and possible source of funding		Short Term (1-3 yrs) (2018-2020)	Mid Term (3-6 Yrs) (2021-2023)	Long term (7-10 yrs) (2024-2027)	Indicative Resource Requirement in million BDT	Manpower/ Human Resources	Possibe source of funding	Outcomes	Performance Indicator
Minimize tiger poaching High Priority	Determine nature and scale of tiger poaching and trade in tiger parts	X	X	X	100.00	BFD/donor supported organization's manpower	Fund from Devel-opment Partner	Nature and scale of tiger poaching and trade in tiger parts determined	Periodic report on tiger poaching
	Improve intelligence relating to tiger poaching incidents; establish an intelligence cell in BFD.		X	X				Intelligence relating to tiger poaching incidents; establish an intelligence cell in BFD developed and improved	Government order/ge-zette notification
	Improve effectiveness of law enforcement; conduct combined anti-poaching operations (headed by the BFD when it is inside the Sundarbans).		X	X				Effectiveness of law enforcement; Combined anti- poaching operations conducted	Post operation report
	Ensure penalties are sufficient to deter poachers, consumers and traders.			X				Penalties are ensured fot tiger related offenders	Verdiction of court
	Raise awareness in target groups about legal protection and importance of tigers and their prey.		X	X				Target groups made aware about legal protection of tiger	Survey report
	Improve prosecution rate of poaching and trade in tiger parts; ensure frequent Mobile Court to ensure rapid trial of poachers; consider tiger poaching cases in Speedy Tribunal; provide rewards and promotions to people for successful prosecution.		X	X				Prosecution rate of poaching and trade in tiger parts improved	Verdiction of court
	Understand and reduce domestic socio-economic dependencies on tiger poaching		X	X				Socio-economic dependency on tiger poaching reduced	Intelligence report
	Develop measures to contribute to the battle against the international trade in tiger parts; improve collaboration with neighboring countries			X				Effectives measures are taken to contribute to the battle against the international trade in tiger parts; collaboration with neighboring countries developed	Electronic and print media
	Monitor levels of tiger poaching and trade in Bangladesh, and spatial distribution of tiger poaching	X	X	X				Scacle of tiger poaching and trade in Bangladesh is monitored regularly; spatial distribution of tiger poaching determined	Temporal and spatial report of tiger poaching

BTAP Goals, objectives, actions and possible source of funding		Short Term (1-3 yrs) (2018-2020)	Mid Term (3-6 Yrs) (2021-2023)	Long term (7-10 yrs) (2024-2027)	Indicative Resource Requirement in million BDT	Manpower/ Human Resources	Possibe source of funding	Outcomes	Performance Indicator
Minimize tiger-human conflict High Priority	Develop THC mitigation activities and supporting protocol to reduce tiger human and livestock killings and injury; maintain effective compensation		X	X	35.00	BFD/donor supported organization's manpower	Fund from Devel-opment Partner	THC mitigation protocol develoepd ; effective compensation to the victims maintained	THC protocol
	Monitor numbers of human, livestock and tiger killings and injury, and spatial distribution of THC	X	X	X				Numbers of human, livestock and tiger killings and injury, and spatial distribution of THC documented	THC report
Assess other potential threats Medium Priority	Complete risk assessment; prioritize mitigation activities for tiger diseases (particularly Canine Distemper); investigate inbreeding and sex ratio of tigers.		X	X	25.00	Conservation parters' man-power/BFD	Fund from Devel-opment Partner	Risk assessment of Canine Distemper done	Exhaustive list of threat factors
THREAT GOAL: Ensure a viable tiger population in the Chittagong Hill Tracts									
Threat objectives	**Strategic action**								
Ensure a suitable tiger population in the Chittagong Hill Tracts Low Priority	Carry out occupancy and abundance survey of tiger and prey.	X	X	X	100.00	Conservation parters' man-power/BFD	Fund from Devel-opment Partner	Tiger occupancy and abundance survey of tiger and prey done	Tiger occupancy and abundance survey report of tiger and prey
	Minimize poaching of tigers and prey, minimize habitat destruction, initiate habitat restoration and establish connectivity between the fragmented habitats.	X	X	X				Poaching of tigers and prey minimized; habitat destruction moinimized; habitat restoration done	Number of poached tiger and prey; amount of acrage taken under restoration programs

Photo credit: Md. Modinul Ahsa

Photo credit: Md. Modinul Ahsan

BTAP Goals, objectives, actions and possible source of funding		Short Term (1-3 yrs) (2018-2020)	Mid Term (3-6 Yrs) (2021-2023)	Long term (7-10 yrs) (2024-2027)	Indicative Resource Requirement in million BDT	Manpower/ Human Resources	Possibe source of funding	Outcomes	Performance Indicator
3.3.2. PREY DEPLETION									
THREAT GOAL: Maintain sufficient prey base (i.e. large prey density at least 500 times higher than tiger density) to support the tiger population in the Sundarbans									
Threat objectives	**Strategic action**								
Evaluate current and desired state of occupancy, connectivity and size of prey populations Medium Priority	Develop methods for assessing prey occupancy, connectivity and population size	X	X	X	50.00	BFD/donor supported organization's manpower	Fund from Development Partner	Methods developed for assessing prey occupancy, connectivity and population size	Report on current and desired state of prey occupancy, connectivity and size of prey populations
	Define target state prey occupancy, connectivity and population size with respect to optimum carrying capacity.	X	X	X				Prey occupancy, connectivity and population size with respect to optimum carrying capacity determined	Occupancy survey report
	Model trends in prey occupancy, connectivity and population size under various threat and management scenarios		X	X				Trends in prey occupancy, connectivity and population size under various threat and management scenarios assessed	Occupancy survey report
	Monitor changes in occupancy, connectivity and size of prey populations.		X	X				Changes in occupancy, connectivity and size of prey populations identified	Occupancy survey report

BTAP Goals, objectives, actions and possible source of funding		Short Term (1-3 yrs) (2018-2020)	Mid Term (3-6 Yrs) (2021-2023)	Long term (7-10 yrs) (2024-2027)	Indicative Resource Requirement in million BDT	Manpower/ Human Resources	Possibe source of funding	Outcomes	Performance Indicator
Threat objectives	**Strategic action**								
Minimize prey poaching High priority	Determine nature and scale of prey poaching and trade in prey parts		X	X	60.00	BFD/donor supported organization's manpower	Fund from Devel-opment Partner	Nature and scale of prey poaching and trade in prey parts determined	Number of prey poach-ing; number of prey related cases
	Improve intelligence relating to prey poaching incidents; establish; intelligence cell in the BFD		X	X				Intelligence relating to prey poaching incidents is ensured; intelligence cell in the BFD established	Government notification
	Improve effectiveness of law enforcement; conduct combined anti-poaching operation (headed by the BFD when it is inside the Sundarbans).		X	X				Effectiveness of law enforcement resulted; combined anti- poaching operation conducted	Post operation report
	Ensure penalties are sufficient to deter poachers, consumers and traders		X	X				Penalties ensured to deter poachers, consumers and traders	Court verdiction
	Raise awareness in target groups about legal protection and importance of tigers and their prey; conduct school-based awareness programmes and incorporate tiger and Sundarbans conservation in school curricula	X	X	X				Target groups made aware about legal protection of tiger	Awareness survey report
	Increase prosecution rate of poaching, consumption and trade in prey parts; ensure frequent Mobile Court to ensure rapid trial of poachers; provide rewards and promotions to people for successful anti-poaching operation and trade	X	X	X				Prosecution rate of poaching, consumption and trade in prey parts increased; Mobile Court ensures rapid trial for poachers;	Periodic report of cases
	Understand and reduce socio-economic dependencies on prey poaching	X	X	X				Socio-economic dependencies on prey poaching is understood; and dependencies on prey poaching reduced	Survey report
	Monitor levels of prey poaching, consumption and trade in Bangladesh, and spatial distribution of prey poaching and consumption		X	X				Level of prey poaching; consumption, trade, spatial distribution of prey poaching and consumption undersood	Survey report

BTAP Goals, objectives, actions and possible source of funding		Short Term (1-3 yrs) (2018-2020)	Mid Term (3-6 Yrs) (2021-2023)	Long term (7-10 yrs) (2024-2027)	Indicative Resource Requirement in million BDT	Manpower/ Human Resources	Possibe source of funding	Outcomes	Performance Indicator
Threat objectives	**Strategic action**								
Assess other potential threats Medium Priority	Complete risk assessment; prioritize mitigation activities for prey disease			X	10.00	Donor supported organizations manpower	Fund from Devel-opment Partner	Risk assessment is done, mitigation activities for prey disease identified	Risk assessment report, mitigation technique report
3.3.3 HABITAT LOSS AND DEGRADATION									
THREAT GOAL: Maintain sufficient habitat to support the Sundarbans tiger and prey populations									
Threat objectives	**Strategic action**								
Evaluate current and desired state of tiger and prey habitat Medium Priority	Investigate tiger and prey habitat requirements (area, cover and composition).		X	X	50.00	BFD/donor supported organization's manpower	Fund from Devel-opment Partner	Elements of tiger and prey habitat is identified	Habitat survey report
	Monitor change in area, cover and composition of tiger and prey habitat	X	X	X				Change in area, cover and composition of tiger and prey habitat monitored regularly	Habitat survey report

BTAP Goals, objectives, actions and possible source of funding		Short Term (1-3 yrs) (2018-2020)	Mid Term (3-6 Yrs) (2021-2023)	Long term (7-10 yrs) (2024-2027)	Indicative Resource Requirement in million BDT	Manpower/ Human Resources	Possibe source of funding	Outcomes	Performance Indicator
Threat objectives	**Strategic action**								
Reduce unsustainable forest resource use High Priority	Determine nature and scale of unsustainable resource use	X			60.00	BFD/donor supported organization's manpower	Fund from Development Partner	Nature and scale of unsustainable resource use determined	Amount of resource harvested
	Understand socio-economic dependencies of forest users on the Sundarbans and develop alternative income opportunities	X						Socio-economic dependencies of forest users on the Sundarbans understood; alternative income opportunities for the resource users ensured	Number of people getting BLC
	Excavate and re-excavate waterhole to facilitate fresh water for the wildlife	X	X	X				Waterhole available to the wildlife	Number of waterholes
	Improve effectiveness of law enforcement in the forest	X						Effectiveness of law enforcement in the forest improved	Number of cases
	Improve prosecution rate of illegal activities; provide rewards and promotions to people for successful prosecution	X						Prosecution rate of illegal activities increased; rewards and promotions to people for successful prosecution rewarded	Number of cases; number of people rewarded for successful prosecution
	Monitor human impact on forest resources and level of illegal activities, and spatial distribution of illegal activities		X					Human impact on forest resources and level of illegal activities, and spatial distribution of illegal activities monitored	Number of human foot print per unit area
THREAT OBJECTIVES	Action								
Assess other potential threats Medium to Low Priority	Complete risk assessment, control tourism in the Sundarbans; prioritize mitigation activities for pollution, invasive species and future mineral and gas exploration/extraction	X			50.00	BFD/donor supported organization's manpower	Fund from Development Partner	Risk assessment done, control tourism controlled, mitigation techiniques for pollution priorotized from invasive species and future mineral and gas exploration/extraction developed	Reports on risk assessment; number of mitigation techniques applied

Table 4.Challenge objectives and strategic actions of BTAP

BTAP Goals, objectives, actions and possible source of funding		Short Term (1-3 yrs) (2018-2020)	Mid Term (3-6 Yrs) (2021-2023)	Long term (7-10 yrs) (2024-2027)	Indicative Resource Requirement in million BDT	Manpower/ Human Resources	Possibe source of funding	Outcomes	Performance Indicator
3.3.4 NATIONAL POLICY									
CHALLENGE GOAL: Mainstream tiger conservation into the GoB's development agenda									
Threat objectives	**Strategic action**								
Incorporate tiger conservation into development plans Medium to Low Priority	Develop an approach to integrate tiger and biodiversity conservation into wider development policies and actions through SDGs, BNCS, NBSAP and BW-CAC		X	X	50.00	MoEF/BFD	Fund from the Government (development fund)	Integrated approach for tiger and biodiversity conservation adopted	Devepoment plan
	Control industrialisation and associated infrastructure in and around (i.e. impact zone) the Sundarbans, e.g. increase of boat traffic in major channels that will disrupt movement and gene flow resulting in habitat and population fragmentation of the tiger and prey.	X	X	X				Industrialisation and associated infrastructure in and around (i.e. impact zone) the Sundarbans controlled	Number of industries and infratructure
	Conduct economic assessment of the benefits of Sundarbans ecosystem services	X						Economic assessment of the benefits of Sundarbans ecosystem services conducted	Published report on ecosystem service valuation
	Develop revenue generation approaches based on conservation friendly activities	X						Revenue generation approaches based on conservation friendly activities developed	Type and number of revenue genartion approaches linked with biodiversity conservation
	Raise awareness in high and mid-level officials of all ministries of the Government about tiger and Sundarbans conservation, and its relationship with development policy	X	X					Awareness in high and mid-level officials of all ministries of the Government raised about tiger and Sundarbans conservation	Number of approved and adopted policy related to tiger and biodiversity conservation
	Raise public awareness across the country by mainstreaming tiger and Sundarbans conservation issues into the media	X	X	X				Mass people of the country became aware about tiger conservation and mass media working actively on the issue	Number of media and number of days casting awareness program by electronic media and popular articles by print media

BTAP Goals, objectives, actions and possible source of funding		Short Term (1-3 yrs) (2018-2020)	Mid Term (3-6 Yrs) (2021-2023)	Long term (7-10 yrs) (2024-2027)	Indicative Resource Requirement in million BDT	Manpower/ Human Resources	Possibe source of funding	Outcomes	Performance Indicator
3.3.5 INSTITUTIONAL DEVELOPMENT									
CHALLENGE GOAL: Improve conservation capacity in the BFD and its conservation partners									
Threat objectives	**Strategic action**								
Build management capacity to plan, implement and monitor BTAP activities High Priority	Assign a focal point in the BFD headquarter to implement BTAP and report to TCCC; assign dedicated BFD-WNCC staff to direct BTAP implementation and coordinate collaboration efforts	X			10.00	BFD/donor supported organization's manpower	Fund from Development Partner	Focal point appointed	Government order
	Prioritise BTAP threats and challenges to develop implementation strategies with collaboration and budget requirements	X						BTAP threats and challenges prioritzed and activtities of BTAP implementation strategies developed	List of threats and challenges; implementation strategy report
	Develop a scientific monitoring and adaptive management process.	X						Scientific monitoring and adaptive management process developed	Scientific monitoring and adaptive management process report
	Develop a management and stakeholder reporting process.	X						Management and stakeholder reporting process developed	Management and stakeholder reporting process report
Build field-level capacity to deal with immediate tiger conservation needs High Priority	Develop a THC protocol to improve management decision-making for different conflict scenarios.	X			10.00	BFD	Fund from the Government (development fund)	THC protocol to improve management decision-making for different conflict scenarios developed	Publihsed THC protocol
	Develop THC alleviation strategies including VTRTs (to reduce tiger and livestock killing), FTRTs (to reduce human killing incidents) and specialist teams (to deal with situations requiring tiger capture).	X						THC alleviation strategies developed and special team created to deal with situations requiring tiger capture	THC alleviation strategies report and special team formation order
	Sustain and strengthen the WCCU and WFL to tackle tiger and prey poaching, and poaching detection.	X						WCCU and WFL coninued working tackle tiger and prey poaching, and poaching detection	Number operations by WCCU and WFL
	Establish a research team to undertake tiger, prey and habitat monitoring programmes.	X						Research team to undertake tiger, prey and habitat monitoring programmes developed	Number of monitoring report on tiger, prey and habitat

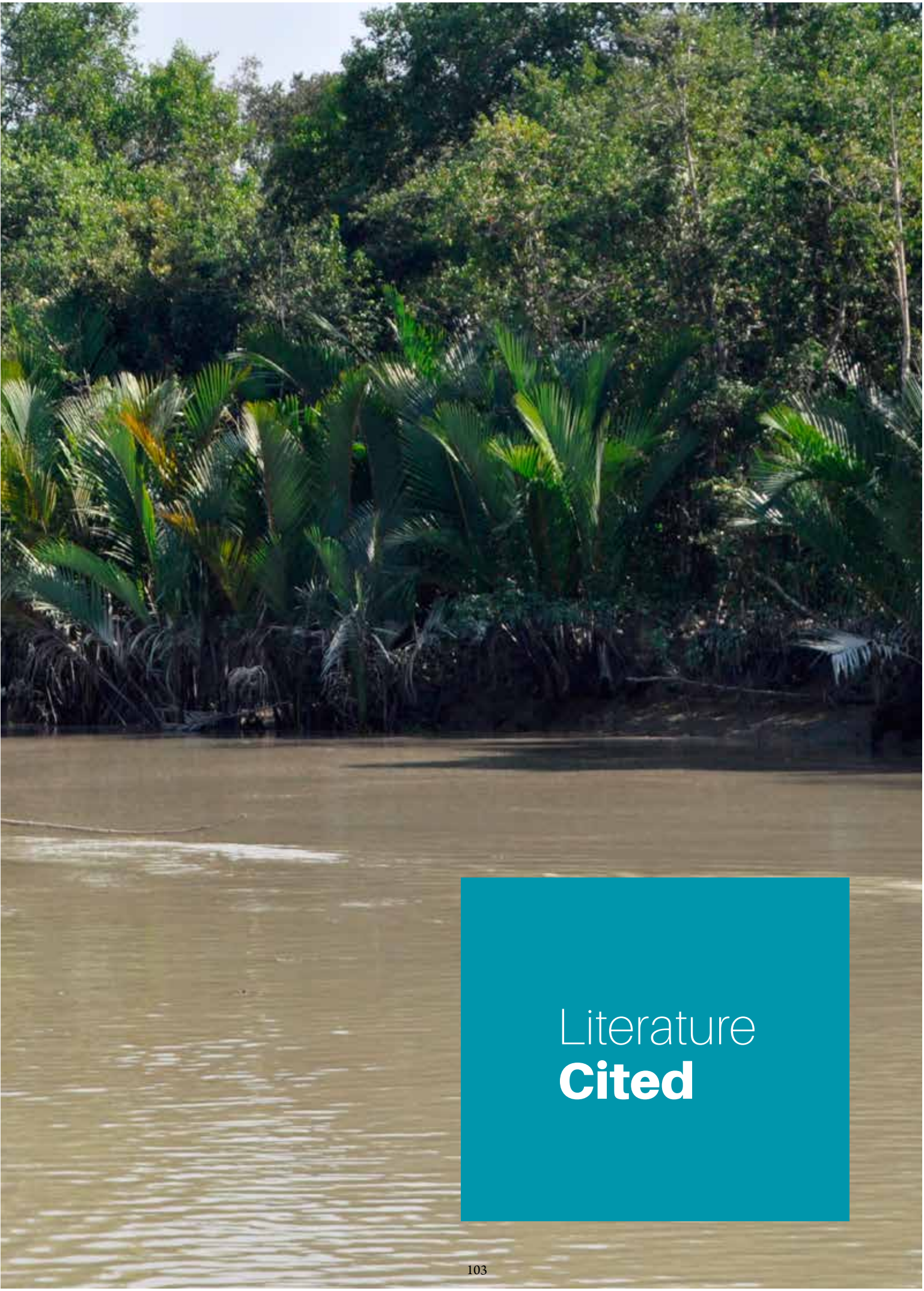
BTAP Goals, objectives, actions and possible source of funding		Short Term (1-3 yrs) (2018-2020)	Mid Term (3-6 Yrs) (2021-2023)	Long term (7-10 yrs) (2024-2027)	Indicative Resource Requirement in million BDT	Manpower/ Human Resources	Possibe source of funding	Outcomes	Performance Indicator
Build capacity for long-term tiger conservation (to last beyond the ten years of BTAP) Medium Priority	Enroll selected BFD officers for further study in conservation related-disciplines and leadership training.	X			80.00	BFD/donor supported organization's manpower	Fund from Development Partner	BFD officers studying in conservation related-disciplines	Number of BFD officers studying conseravtion related discipline
	Develop a sustainable financing mechanism for tiger conservation; initiate 'Tiger Conservation Fund'.	X						Sustainable financing mechanism for tiger conservation developed, 'Tiger Conservation Fund' initiated	Fund details
	Conduct an organisational review to understand opportunities for retention of wildlife staff within WNCC and also for BFD staff within the Sundarbans	X						Wildlife staff within WNCC and also for BFD staff within the Sundarbans retained	Organizational set up
	Sustain and strengthen the WC for wildlife conservation training programmes for wildlife and forestry staff.		X					Wildlife conservation training programmes for wildlife and forestry staff sustained	Number and frequency of training undertaken
	Link Sundarbans staff reviews and promotions to tiger and Sundarbans conservation goals and objectives.		X					Staff reviews and promotions linked to tiger and Sundarbans conservation goals and objectives	Staff review report
3.3.6 FOREST PROTECTION AND LAW ENFORCEMENT									
CHALLENGE GOAL: Improve law enforcement to ensure protection of tiger, prey and habitat									
Threat objectives	**Strategic action**								
Improve law enforcement capacity in the Sundarbans High Priority	Develop and implement a forest protection strategy to improve BFD patrolling (viz. SMART patrolling), monitoring, staffing, work incentives and staff living conditions.	X			50.00	BFD/RAB/ COAST GUARD/ NAVY/CPG/ CMC/VTRT	Fund from Development Partner	Forest protection strategy developed; staff living condition improved	SMART patrolling report, new building
	Train BFD staff on legislation and enforcement as well as on prosecution and wildlife crime documentation.	X						BFD staff trained on legislation and enforcement as well as on prosecution and wildlife crime documentation.	Number of staff trained; case filing report: POR, UDOR etc.

BTAP Goals, objectives, actions and possible source of funding		Short Term (1-3 yrs) (2018-2020)	Mid Term (3-6 Yrs) (2021-2023)	Long term (7-10 yrs) (2024-2027)	Indicative Resource Requirement in million BDT	Manpower/ Human Resources	Possibe source of funding	Outcomes	Performance Indicator
3.3.7 EDUCATION, AWARENESS AND COMMUNITY INVOLVEMENT									
CHALLENGE GOAL: Build national capacity to implement education and awareness programmes, and community involvement									
Threat objectives	**Strategic action**								
Ensure awareness and education is targeted at priority audiences Medium Priority	Develop a national tiger conservation education and awareness strategy	X			10.00	BFD/donor supported organization's manpower	Fund from Development Partner	National tiger conservation education and awareness strategy prepared	National tiger conservation education and awareness strategy document
Build capacity to implement awareness and education programmes Medium Priority	Organise training to build national skills in conservation communication and social marketing.		X		10.00	BFD/donor supported organization's manpower	Fund from Development Partner	Training to build national skills in conservation communication and social marketing organized	Number of training undertaken
Increase involvement and stake of local communities in tiger conservation Low Priority	Facilitate alternative livelihood options (especially focusing on tiger victim families) and incentives	X	X	X	50.00	BFD/donor supported organization's manpower	Fund from Development Partner	Alternative livelihood options (especially focusing on tiger victim families) facilitated	Nmber of AIG; number of family involved
3.3.8 RESEARCH AND MONITORING									
CHALLENGE GOAL: Increase capacity to conduct tiger conservation research and monitoring									
THREAT OBJECTIVES	Action								
Ensure research is prioritised by management needs Medium Priority	Develop a prioritised tiger conservation research and monitoring agenda to guide government agencies, academic institutions, NGOs and individual researchers.	X			5.00	BFD/donor supported organization's manpower	Fund from Development Partner	Tiger research agenda prioritized and documented	Research agenda document

BTAP Goals, objectives, actions and possible source of funding		Short Term (1-3 yrs) (2018-2020)	Mid Term (3-6 Yrs) (2021-2023)	Long term (7-10 yrs) (2024-2027)	Indicative Resource Requirement in million BDT	Manpower/ Human Resources	Possibe source of funding	Outcomes	Performance Indicator
Improve tiger base, and research and conservation knowledge learning facilities Low Priority	Establish a centre and network for tiger conservation and Sundarbans research and knowledge management.	X	X		50.00	BFD/donor supported organization's manpower	Fund from Development Partner	Research Center (managrove research center) established	Government order
	Develop a platform to facilitate sharing of information between national and international tiger conservation researchers.	X						Platform established to facilitate sharing of information between national and international tiger conservation researchers.	Government circulur
	Assess existing national and regional courses to understand need for an in-country conservation biology training programme.	X	X					National and regional courses on conservation biology undertaken	Course curriculum
Build new generation of tiger conservation scientists Low Priority	Set up tiger conservation scholarships to support study in a range of disciplines to tackle priority research and monitoring items; provide all sorts of assistance by BFD in tiger and Sundarbans oriented research projects.		X	X	80.00	BFD	Fund from Development Partner	Tiger scholarships initiated	Number of awardee; scholarship fund
3.3.9 COLLABORATION									
CHALLENG GOAL: Encourage collaboration to support the BFD in implementation of the BTAP									
Threat objectives	**Strategic action**								
Facilitate the engagement and coordination of collaborators Medium Priority	Under the guidance of TCCC develop a platform to build collaboration between the BFD and other parties for implementation as well as technical and funding support for BTAP activities	X			5.0	BFD/donor supported organization's manpower	Government Development Fiund/ Conservation partners	Collaborative body formed	Notification
Increase collaboration to increase available technical skills Medium Priority	Complete gap assessment of conservation skills to determine national and international collaboration requirements	X			50.0	BFD/donor supported organization's manpower	Government Development Fiund/ Conservation partners	Gap assessment of conservation skills to determine national and international collaboration requirements completed	Gap assessment report

BTAP Goals, objectives, actions and possible source of funding		Short Term (1-3 yrs) (2018-2020)	Mid Term (3-6 Yrs) (2021-2023)	Long term (7-10 yrs) (2024-2027)	Indicative Resource Requirement in million BDT	Manpower/ Human Resources	Possibe source of funding	Outcomes	Performance Indicator
Work with local communities to build joint solutions for tiger conservation Medium Priority	Develop a community collaboration approach for forest and tiger conservation including a supporting institutional structure	X			25.00	BFD/donor supported organization's manpower	Government Development Fiund/ Conservation partners	Community collaboration approach for forest and tiger conservation developed	Notification
	Develop capacity of local community members in mangrove forest and tiger conservation	X						Capacity of local community members in mangrove forest and tiger conservation developed	Capacity Assessment Report
Engage other government bodies to increase BTAP implementation capacity	Undertake joint initiatives with other Government agencies in areas of common interest, e.g. incorporation of Sundarbans conservation material into educational initiatives arranged by the Ministry of Education.	X	X		5.00	BFD	Government Development Fund	Joint initiatives with Ministry of Education and other Government undertaken	Course curriculum
High Priority	Raise awareness in high and mid-level officials of other Government agencies in tiger and Sundarbans conservation issues	X	X	X				High and mid-level officials become aware about tiger and Sundarban conservation	Awarness survey report
Engage neighbouring countries to implement trans boundary conservation initiatives	Open communication channels to develop joint activities with government and non-government organisations in neighbouring countries.	X	X	X	50.00	MoEF/BFD	Government Development Fiund	Channel developed for joint activities with government and non-government organisations in neighbouring countries.	Government Notification
	Develop a platform to enable government collaboration on cross-border		X	X				Platform established to enable government collaboration on cross-border	Government Notification
Medium Priority	Develop links and networks for sharing research results and conducting collaborative trans boundary research.		X	X				Links and networks for sharing research results and conducting collaborative trans boundary research established	Government Notification
Collaborate with the international community to tackle the trade in tiger parts Medium Priority	Form relationships with other governments and international organisations to conduct joint initiatives aimed at reducing the international trade in tiger parts.		X	X	5.00	MoEF/BFD	Government development fund	Platform established to curb cross boudary illegal trade on tiger and tiger parts	Government Notification
				BDT	**1285.0 m**				

Photo credit: Md. Modinul Ahsan



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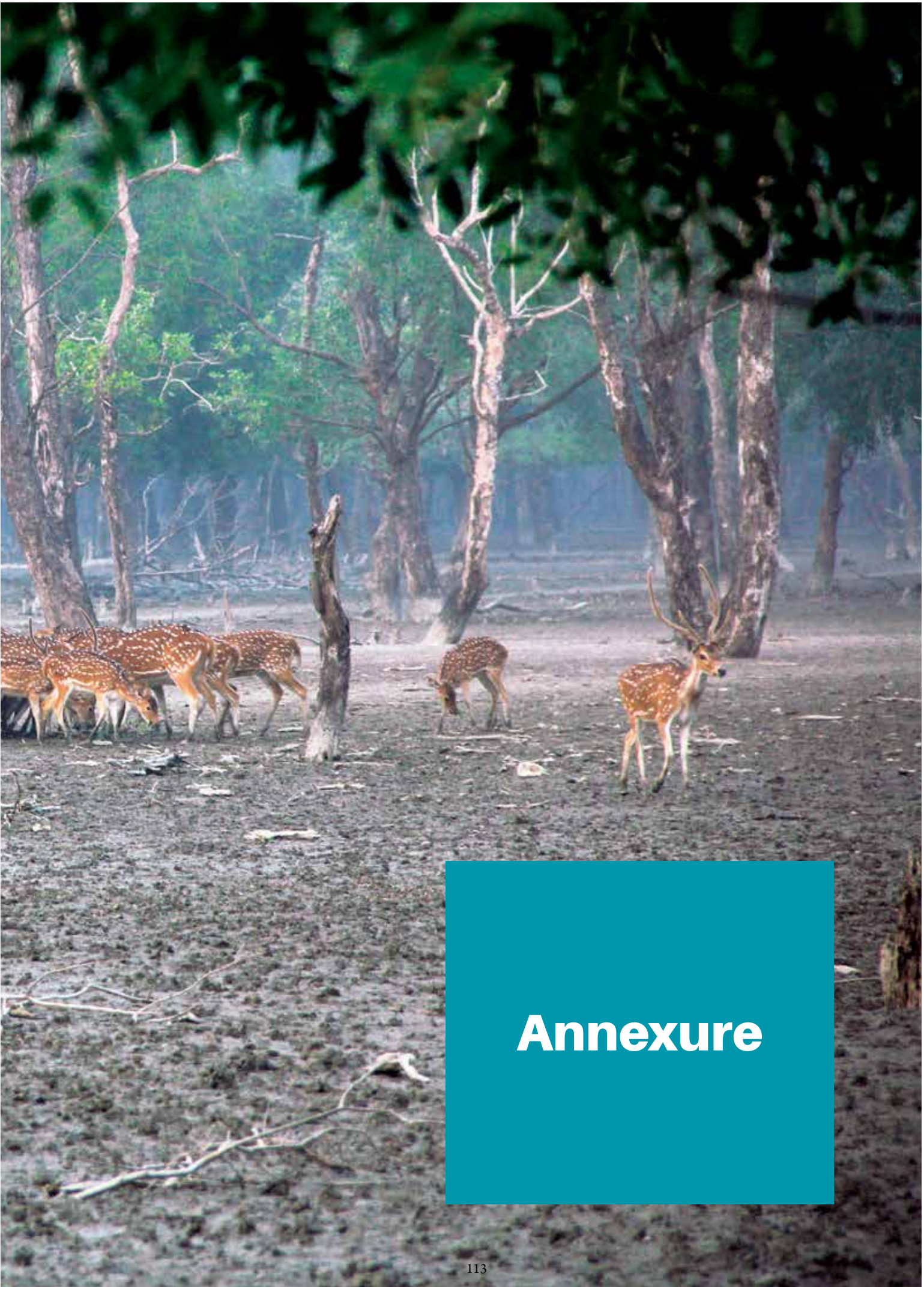

Annexure

Annex I

THE ST. PETERSBURG DECLARATION ON TIGER CONSERVATION

(Saint Petersburg, Russia, November 23, 2010)

We, the heads of the Governments of the People's Republic of Bangladesh, the Kingdom of Bhutan, the Kingdom of Cambodia, the People's Republic of China, the Republic of India, the Republic of Indonesia, the Lao People's Democratic Republic, Malaysia, the Union of Myanmar, the Federal Democratic Republic of Nepal, the Russian Federation, the Kingdom of Thailand, and the Socialist Republic of Vietnam, being custodians of the last remaining tigers in the wild, have gathered at an unprecedented Global Tiger Summit in St. Petersburg, Russian Federation, from 21 – 24 November 2010, with the common goal of tiger conservation.

We:

RECOGNIZE that Asia's most iconic animal faces imminent extinction in the wild. In the past century, tiger numbers have plummeted from 100,000 to below 3,500, and continue to fall. Tiger numbers and habitat have declined by 40 percent in the last decade alone, lost largely to habitat loss, poaching, the illegal wildlife trade, and human-tiger conflict. Three subspecies have already disappeared, and none of the other six are secure.

ACKNOWLEDGE that the tiger is one of the important indicators of healthy ecosystems and a failure to reverse these trends will result in not only the loss of tigers but also a loss of biological diversity throughout the entire Asiatic region, together with the tangible and intangible benefits provided by these magnificent predators and the ecosystems they inhabit.

NOTE that whilst the conservation of the tiger is primarily a national responsibility and that increased cooperation and coordination of efforts among the tiger range countries is essential, the reversal of this crisis is additionally dependent upon financial and technical support from the international community, bearing in mind

that most TRCs are developing countries The crisis facing the tiger has yet to receive the international attention it deserves and saving this species is a common responsibility.

UNDERSTAND the role of international agreements on the conservation of biological diversity and protection of rare and endangered species, including the tiger, such as the Convention on Biological Diversity, the Convention on International Trade in Endangered Species of Flora and Fauna (CITES), and the Convention on the Conservation of Migratory Species of Wild Animals (CMS).

ACKNOWLEDGE the work to date of the Global Tiger Forum and encourage its revitalisation and more active role.

RECALL AND ENDORSE The Manifesto on Combating Wildlife Crime in Asia, adopted in Pattaya, Thailand, in April 2009; The Recommendations of the Global Tiger Workshop in Kathmandu, Nepal, October 2009; The Hua Hin Declaration on Tiger Conservation at the First Asian Ministerial Conference on Tiger Conservation (1st AMC) in Hua Hin, Thailand, January 2010; and the Work Plan of the Pre Tiger Summit in Bali, Indonesia, July 2010.

WELCOME the adoption of National Tiger Recovery Programs (NTRPs) and the Global Tiger Recovery Program (GTRP).

ACKNOWLEDGE and appreciate the presence and support of other governments, international organisations, non-governmental organisations, and other supporters of tigers.

Photo credit: Md. Modinul Ahsan

THE THIMPHU AFFIRMATIVE NINE-POINT ACTION AGENDA ON TIGER CONSERVATION

Thimphu, Bhutan, October 23, 2012

The leaders of the governments of the 13 Tiger Range Countries1 (TRCs) met in November, 2010, at the International Tiger Forum in St. Petersburg, Russia, and declared their collective political will to take all action necessary to prevent the extinction of wild tigers. They set the goal of doubling the numbers of wild tigers globally by 2022 in the St. Petersburg Declaration on Tiger Conservation, and endorsed the Global Tiger Recovery Program (GTRP) as a road map to reach that goal, supported by international partners to mobilise needed external resources.

The TRC Ministers or their representatives who are charged with implementing the GTRP and its constituent National Tiger Recovery Priorities, met on October 22- 23, 2012, at the Second Asian Ministerial Conference on Tiger Conservation in Thimphu, Bhutan, to reflect on advances thus far, enhance the action agenda through 2014, and re-emphasise their political will for tiger conservation demonstrated at the International Tiger Forum.

Progressin reversing the wild tigers' decline toward extinction has been significant based on actions undertaken by TRCs. Nonetheless, the threats to wild tigers and their natural habitats are seen to be increasing. Tiger landscapes are economically and politically undervalued and their importance to human well-being poorly recognised.

Building on the pledges of the St. Petersburg Declaration, the Ministers or the Heads of Delegations of the TRCs have identified an affirmative nine-point action agenda up to 2014 and ask partners to intensify their support to:

1. **Actively strengthen front lines:** Urgently enhance rewards, recognition, and resources for frontline staff (in the form of numbers, institutional capacity, skills, tools, technology, infrastructure, operating costs, and insurance against loss of life and injury) in all TRCs over the next three years.
2. **Diligently conserve tiger habitat, inside and outside protected areas, against current and future threats:** Strengthen and continue programmes to extend protected areas, remove current encroachments in core breeding areas and ensure full public disclosure through land-use plans, mapping current and future threats, application of the principles of Smart Green Infrastructure, better science to maintain quality habitats, smart patrolling to increase management effectiveness, and improved monitoring, with necessary programmes and disclosure completed over the next two years.
3. **Significantly enhance engaging and sharing the benefits of conservation with communities**, making them partners in tiger and habitat conservation and expanding sharing of benefits from conservation, expanding alternative livelihood programmes, and promptly and adequately compensating villagers for losses due to/caused by tigers in all TRCs in two years.

4. **Enhance and mainstream collaboration among TRCs** in management of By issuance of the **Thimphu Affirmative Nine**- transboundary landscapes and corridors, combatting illegal trade, and eliminating illicit demand through bilateral/multilateral mechanisms and with the support of organisations such as ASEAN-WEN, SA WEN, INTERPOL, and others.

5. **Support TRCs with low tiger densities to launch tiger restoration programmes:** Build on lessons of success, create the conditions essential for successful restoration, and find suitable sources of tigers in at least two different national programmes over three years.

6. **Significantly accelerate the flow of national and external funds to support actions on the ground:** Focus new support on gaps and accelerate projects to implement National Tiger Recovery Priorities (NTRPs) and fully fund the Global Tiger Recovery Programme by 2014.

7. **Develop a new partnership with business and industry:** Engage business and industry in habitat conservation, valuation of ecosystems, sustainable finance, and outreach to consumers and other stakeholders, with five pilots that minimise and compensate for impacts to be launched across the TRCs in the next two years.

8. **Develop and implement comprehensive national awareness strategies and initiatives** to instill pride and bring people closer to nature to counteract the negative impacts on tigers from urbanisation, disengagement of youth, development, and loss of cultural heritage, and to widely disseminate the value of tiger conservation landscapes.

9. **Develop national action plans for a period of two years for each TRC with criteria and indicators to monitor NTRP/GTRP implementation.**

10. **Point Action Agenda on Tiger Conservation,** the TRC Ministers or the Heads of Delegations re-confirm their commitment to collective action and political leadership, together with the continued support of international partners to reach the goal of doubling the number of wild tigers globally by

Photo credit: Md. Modinul Ahsan

DHAKA RECOMMENDATIONS ON ADVANCING IMPLEMENTATION OF THE GLOBAL TIGER RECOVERY PROGRAM

Dhaka, Bangladesh. September 16, 2014

Senior Officials and Experts of the 13 Tiger Range Countries (TRCs) and partner organisations, development partners, and donors met from September 14 to 16, 2014, in Dhaka, Bangladesh, at the 2nd Stocktaking Conference to Review Implementation of the Global Tiger Recovery Program (GTRP). The GTRP is the road map endorsed by TRC leaders in 2010 at the International Tiger Forum in St. Petersburg, Russian Federation, to achieve the goal of the St. Petersburg Declaration on Tiger Conservation: double the number of wild tigers globally by 2022.

Building on the pledges of the St. Petersburg Declaration, the Thimphu Affirmative Nine-Point Action Agenda, which emerged from the 2nd Asian Ministerial Conference on Tiger Conservation, held in Bhutan in November 2012, outlines areas to be targeted for intensified efforts by the TRCs and partners.

In taking stock of the GTRP Implementation Plan 2013-14 based on the Thimphu Agenda, conference participants agreed that significant progress has been achieved in meeting the goals of the Thimphu Agenda and in addressing the wild tiger's decline toward extinction. Notable achievements include adopting new legislation and policies, creating new protected areas, growing transboundary collaboration, building capacity of frontline staff, and reaching out for the participation of the private sector; however, some areas of continued concern remain. Participants therefore recommend the following actions to advance implementation within the timelines of the Thimphu Agenda:

1. **To strengthen FRONTLINES:** Continue to increase investment in frontline staff remuneration, benefits (inter alia, risk allowances, rations, and improved quality of life), recognition, skills development, and field equipment and tools, including communications and transportation. Continue to professionalise their service through increased use of technology-based patrolling in protected areas and other tiger habitats. Maintain robust patrolling databases and improve intelligence-led enforcement.

2. **To conserve HABITAT:** Map and secure tiger habitat (protected areas, buffer zones, corridors, and other units) and land uses in tiger landscapes, employing new tools and technology for mapping and monitoring habitat. Assess and maintain functionality of corridors. Regularly assess management effectiveness in tiger protected areas. Convene national- or provincial-level meetings and working groups with relevant development sectors to develop Smart Green Infrastructure (SGI) applications in tiger landscapes threatened by infrastructure.

3. **To engage COMMUNITIES:** Expand capacity to deal with human-tiger conflict, which may increase with tiger or prey recovery, through national and local conflict-relief funds and publicise these efforts among affected communities. Make communities partners in conservation.

4. **To enhance COLLABORATION:** Actively engage with neighboring TRCs in transboundary landscape management. Actively improve international intelligence sharing, through existing channels, leading to enforcement operations including those in hot spots of illegal tiger trade. Actively promote multi-agency and multi-country collaborations through organisations such as SAWEN and ASEAN WEN. Make use of the valuable ICCWC Wildlife and Forest Crime Analytic Toolkit, which was successfully piloted in two TRCs.

5. **To launch RESTORATION:** TRCs and partners with the expertise commit to support ongoing plans of Kazakhstan, Cambodia, and China and encourage other countries and sites with low tiger densities to advance feasibility planning for restoration.

6. **To increase the FLOW OF FUNDS:** Continue to seek increasing governmental budgets for tiger conservation. Request development partners and donors to devote attention to the TRCs and themes that are underfunded. Establish or enhance national systems for tracking utilisation of financial resources for tiger conservation. Identify points of entry to access funding sources related to climate change adaptation and to smart green infrastructure for the GTRP.

7. **To develop new partnerships with BUSINESS AND INDUSTRY:** Take advantage of the Confederation of Indian Industry's (CII) offer to support and facilitate TRCs interested in industry engagement and seek other opportunities to leverage private-sector support.

8. **To build comprehensive AWARENESS and reduce illicit demand:** Conduct targeted and well-researched and designed programmes to reduce illicit demand for tiger parts and for prey species. Urgently assist in development of the Global Support Program for demand reduction. To support campaigns to reduce illicit demand, review laws and policies to ensure they contribute to these efforts.

9.a. **To MONITOR tigers, prey, and habitat:** By 2016, complete science-based national tiger monitoring and assessment to determine tiger population, prey, and habitat status in all tiger habitat. Undertake reserve-specific tiger monitoring using camera traps, DNA analysis ensuring transparency, or other intelligent technologies) to build up national tiger databases.

9.b. **To MONITOR GTRP implementation:** Continue to improve programme implementation and coordination through refinement of Key Performance Indicators, increased capacity to gather and report data, and harmonising KPIs to the Thimphu Agenda. Develop a more systematic and periodic monitoring and reporting strategy.

These recommendations will form the basis for the GTRP Implementation Plan 2015-2016, which will be presented for endorsement at the 3rd Asian Ministerial Conference on Tiger Conservation.

The TRCs appreciate the commitment of the Government of Bangladesh under the dynamic leadership of the Honorable Prime Minister Sheikh Hasina in tiger conservation. TRCs invite the Honorable Prime Minister to continue her stewardship of the St. Petersburg Declaration.

TRCs acknowledge and appreciate the significant contribution of the World Bank through the GTI to convene the TRCs' Heads of Governments, Ministers, and Senior Officials and the TRCs' partner organisations. This led to the development and sustained implementation of the GTRP and National Action Plans to double wild tiger populations globally by 2022, and has greatly elevated the tiger conservation agenda at the national and global levels. TRCs call for clarifying the future role of the GTI within the World Bank and, recognising the critical importance of maintaining the continuity of high-level government engagement enabled by the World Bank, the TRCs will in a timely manner explore and make recommendations on options for going forward so decisions can be made at the 3rd Ministerial Conference.

By adoption and issuance of the Dhaka Recommendations on Advancing Implementation of the Global Tiger Recovery Programme, Senior Officials and Experts of the TRCs express their resolve and conviction that following these recommendations, coupled with continued collective action and political leadership, will move us significantly closer to achieving the goal of doubling the number of wild tigers globally by 2022, and ensuring the integrity of tiger conservation landscapes.

Photo credit: Md. Modinul Ahsan

Annex II

FINDINGS FROM THE WORKSHOP ON UPDATING NATIONAL TIGER RECOVERY PROGRAM (NTRP)

Venue: Chandpai Range, Bagerhat

- Establish intelligence unit in BFD for monitoring and controlling tiger and prey poaching.
- Establish collaboration of BFD with other law-enforcing agencies for intelligence sharing and joint patrolling.
- SMART patrolling should cover the monitoring of tiger, prey and habitat, and should be conducted on water and land areas.
- Form an elite force by the best staff of the BFD, which will be dedicated for the Sundarbans and its biodiversity.
- Increase BFD staff capacity on proper evidence documentation and prosecution report writing, and create prosecution database for future reference.
- Introduce risk allowance, rationing and medical facility for BFD staff.
- Raise the public awareness by celebrating the International Tiger Day from grass-root up to the national level.
- Provide modest salaries to CPG, VTRT and CMC members.
- Establish floating camps in the boundary areas; check unloading of boats.
- Establish a wildlife rescue centre and a research station near the Sundarbans.
- Engage the local communities to develop ecotourism and provide technical and marketing support for handicrafts.
- Introduce remote sensing technology to detect the vegetation change.
- Increase international cooperation for wildlife crime monitoring and control.

Venue: Satkhira Range, Satkhira

- Suspend all kinds of resource harvest for a specific period of time.
- Increase trained manpower and logistics (including necessary fuel) in the BFD.
- Train BFD staff on tranquilisation, handling and translocation of tiger, and develop a number of teams (e.g. four teams for four ranges).
- Introduce risk allowance, rationing and medical facility for BFD staff.
- Encourage research (e.g. by waiving entry fee and VAT/IT) and ensure wide dissemination of research findings.
- Include tiger conservation issue in monthly coordination meetings of the local government and administration.
- Raise public awareness by sensitising and involving the local political leaders, involving the local government, meetings with resource harvesters, religious leaders and women (particularly 'uthan boithok' or home-yard meetings).
- Include tiger and Sundarbans conservation as well as tiger-human conflict mitigation issues in the school curricula, especially focusing on 'mangrove children'.
- Build online app to popularise and monitor the tiger conservation activities.
- Encourage donations for tiger conservation, especially from the companies using the tiger as brand.

Venue: Khulna Range, Khulna

The third workshop for Khulna Range was held on 21 Sep 2016 in Dacope, Khulna. A total of 40 participants had attended, of which 25 were BFD staff and the remaining 15 were other stakeholders. The new or modified strategic actions against some threat objectives are given below --

- Make legal arrangements to shift tiger poaching cases to Speedy Tribunal.
- Suspend all resource harvest permits, at least for a certain period of time.
- Strengthen and expand the SMART patrolling.
- Develop wireless communication, especially in areas out of cell phone network.
- Provide high-speed vessels, with fuel supply, in the BFD posts.
- Train BFD staff as well as FTRTs and VTRTs on wildlife conservation and management.
- Increase trained manpower and logistics in the BFD.
- Strengthen coordination between BFD and local administration and institutions.
- Introduce risk allowance for BFD staff.
- Share success stories and disseminate conservation messages through social media.
- Arrange awareness programmes in local schools and colleges.
- Advertise tiger and Sundarbans conservation through TV, radio and newspapers as well as through billboards and signboards.
- Motivate the poachers (to give up poaching) through local chairman, member, school teachers, religious leaders, etc.
- Establish a wildlife and mangrove forest research centre near the Sundarbans.
- Establish some interpretation centers in public/tourist places near the Sundarbans.

Venue: Sarankhola Range, Bagerhat

- Conduct strong anti-poaching operation by combined forces of BFD and all law-enforcing agencies (e.g., police, RAB, BGB, Coast Guard, etc.).
- Increase punishment for poaching and trade of tiger parts.
- Support and monitor legal procedures and pursue cases of tiger poaching to ensure punishment.
- Give reward for significant contribution to tiger and Sundarbans conservation.
- Arrange regular monitoring of tiger and prey through a combined team of all stakeholders.
- Ensure strong political commitment for tiger conservation.
- Provide essential logistics (e.g. sound-grenades, powerful torches, etc.) to BFD and community groups (e.g. VTRTs) to reduce tiger-human conflict.
- Provide basic skills development training to the community groups (VTRTs, FTRTs, CMCs and CPGs) to reduce tiger-human conflict.
- Assist regeneration of degraded forest patches along the periphery through new projects/programmes.
- Raise awareness through public debates (especially in the local educational institutions), discussion in mosques and temples, and through billboards and posters.
- Support and expand traditional 'pata' songs and street drama to strengthen tiger conservation.
- Include tiger and Sundarbans conservation in the school curricula.

Photo credit: Md. Modinul Ahsan

Venue: Khulna

- Develop conservation awareness and education strategy, and select the priority audience for conservation education and awareness through literature review and local consultancy.
- Develop an interactive exhibit and campaign programme (through local government, community based organisation, religious leaders and political leaders).
- Incorporate the conservation oriented curriculum in the school text books and implement educational institute based conservation awareness programmes.
- Implement community based conservation education and awareness for FRC and dependent communities.
- Develop locally appropriate educational materials to empower awareness raising activities through social media campaigning.
- Develop a functional platform for executing conservation education and awareness programmes.
- Develop a network of local communities, NGOs, local government and institutions in order to raise public awareness.
- Develop Training of Trainers, focussing particularly the school teachers) on conservation education.
- Appoint a focal point at BFD headquarter for BTAP and NTRP planning, implementation and monitoring.
- Clarify the roles and responsibilities of the DFO-WNCC in relation to the territorial divisions of the BFD.
- Increase the field level capacity of the CPGs (Community Patrol Groups) in order to reduce tiger-human conflict.
- Ensure coordinated conservation efforts involving BFD and other law enforcing agencies.
- Materialise the link between the Sundarbans staff reviews and promotions to tiger conservation goals and objectives.
- Ensure that performance incentives are given on the basis of wildlife-related offence detection and control; allocate various incentives (viz., hardship, risk and saline area allowances) to the BFD staff working in the Sundarbans.
- Improve BFD patrolling (e.g. full-fledged SMART patrolling) in the Sundarbans.
- Ensure sufficient community patrolling and watching in the villages around the Sundarbans.
- Establish a joint surveillance team of BFD, RAB, police, BGB, Coast Guards and Bangladesh Navy.
- Recruit sufficient number of Assistant Wildlife Wardens in the Sundarbans in order to strengthen the wildlife management.
- Maintain specific dress code, with modern arms, for all officers and staff of the BFD working in the Sundarbans.

- Revisit the Wildlife Act in relation to the prey base in the Sundarbans, particularly focusing on increasing the punishment and penalty for prey poaching.
- Declare the impact zone (i.e. ECA) up to 20 km outside the boundary of the Sundarbans.
- Develop a platform to build collaboration between the BFD and other parties to technical and funding support for BTAP activities including the academic and research institutions.
- Establish the 'Sundarbans Academy' in collaboration with the academic institutions.
- Develop a platform to enable Government collaboration on cross-border monitoring and control of illegal trade in tiger parts.
- Assure the abidance of conservation related international conventions to which Bangladesh is a signatory.
- Ensure collaboration with relevant international organisations (viz. CITES, UN bodies, Ramsar, IUCN, WWF, Interpol, etc.) to strengthen tiger conservation.

Photo credit: Emdadul Islam Bitu

Photo credit: Md. Modinul Ahsan

Venue: Khulna Range, Khulna

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- Establish a wildlife and mangrove forest research centre near the Sundarbans.
- Establish some interpretation centers in public/tourist places near the Sundarbans.

The **Strengthening Regional Cooperation for Wildlife Protection** (**SRCWP**) project, the first World Bank supported regional project in South Asia, aims to build country capacity and incentives for tackling the illegal wildlife trade and other selected regional conservation threats to habitats in border areas. The project was launched in 2011 in Bangladesh and Nepal in the first phase and Bhutan joined in the second phase to bring regional collaboration in combating wildlife crime through strengthened legislative and regulatory frameworks and well-equipped specialized agencies and systems, as well as relevant training and awareness programs for staff responsible for enforcement of wildlife laws and regulations. The project is also supporting the institutional strengthening of the South Asia Wildlife Enforcement Network (SAWEN) which was established by SAARC countries in 2011 to combat wildlife crime in the South Asia Region.

The Bangladesh Forest Department (BFD) is implementing the project through a partnership with research institutes, universities and environmental NGOs. A total of 36 sub-projects have been supported to improve the management of protected areas and conservation of flagship species through a landscape approach. Some of the sub-projects are addressing human-wildlife conflict through engagement with the local communities and civil society to foster an enduring culture of wildlife stewardship and protection. The regional wildlife project has supported the establishment of a Wildlife Crime Control Unit (WCCU) within the Wildlife Circle, three Wildlife divisions in the Forest Department, and a Wildlife Centre to undertake training, research, education and awareness on the issues of wildlife conservation and protection. This publication has documented the outcome of the sub-project entitled “Implementation of National Tiger Recovery Programme (NTRP)”

Wildlife Managment and Nature Conservation Division, Khulna

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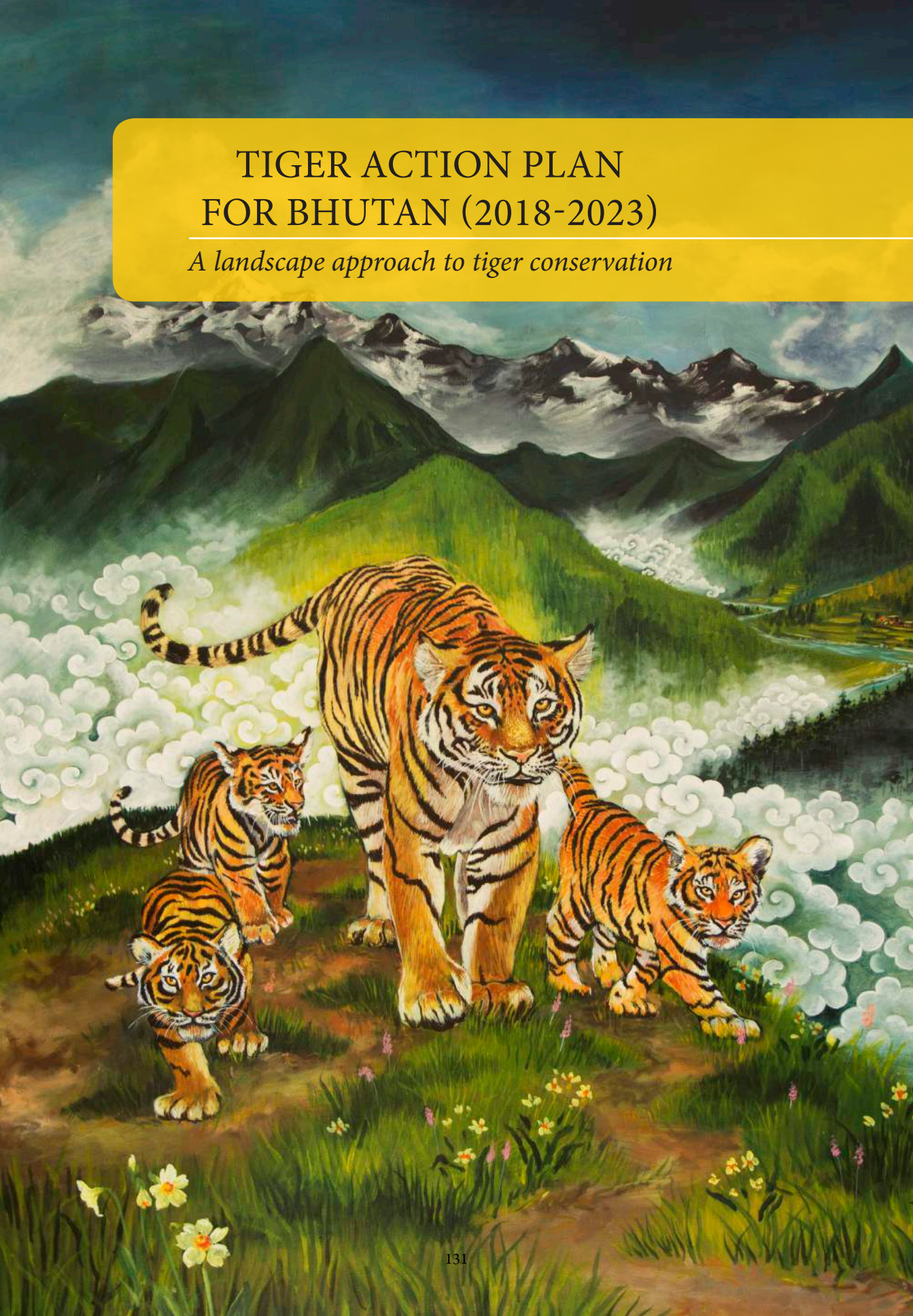
TIGER ACTION PLAN FOR BHUTAN (2018-2023)

A landscape approach to tiger conservation



Tiger Action Plan for Bhutan (2018-2023)

A landscape approach to tiger conservation

Nature Conservation Division
Department of Forests and Park Services
Ministry of Agriculture and Forests

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ROYAL GOVERNMENT OF BHUTAN
Ministry of Agriculture & Forests
Tashichhodzong, Thimphu : Bhutan

MINISTER

19th July 2018

FOREWORD

While rest of the world are whirling under the threat of species extinction, habitat loss and changing climate, we here in Bhutan are fortunate to have our visionary monarchs for their stewardship in environmental conservation. We propelled into the 21st century as the champion and the leader in environmental conservation in the world. Today, Bhutan is a part of global biodiversity hotspot and hotspot for wild felids.

Large carnivores are threatened throughout their range and their populations in the wild continue to decline. Just over a century ago, there were as many as 100,000 wild tigers living in Asia. Today, fewer than 3,900 tigers remain in the wild occupying a mere seven percent of their historic range. Tigers remains as Endangered on the IUCN Red List of Threatened Species for almost a half century now. Bhutan as one of the tiger range countries is critical in conserving this charismatic species in wild for perpetuity.

Globally, tigers and the landscapes they occupy plays a significant role in maintaining ecological balance and providing ecosystem and economic services. These magnificent animal occupies a special place in the culture and tradition around the world. In Bhutan, tigers are revered as symbol of strength and power associated with the religion and the culture.

I am delighted to note that this new tiger action plan will be implemented in this crucial time for tiger conservation. Globally, we are in the last quarter of the 2010 St. Petersburg Declaration on tiger population doubling and for Bhutan, it coincides with the starting of the 12th Five Year Plan and the Bhutan for Life Project implementation. I am convinced that our commitment to achieve the global goals through our local actions is clearly manifested in this action plan.

I congratulate and extend my appreciation to the Department of Forests and Park Services and others involved in the formulation of this action plan. I wish them good luck for the successful implementation of the plan.

Tashi Delek!

(Yeshey Dorji)
Minister, Ministry of Agriculture and Forests
Chairman, Global Tiger Forum

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ROYAL GOVERNMENT OF BHUTAN
Ministry of Agriculture & Forests
Tashichhodzong, Thimphu : Bhutan

སྒྲུང་ཚེན།
SECRETARY

18th July 2018

PREFACE

With the completion of the first Tiger Action Plan from 2006-2015, Bhutan today is a proud home to an estimated 103 tigers which shares the landscape along with other charismatic species such as snow leopards, clouded leopards, elephants and many other globally threatened species. The 2015 tiger population estimate is a massive increase from the 1998 survey which estimated about 75 tigers in the country. This increase in population is a testimony to the importance placed on environmental conservation by our benevolent leaders.

It is my pleasure to introduce the second Tiger Action Plan for Bhutan which will be implemented in the next five years from 2018-2023. I am delighted to know that the plan period is in synchrony with the 12th Five Year Plan of the Royal Government of Bhutan and also the first five year of Bhutan for Life project implementation. This gives us a huge opportunity in harmonizing the strategies and actions of these plans towards achieving the common goal within the limited resources.

As we are in the eighth year of the famous St. Petersburg Declaration of 2010 on doubling the global tiger population by 2022, this new action plan signifies our continued commitment to the declaration and will serve as a guiding document for the next five years in achieving our goals by the end of 2022.

This tiger action plan intends to address the direct threats to tigers through strengthened anti-poaching and combating illegal wildlife trade by enhancing the capacities and coordination of our rangers and law enforcement agencies. Habitat management will be carried out both inside and outside the protected areas to increase and retain the herbivore population in wild which not only lead to increase in tiger population, but also aid in reducing conflict with humans. As ensuring safety of both humans and tigers are important, addressing human-tiger conflict through preventive and adaptive mitigation measures with involvement of the local communities is an important part of this plan.

Lastly, I would like to express my sincere gratitude and congratulations to the Department of Forests and Park Services and others who were involved for their hard work and dedication in coming up with this holistic plan.

Tashi Delek!

(Rinzin Dorji)

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Royal Government of Bhutan
Ministry of Agriculture and Forests
Department of Forests and Park Services
Thimphu

DIRECTOR 12th July 2018

ACKNOWLEDGEMENT

This document is an outcome of unwavering support and valuable contribution from many institutions and individuals. The Department of Forests and Park Services would like to sincerely thank all the Chief Forestry Officers (CFOs) and focal officers from both functional and field offices and Director, Ugyen Wangchuck Institute for Conservation and Environmental Research (UWICER) for their valuable inputs during formulation of the plan. We appreciate the commendable initiative by Nature Conservation Division in taking this task forward.

The Department gratefully acknowledge the contributions of Mr. Phub Dhendup- Sarpang Forest Division, Dr. Phuntsho Thinley, Mr. Tiger Sangay and Mr. Tashi Dhendup- UWICER, Dr. Tshering Tempa- Global Tiger Center, Mr. Vijay Moktan- WWF Bhutan, Mr. Lhendup Tharchen, Mr. Sangay Dorji, Mr. Ugyen Penjor and Mr. Tandin- NCD for their hard work in developing and shaping this plan. We also remain highly indebted to Dr. Eric Wikramanayake for his valuable feedbacks and inputs in this plan.

We would like to extend our heartfelt gratitude to the continued generosity extended by our partners in conserving and promoting our rich biodiversity and particularly tiger conservation works. In particular, we acknowledge the generous financial support provided by WWF Bhutan in development of this action plan.

Tashi Delek and Best Wishes!

(Phento Tshering)

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Executive Summary

With more than 71 percent of its geographic area under forest cover and over 51 percent of the country under protection, Bhutan enjoys the fruit of wise and visionary leadership of our benevolent monarchs in environmental conservation. The stringent yet dynamic conservation legislations backed by pro-environment development policies and Buddhist ethos has propelled us into the 21st century as an 'epitome' and the global leader in environment conservation. Today, Bhutan is a part of global biodiversity hotspot thus explicating our significance in the global conservation.

The tiger has been listed as Endangered on the IUCN Red List of Threatened Species since 1969. Their population in the wild plummeted from over 100,000 just a century ago to fewer than 3,900 today, occupying a mere seven percent of their historic range. In Bhutan, the establishment of Department of Forests in 1952 and enactment of Forest Act of Bhutan in 1969 initiated tiger conservation backed with legal protection. The tiger surveys of 1989, 1998 and 2015 estimated tiger population in the country with improved methods over the years. Today, Bhutan is home to estimated 103 adult tigers freely roaming between 100 and 4300 meters amsl.

Bhutan prepared and implemented the first Tiger Action Plan from 2006 to 2015 much of which were the part of the national tiger recovery program concomitant to the 2010 St. Petersburg declaration of doubling the tiger population. With the first plan expiring in 2015, a revised action plan was felt necessary to carry forward the activities in fulfilment of the commitments to global tiger recovery program and the recommendations from the national tiger survey (2014-2015). This plan is a product of substantial contribution from the field managers, relentless support from the core working group and valuable inputs from the experts and reviewers.

During the inception workshop with the field managers, threats, challenges and their drivers were identified. Major threats to tiger conservation in Bhutan are; 1. Poaching and illegal trade, 2. Prey depletion, 3. Human tiger conflict, 4. Habitat degradation and fragmentation, 5. Diseases and 6. Climate change. The strategies actions and interventions in this plan are designed to directly address the threats and challenges and its drivers.

This action plan was prepared (revised) with the vision of achieving and maintaining a viable population of tigers and their prey, coexisting in harmony with humans in an interconnected landscape. The goal of the action plan is to increase tiger population in Bhutan by 20 percent by 2022 from the 2015 baseline of 103. The goal is expected to be achieved by implementing actions under the four major objectives as listed below.

The first objective is to reduce poaching of tigers by 90 percent. Strengthening anti-poaching using SMART patrolling and zero poaching strategy is the major activity. Additionally, staff capacity, coordination amongst different agencies, infrastructure and equipment development, improving communication, awareness and advocacy and transboundary coordination are deemed important.

Habitat improvement and management is the second important objective. Habitat improvement will be achieved through enrichment plantations, salt lick and waterhole creation, management of grassland and abandoned grazing grounds. Zoning and delineating critical tiger habitats both within and outside protected areas is important for long-term survival of tigers. Developmental activities in such critical habitats should be guided by principles of smart green infrastructure. Some of the tiger habitats will be managed as per the CA|TS standards.

Human-tiger-conflict is detrimental to both humans and tigers. Conflict prevention strategies through awareness, improved livelihood opportunities, and construction of physical barriers are often helpful when supported by mitigation measures like compensation and insurance schemes. Understanding the nature of conflict and its distribution is necessary in developing future management strategies.

Tiger conservation needs to be guided by a sound scientific data and information. For that, periodic assessment of tiger population and distribution is deemed important for the long term conservation planning. Besides, information on ecology, movement and genetics are also essential. In addition, detailed study on the impact of climate change, threats from zoonotic disease and feral/stray dogs on tigers in Bhutan is felt urgent and warrants immediate action.

The plan will be implemented from July 2018 to June 2023 for the period of five years. The total estimated cost is Nu. 619.63 Million of which, majority of the fund will be financed from Royal Government of Bhutan and Bhutan for Life project while the balance fund gap will be sourced from other donors.

List of Acronyms

BTFEC	Bhutan Trust Fund for Environmental Conservation
BFL	Bhutan for Life
CDV	Canine Distemper Virus
CITES	Convention on International Trade of Endangered Species of Wild Fauna and Flora
DoFPS	Department of Forests and Park Services
DoL	Department of Livestock
FNCRR	Forest and Nature Conservation Rules and Regulations 2017
FPED	Forest Protection and Enforcement Division, DoFPS
FYP	Five Year Plan
GEF	Global Environment Facility
GTC	Global Tiger Center, Gelephu
GNHC	Gross National Happiness Commission
IUCN	International Union for Conservation of Nature
MoAF	Ministry of Agriculture and Forests
NCD	Nature Conservation Division, DoFPS
NSB	National Statistics Bureau
PA	Protected Area
RGoB	Royal Government of Bhutan
RMNP	Royal Manas National Park
SMART	Spatial Monitoring and Reporting Tool
TCP	Tiger Conservation Program
UWICER	Ugyen Wangchuck Institute for Conservation and Environmental Research, DoFPS
WWF	World Wildlife Fund

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Chapter I: Introduction

1.1. Environment conservation in Bhutan

While rest of the world are whirling under the threat of species extinction, habitat loss and fragmentation, and climate change, we here in Bhutan are fortunate to have wise and visionary monarchs for their leadership in environmental conservation. The stringent yet dynamic conservation legislations backed by environmental-friendly development policies has helped to maintain the pristine biodiversity intact. This has propelled us into the 21st century as the champion and the leader in environmental conservation in the world. Today, Bhutan is a part of biodiversity hotspot (Myers et al., 2000) and hotspot for wild felids (Tempa et al., 2013). With more than 70 percent of its geographical area under forest cover and over 51 percent of the country protected in the form of national parks and biological corridors, Bhutan is the land of pristine forests, clean water, and fresh air. It is perhaps one of the few landscapes on the earth where snow leopard (*Panthera uncia*) and tiger (*Panthera tigris)* habitat overlaps in a common landscape. Buddhist belief and ethos that respects all life forms has allowed tiger and their prey species to co-exist alongside humans and livestock (Li et al., 2013).

Environmental conservation is one of the four pillars of Bhutan's development philosophy, the Gross National Happiness. As reflected in the constitution, Bhutan is mandated to maintain at least 60 percent of its land under forest cover for all times to come. The forests interwoven with free-flowing rivers and biological corridors houses endangered royal Bengal tigers, elusive snow leopards, elegant black-necked cranes and Asiatic elephants besides many other species.

The paradox of conserving wildlands, while at the same time improving human welfare has exhorted much debate. Most countries are geared towards human welfare and socio-economic development and are experiencing profound economic growth fueled by open markets and globalization. Bhutanese society is undergoing changes in recent times as Bhutan became a constitutional democracy with increasing economic development.

In pursuit of economic development, forests are increasingly cleared for roads, hydroelectric dams, power transmission lines, mines and commercial logging. In the last 5 years, 3 mega hydro-power dams were constructed in prime tiger habitat with growing evidence of the biodiversity threats of hydropower throughout the Himalayas (Pandit & Grumbine, 2012) . While the proponents of these economic development projects claim that environmental disturbances are temporary, the scale and intensity of development is unprecedented through Bhutan's history. Therefore, the need for the conservation of our rich natural heritage is felt urgent more than ever in today's world of globalization and consumerism.

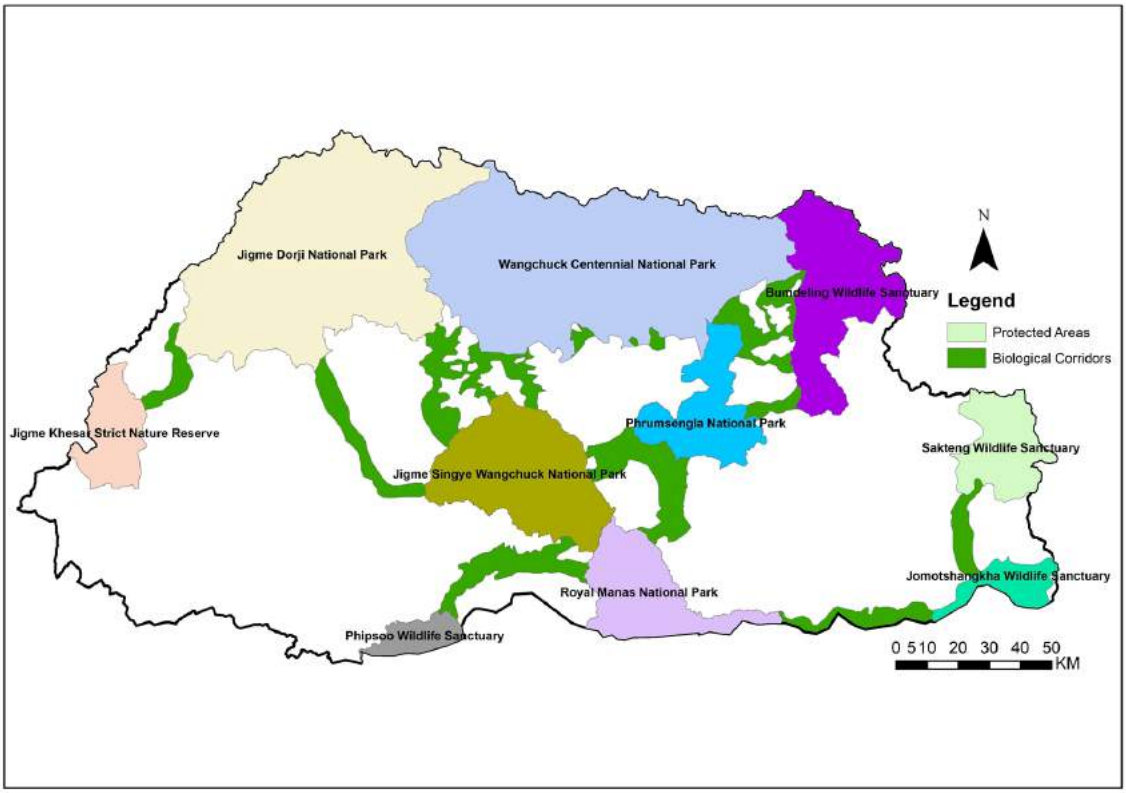


Figure 1. Map showing protected areas of Bhutan.

1.2. Global status and distribution of tigers

Large carnivores are threatened throughout their range and their populations in the wild continue to decline due to habitat loss and fragmentation, prey depletion and direct poaching for illegal trade and commerce (Ripple et al., 2014). The tiger is one of the biggest and most fearsome predators in the world. Just over a century ago, there were as many as 100,000 wild tigers living in Asia. Today, fewer than 3,900 tigers remain in the wild.

Earlier, the tiger was classified into nine subspecies, three of which (Javan, Caspian, and Bali) were considered extinct. A fourth, the south-China subspecies, is most likely extinct in the wild and existing subspecies are Bengal, Indochinese, Sumatran, Siberian, and Malayan (Goodrich et al., 2015). However, the recent taxonomic revision by the International Union for Conservation of Nature (IUCN) Cat Specialist Group has clubbed tigers into two sub species; *Panthera tigris tigris* distributed in mainland Asia, including India, Pakistan, Nepal, Bhutan, Sikkim, China, Russia, Indochina and the Malay Peninsula and *Panthera tigris sondaica* found in Sumatra and formerly Java and Bali (Kitchener et al., 2017). Tigers are listed as "Endangered" in the IUCN Red List of Threatened Species.

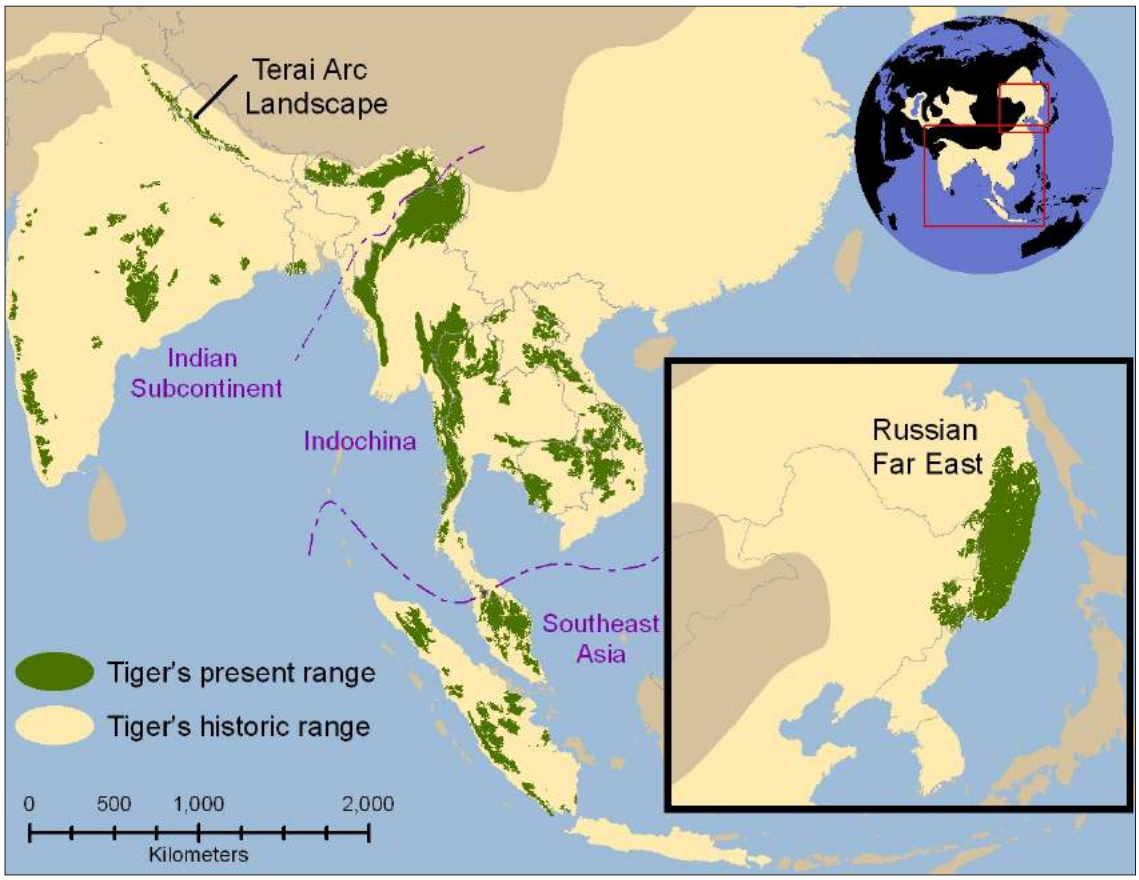


Figure 2. Historic and present distribution of tigers (Dinerstein et al., 2007)

Tigers once roamed across the Asian and Caucasian continent stretching from the south of Caspian Sea in the west to the Indonesian islands of Java and Bali. Tigers today occupy a mere seven percent of its historic range in south and southeast Asia, northeastern China and the Russian far east (Seidensticker, 2010; Dinerstein et al., 2007) in a diverse landscapes from rainforests to grasslands, savannahs to mangrove forests, and high altitude habitats of the Himalayas to the boreal forests of the Russian far east (WWF, 2016) thus displaying the testimony of ubiquity and adaptability across the range of habitat.

1.3. Tiger conservation in Bhutan

The conservation of tigers in Bhutan started with establishment of the Department of Forests in 1952. The first Forest Act of Bhutan in 1969 provided the legal protection to the tiger, the same year tigers were listed as endangered species by IUCN. This act was later replaced by the Forest and Nature Conservation Act of Bhutan 1995 and enlisting tigers under totally protected Schedule I species. The first nationwide tiger survey based on social survey and anecdotes was carried out in 1988 (Dorji & Santiapillai, 1989) and estimated about 150 tigers in Bhutan. The second nationwide tiger survey was carried out using sign survey (pug marks) from 1996 to 1998. The

result from this survey was the basis for the Tiger Conservation Strategy for the Kingdom of Bhutan was developed in 1998 (McDougal & Tshering, 1998).

In 2003, the government created the Tiger Conservation Fund to compensate livestock kills by tiger, snow leopard and common leopard. In the same year, Bhutan ratified the Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES), thus duly enforcing regulations pertaining to illicit trade of endangered species and their derivatives.

The Tiger Action Plan for the Kingdom of Bhutan (2006-2015) was developed in 2005 (NCD, 2005). This plan identified the key threats to tigers and proposed opportunities for tiger conservation, and laid down detailed planning and activities for the conservation of tiger and its habitats, including the broader plans to mitigate tiger-human conflicts through social and educational components.

Further, the Bhutan National Human-Wildlife Conflicts Management Strategy of 2008 provides specific plans to mitigate the conflicts through livestock intensification and compensation programs, and research on tiger ecology (NCD, 2008). The penalty under the Forest and Nature Conservation Rules of 2006 for killing of a tiger was revised to Nu.1 million in 2013.

The nationwide tiger survey using state of the art method (Spatial Capture-Recapture (SCR) using camera trap was conducted in 2014-2015 (DoFPS, 2015). The recent estimate of tiger population in Bhutan is 103 tigers at a density of 0.46 tigers per 100 km^2 for the whole survey area of 28,225 km^2 (DoFPS, 2015) . Tigers are distributed through the north-western, central, and south-central part of the country between the altitudinal ranges of 150 to 4,300 meters. However, they are mostly concentrated in north-western, central and south-central region. Tiger photographs and signs were also detected from areas like Bumdeling Wildlife Sanctuary, Jigme Khesar Strict Nature Reserve, Samtse Forest Division and Tashigang Forest Division from where tigers were not recorded during the nationwide tiger survey.

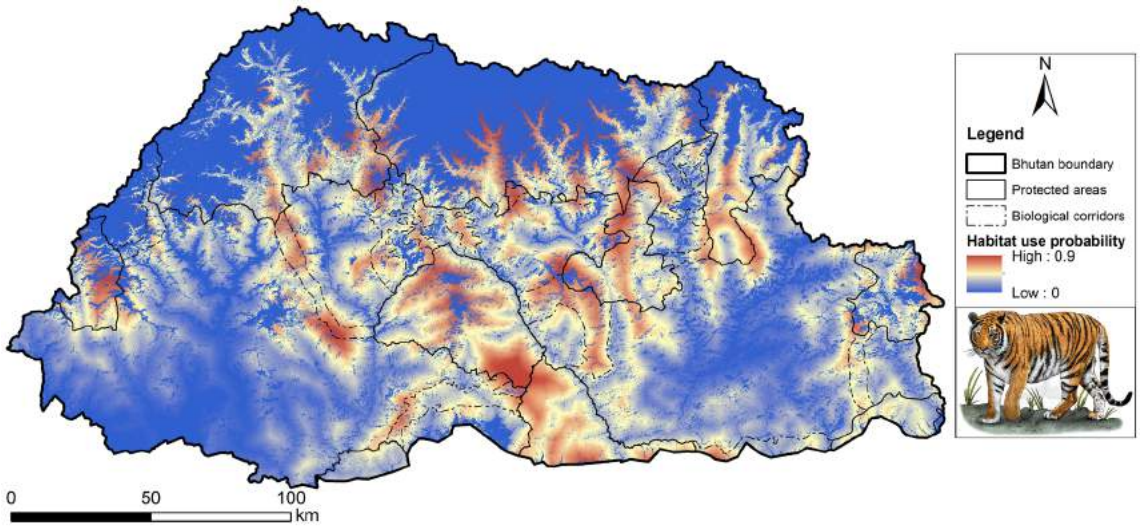


Figure 3. Tiger distribution map for Bhutan (NCD, 2018)

1.4. Rationale and progress for Tiger Action Plan revision

The Tiger Action Plan for the Kingdom of Bhutan 2005-2015, expired in 2015. Significant achievements were made by implementing this tiger action plan. To take forward the tiger conservation works to the next level in the light of new issues and challenges, the revision of old tiger action plan is felt necessary.

In 2010, the heads of the 13 Tiger Range Countries met in St. Petersburg, Russia and pledged to double the number of wild tigers by 2022. Bhutan being one of the tiger range countries has also agreed to increase its tiger population. As we are already halfway through to the St. Petersburg declaration, it is important to expedite the national tiger recovery program to achieve the global commitment. The revised tiger action plan will guide towards achieving the targets by 2022 and further strengthening the tiger conservation in Bhutan.

Also, the findings from the recent tiger survey of 2014-15 emphasizes providing protection outside of the protected areas as tigers are not confined only to the protected areas. The tiger habitat outside the protected areas are mostly engaged in forest related services delivery and do not have specific plans for any conservation activities. The survey findings also recommended zoning of suitable tiger habitats, corridor management, need to strengthen patrolling and tiger recovery and reintroduction programs.

More recently, the death of the tiger at the wildlife rescue and rehabilitation unit in Thimphu due to neuro-cysticercosis has raised concerns over the prevalence of zoonotic diseases in the wild in Bhutan. This needs to be examined and preventive and mitigation measures to be put in place.

This action plan is the product of a detailed consultative meeting with the chief forestry officers and relevant officials of the protected areas and field divisions and tiger biologists at Gelephu in November 2017 followed by the meeting of the core team at Punakha in March, 2018. With extensive reviews and inputs from the experts, the plan was approved by the Department of Forests and Park Services in July 2018.

Chapter II. Importance of tiger conservation

2.1. Ecological significance

As apex predators, large carnivores play an important role in ecosystems and provide important ecosystem services (Karanth et al., 2003; Ripple et al., 2014). Being on the top of ecosystem, tigers are considered as the umbrella species. Their presence in the food web is an indicator of the health of the ecosystem. The tiger range covers around 70 million hectares, the large majority of which is also in four biodiversity hotspots, the world's richest places in terms of plant and animal diversity: Eastern Himalayas, Indo-Burma, Western Ghats and Sundaland (Millenium Ecosystem Assessment, 2005).

In conserving tigers we also conserve some of the richest ecosystems, including habitats of some of the globally threatened species like Asian elephant, greater one-horned rhino, clouded leopards, red pandas, etc. Conservation policies and investment spurred on by interest in tigers will also benefit thousands of other species, many of which are threatened. (WWF, 2017).

In Bhutan's Jigme Dorji National Park, areas occupied by tigers were found to experience significantly fewer incidences of crop and livestock losses to ungulates and guild species compared to those without tigers (Thinley et al., 2018).

2.2. Ecosystem services

Tiger landscapes provide many ecosystem services that spill out beyond the range of the tiger. It is estimated that, on average, forests in tiger landscapes have nearly 3.5 times the amount of carbon than forest areas outside tiger landscapes (WWF, 2017).

Much of South Asia suffer from water stress which is projected to become critical in many areas by 2040, leading to local and international conflict, including political tensions. In addition, land use change, combined with agricultural intensification, has reduced water quality throughout many tiger-range countries (WWF, 2017). Tiger conservation landscapes overlap with nine globally important watersheds, covering 5.8 million km^2, which serve as water sources for agriculture, energy generation, industry and domestic use for up to 830 million people (Pienkowski et al., 2017).

In Bhutan hydropower is the leading sector in generating revenue for the government and the tiger habitats overlap with the headwaters that maintain and regulate flows to the dams. Water regulation and purification values for every hectare of forest protected in Bhutan have been estimated at over US$6,000 per year (Kubiszewski et al., 2012).

Tiger habitats, mostly forests, off-sets the effects of natural hazards such as floods, landslides, tsunamis, storm surge, erosion, droughts, fires, and hurricanes. They also conserve crop wild relatives and wild food sources (WWF, 2017).

2.3. Economic benefits

Tiger landscapes are a vital safety net for local communities by providing access to sustainable natural resources for subsistence and sale. Poor people are highly dependent on forest ecosystem

services for water, food, medicine, fuel, and fiber. It is estimated that 80 percent of the income of the rural poor in southeast Asia is derived from the local biodiversity. Tiger landscapes are repositories of herbal plant richness (WWF, 2017).

Tiger landscapes support agriculture by supplying fresh surface and ground water, protecting soil from erosion, and regulating local weather; they also enhance food security by providing a source of wild genetic material for plant breeders (WWF, 2017).

The other charismatic megafaunas living in tiger landscapes are highly attractive to tourists, creating economic opportunities for local people in the ecotourism industry. It has been estimated that global protected areas generate over US$600 billion per annum in revenue from visitors (Balmford et al., 2015). The role of tigers in tourism is important across the tiger range, although benefits are unevenly distributed (Carter & Allendorf, 2016). Ecotourism is the fast growing and most profitable segment of the tourism industry.

2.4. Cultural significance

Tigers occupy a special space in the spiritual beliefs and cultural history in Asia. Many indigenous people live in tiger habitat and preserving tigers can also preserve traditional cultures. Tiger landscapes protect sacred natural sites important to a range of faiths, and more generally, protection of the tiger plays a very important cultural role around the world.

In Bhutan, tigers are deeply rooted in the religious and cultural heritage. As early as the eighth century, Guru Padmasambhava, was believed to have flown from Singye Dzong to Taktshang (tiger's nest) monastery, riding on a tigress. Tigers are regarded as one of the four powerful animals, called the “four dignities” - *Tak* (Tiger), *Seng* (Snow lion), *Chung* (Garuda), and *Druk* (Dragon). The tiger is the third animal in sequence among the twelve Buddhist zodiac signs.

Culturally, tigers are revered as the symbol of strength and ferocity. Believing that tiger pictures can ward off evil spirits, murals with tiger paintings are often seen. Tigers are believed to be the manifestation of the local deities, and many places in Bhutan are named after the tigers.



Chapter III: Threats and Challenges

3.1. Threats

3.1.1. Poaching and the illegal trade of tiger parts and derivatives

Poaching of tigers for illegal trade is the greatest threat for the tigers' survival today across all the tiger range countries. In Bhutan, wildlife poaching in general has never been considered as a significant threat for conservation, however, not undermining the current trend of wildlife poaching. The belief that most Bhutanese are Buddhist and they will not harm other sentient being is still strongly held by many Bhutanese. Thus, we are unwilling to accept that poaching is a major threat for tigers in Bhutan.

However, the data available with the Department of Forests and Park Services (DoFPS) on tiger poaching is an ominous indication that tiger poaching is rampant in Bhutan. From 2013-2017, 17 cases involving poaching and illegal trade of tigers were recorded and prosecuted. This is almost 20% of the total tiger population in Bhutan. Many such cases would have gone undetected by the authorities. Tiger poaching incidences involving organized groups and various techniques were detected by the frontline staff.

Bhutan, due to porous border with neighboring countries, also witness poaching from across the border in some of the prime tiger habitats. Bhutan is also increasingly being used for the transportation of tiger parts and its derivatives. This is a threat not only for tigers in Bhutan, but also for the tigers in the region.

As tigers are highly territorial animal, infanticide from unrelated male/female is a common occurrence. Poaching of one dominant tiger means wiping out the whole family of that tiger. Thus, tiger poaching in Bhutan like in any other tiger range country is the main threat for the future survival.

3.1.2. Prey depletion

Tiger as an obligate carnivore will invariably depend on the availability of prey species. In Bhutan, sambar deer and wild pig are the most important prey species of tiger. Livestock also contribute to large proportion of tiger diet (Wang & Macdonald, 2006) in the mid-temperate regions of Bhutan. These assemblages of tiger prey (wild and domestic) further supplemented by smaller prey such as serow, muntjac and goral enable tigers to breed and reproduce even at high elevations. However, as the number of trans-humans decreases in tiger habitats and the prey availability for tigers also decreases. Further, the loss of grazing grounds to shrubs and trees also reduce the prime habitat for wild herbivores.

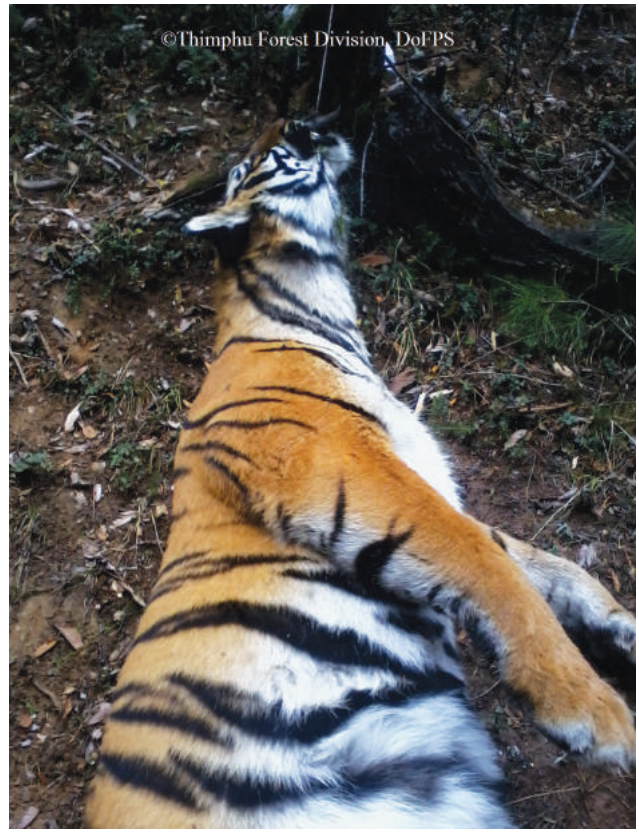
Wild pigs, sambar deer and barking deer are considered as pests to the farmers and are often prosecuted and killed. Although not widespread, this is a serious threat that should be addressed immediately. Poaching from across the border for the prey species like sambar, gaur and wild pigs is also a major cause for the reduction of prey population.





3.1.3. Human-Tiger Conflict leading to retaliatory killing of tigers

Large carnivores have undergone striking declines in both population size and geographic range with 61 % of the world's large carnivore species being threatened with extinction (Ripple et al., 2014). A major driver of these declines has been persecution by humans driven by real or perceived threats to human lives and/or their livestock (Ripple et al., 2014; Dalerum et al., 2009). Such threats can prompt retaliatory and preventative killings of carnivores, causing their translocations, incur high costs for rural people, and result in negative attitudes by local people, thereby reducing support for conservation (Mc Manus et al., 2014).



A small proportion of Bhutanese households also dwell within Protected Areas and Biological Corridors. An estimated 5325 households reside inside the park, and additional 1662 households reside within the buffer of 500 meters from the parks. About 3425 households falls inside the biological corridors and additional 2748 households within the buffer of 500 meters from biological corridors. These households depend on forests for timber, fodder, fuel and non-wood forest products. For instance, in the Royal Manas National Park (RMNP), a core habitat for tigers, 62 % of households depend on forests for fuel and fodder. Farming communities are also severely impacted by human-wildlife conflict. More than 50% of the households in RMNP succumb to loss of either crops or livestock to wild animals. Poisoning of the livestock kills and setting up snares are often deployed in retaliation to the tigers.

3.1.4. Habitat degradation, fragmentation, and loss

Bhutan being a growing economy, developmental activities are taking a heavy toll on natural resources and is expected to accelerate in the coming years. As per the Annual RNR Statistics of 2016, within the last five years, Bhutan has lost 38,581 acres of State Reserve Forest to infrastructure development like power transmission lines, roads, institutions, land substitution, etc., (MoAF, 2016).

Tiger is a wide-ranging species and requires a large tract of connected landscapes with minimal human interference. Habitat fragmentation due to infrastructure development can limit the dispersal of new individuals, thereby causing bottleneck in gene flow (Mills, 2012).

Thus, securing the critical habitats for tigers and its prey will be instrumental in saving the wild tigers from local extinction.

3.1.5. Diseases

In addition to the pressure of habitat loss, poaching and retaliatory killing, a new threat to tiger populations in the wild has surfaced in the form of communicable zoonotic diseases. There is a need for long-term wildlife monitoring and health surveillance in identifying emerging threats in endangered species.

Canine distemper virus (CDV) is the second most common cause of infectious disease death in domestic dogs and is a significant viral disease of global importance in common and endangered wild carnivores. CDV has recently been identified in populations of wild tigers in Russia and India and is a significant threat to small, isolated tiger populations.

The recent incident of tiger which came close to human habitation and later captured and died at the wildlife rescue and rehabilitation unit at Taba was discovered with tapeworm cysts in the brain which is suspected to be contacted from domestic animals.

3.1.6. Climate change

Climate change is an emerging and important threat to biodiversity (Beamount et al., 2011) and is likely to affect the persistence of large, space-requiring species through habitat shift, loss, and fragmentation. Anthropogenic land and resource use changes related to climate change can also impact the survival of wildlife. Thus, climate change has to be integrated into biodiversity conservation plans (Forrest et al., 2012).

The tiger habitats in Bhutan are mostly montane habitats and these are some of the most vulnerable ecosystem to climate changes. Climate change impacts may manifest directly, such as through the physiological stress experienced when ambient summer temperatures exceed organisms' tolerance level. This would lead to shift in their ranges from productive prime lowland tiger habitats to less productive uplands. Other impacts occur indirectly through effects on interactions with other species including prey, co-predators (guild), competitors, parasites or hosts, or on a species' habitat, as well as through interactions with other putative threatening processes such as habitat loss. Erratic monsoon and extreme weather patterns may lead to failure

in agriculture crops thereby increasing the poverty of the farming communities in rural areas and increase the incidences of tiger poaching. Poverty, poaching, and wildlife trades are intricately linked to each other (Challender & MacMillan, 2014; Duffy & St John, 2013).

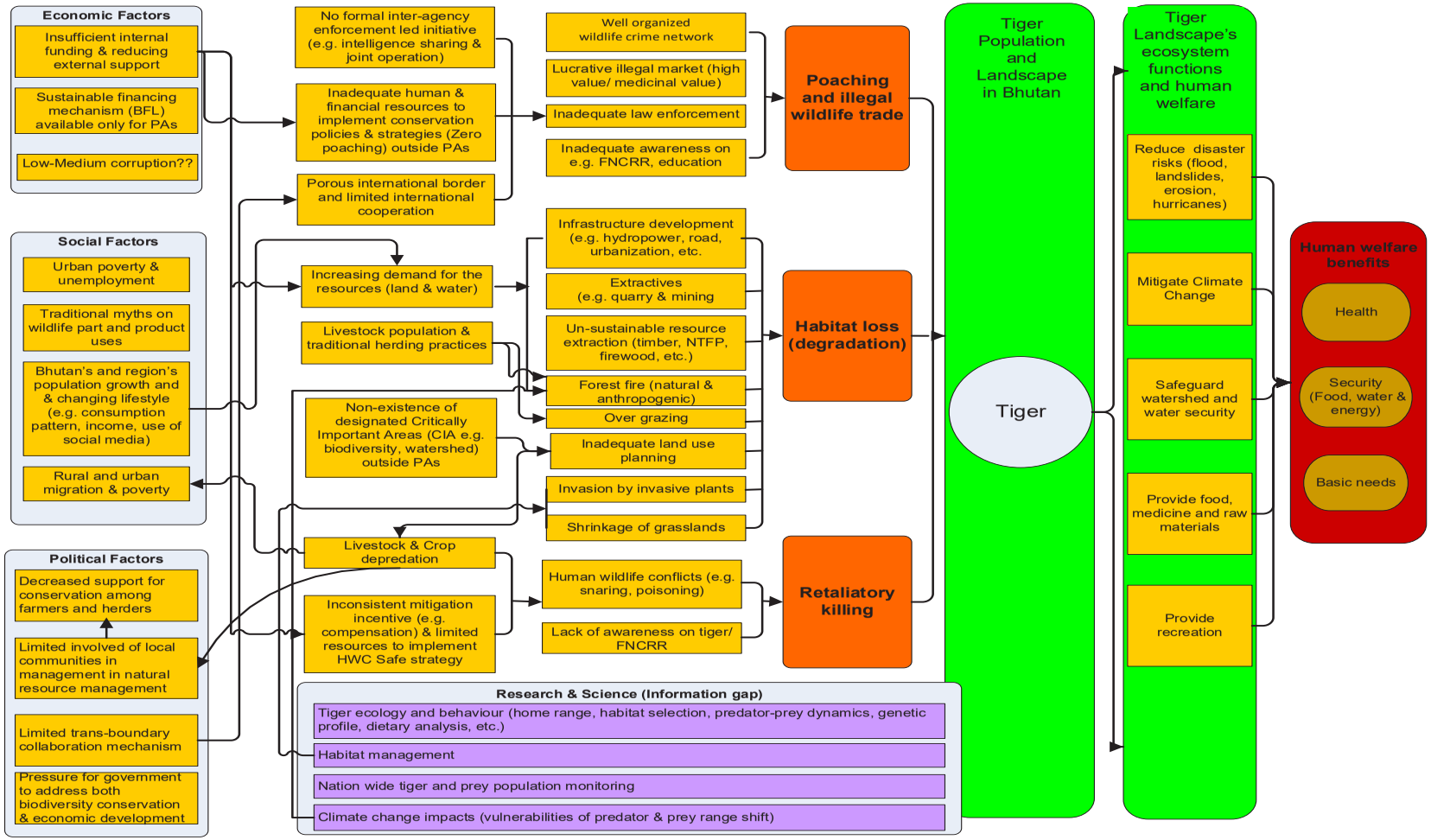
3.2. Challenges

3.2.1. Inadequate resources and capacity for tiger conservation

Studies show that fewer than 10 percent of the protected areas in tiger landscapes have highly effective management, and 20 percent have an absolute lack of management. A global study on the management effectiveness in protected areas found that 65 percent of the assessed protected areas had significant management deficiencies (GTIS, 2010).

The assessment report on the protected areas of Bhutan shows that the protected areas are managed well. However, the assessment found that effectiveness is limited by a low level of resources (both financial and technical) and due to gaps in monitoring and research data, which limits the ability to understand the impact of conservation intervention, reaction to changing conditions and undertake adaptive management to improve efficiency and effectiveness (MoAF, 2016).

Conceptual Framework on Tiger Conservation in Bhutan



Chapter IV: Action Plan

4.1. Vision, Goal and Objectives

4.1.1. Vision:

"A viable population of tigers and their prey, coexisting with humans in an interconnected landscape"

4.1.2. Goal:

By 2023 tiger population in Bhutan increased by 20 percent from the 2015 baseline through enhanced protection and improved habitat.

4.1.3. Objectives

Objective I: Reduce poaching of tigers by 90 percent at the end of plan period.

Objective II: Manage critical tiger habitats within and outside protected areas.

Objective III: Reduce human-tiger conflict.

Objective IV: Increase science based information on tiger, prey and their landscape.

4.2. Objective I: Reduce poaching of tiger by 90 percent at the end of plan period.

Rationale

Illegal killing, trade and use has been, and remains today, one of the main causes of the drastic and apparently continuing decline in the numbers of many world's most charismatic endangered species (Corlett, 2007). The DoFPS during the year 2013 and 2014 recorded 159 cases of wildlife crime and collected more than Nu.10.5 million as fines and penalties. In the last five years from 2013-2007, 17 cases involving poaching and illegal trade of tiger were recorded and prosecuted. Species such as the musk deer and the Himalayan black bear are poached for the musk and bile respectively, while tiger and common leopard are indiscriminately caught in the snares intended to trap other species or are deliberately poisoned in retaliation.

In order to tackle poaching and illegal trade of wildlife including charismatic species such as tiger and elephants, Bhutan now adopts a Zero Poaching Strategy containing six major pillars: 1) Assessment; 2) Technology; 3) Capacity; 4) Community; 5) Prosecution; and 6) Cooperation. The National Zero Poaching Strategy (2018-2023) containing a more unified anti-poaching actions is now in place for rollout at national level. The activities of this action plan will be supported by Zero Poaching Strategy for effective implementation and measurably move towards zero poaching in all the important habitats of tigers in Bhutan.

Output 1.1: Current wildlife protection in Bhutan assessed.

Action 1.1.1: Conduct protection assessment and develop poaching hotspot map, identify priority areas for enforcement and enhance SMART rollout.

Output 1.2: SMART patrol program fully implemented by all the field offices.

Action 1.2.1: Finalize setting up SMART data model & reporting requirements for Bhutan.

Action 1.2.2: Train data officers on SMART software for tactical patrolling.

Action 1.2.3: Carry out regular SMART patrolling in all field divisions.

Action 1.2.4: Develop mechanisms to share intelligence reports among the field offices.

Action 1.2.5: Develop and maintain database of patrolling and surveillance reports at the field offices and headquarter.

Action 1.2.6: Carry out refresher course and capacity building on SMART patrolling.

Output 1.3: Strengthened infrastructure and equipment support for anti-poaching effectiveness.

Action 1.3.1: Set up Forest Protection and Enforcement Unit (FPEU) in each forest division and protected areas.

Action 1.3.2: Strengthen Forest Protection and Enforcement Section under Forest Protection and Enforcement Division.

Action 1.3.3: Set up and equip guard posts in strategic locations.

Action 1.3.4: Support frontline staff with field gears to patrol remote areas.

Output 1.4: Improved communication systems for protection.

Action 1.4.1: Set up repeater for wireless communication in appropriate locations.

Action 1.4.2: Maintain and improve existing communication system.

Output 1.5: Awareness campaigns conducted on significance of tiger conservation.

Action 1.5.1: Conduct education and awareness campaigns among communities on ills of wildlife poaching.

Action 1.5.2: Organize religious discourses on the spiritual linkage of conservation and human wellbeing.

Action 1.5.3: Identify & support nature clubs in schools as ambassador of conservation.

Action 1.5.4: Observe Global Tiger Day at appropriate locations.

Output 1.6: Strengthened capacities of law enforcement divisions under MoAF.

Action 1.6.1: Strengthen and support legal services under MoAF.

Actionn1.6.2: Conduct awareness workshop on FNCRR and other relevant legislations for all the field divisions.

Action 1.6.3: Train field staff in basic enforcement skills including wildlife crime detection and prosecution.

Output 1.7: Enhanced cooperation and coordination among the law enforcement agencies.

Action 1.7.1: Conduct workshop on detection of illegal wildlife trade with law enforcement agencies.

Action 1.7.2: Develop protocols for recording and reporting of illegal wildlife trade.

Action 1.7.3: Formalize inter-agency intelligence led enforcement initiatives at national level.

Action 1.7.4: Strengthen on ground intelligence led enforcement initiatives.

Output 1.8: Strengthened transboundary cooperation on tiger conservation.

Action 1.8.1: Organize regular meetings and workshops at transboundary level to discuss issues, challenges and best practices.

Action 1.8.2: Arrange exchange visits for the forestry officials.

Action 1.8.3: Coordinate and collaborate with park official and other stakeholders from India on synchronized anti-poaching patrol, tiger monitoring and other activities.

4.3. Objective II: Manage critical tiger habitats within and outside protected areas

Rationale:

Habitat degradation and fragmentation is another primary threats to maintaining viable population of tigers and their prey in the country. Empty forest syndrome (Datta, Anand, & Naniwadekar, 2008) is the common phenomena in the mountainous landscape. A good forest cover do not necessarily translate into a good tiger habitat. Our leaders and predecessors has done extremely well in protecting the forest and securing the habitats of tigers in Bhutan.

As Bhutanese farmers abandoned the old practice of *tseri* agriculture (slash and burn agriculture practices) and trans-migratory livestock herding practice, *tseri* and grasslands are overtaken by woody shrubs and trees (Siebert & Belsky, 2014). Intermediate disturbance regimes like fires and logging trend to increase herbaceous biomass for ungulate which in turn may benefit carnivores (Hebblewhite, Munro, & Merrill , 2009). Heterogeneous habitat (mixed of grasslands and grazing ground, forests) instead of pure forests covers tend to support more of the tiger's primary prey species (Bhattarai & Kindlmann, 2012; Simcharoen et al., 2014).

Except in small pocket of RMNP, active habitat management is not being carried out in most tiger habitats in Bhutan. The existing alluvial grasslands are invaded by trees and other woody shrubs in the south. The traditional grazing ground are also increasingly being lost to trees and

woody species in the mid-temperate forests as our farmers are increasingly abandoning their old lifestyle of migratory cattle herding. Therefore, traditional grazing grounds in the temperate mid-altitudes and existing alluvial grasslands in the south should be actively managed so that it will benefit ungulate species and other large tiger prey.

Thus, to fulfil our objective of increasing tiger number in Bhutan by 20% by 2023, an active habitat improvement is critical.

Also in order to maintain ecological integrity and connectivity of Bhutan's tiger landscape, it is imperative to identify and map areas of high ecological significance like breeding/source sites; good tiger habitat under high anthropogenic threats; tiger habitat with high religious and cultural significance; and connectivity breaks and bottleneck habitat areas.

A systematic review of all the legislation, policies and plans has to be carried out in order to harmonize tiger habitat management with conflicting human land-use.

Output 2.1: Critical tiger and their prey habitats zoned and delineated within and outside the protected area network

Action 2.1.1: Identify and map critical tiger habitat for protection and management interventions.

Action 2.1.2: Conduct stakeholder consultation meeting to harmonize critical tiger habitat maps with developmental master plans.

Output 2.2: Critical tiger habitats managed as per the habitat management guidelines

Action 2.2.1: Carryout grassland management including controlled burning and weed eradication.

Action 2.2.2: Initiate habitat improvement through enrichment plantation of native palatable species and removal of invasive species.

Action2.2.3: Maintain and improve the existing cattle grazing lands (tshamdos) for wild herbivores.

Action 2.2.4: Maintain natural water holes and saltlicks and create new ones on need basis.

Output 2.3: Principles of smart-green infrastructure adopted and implemented for infrastructure development in the critical tiger habitats.

Action 2.3.1: Organize sensitization workshops on smart-green infrastructure with relevant stakeholders.

Action 2.3.2: Organize exposure trips for relevant stakeholders to understand and appreciate the features of smart-green infrastructure.

Action 2.3.3: Incorporate smart-green features in the national and local infrastructure development plans.

Action 2.3.4: Enforce and monitor smart-green features in infrastructure development in the tiger habitats.

Output 2.4: Tiger and prey habitat change and management interventions studied and monitored.

Action 2.4.1: Identify and establish permanent plots in tiger habitats at different ecological zones.

Action 2.4.2: Assess the effects of road and infrastructural developments on the habitat connectivity for tiger and prey.

Output 2.5. At least 5 tiger sites (PAs and forest divisions) managed as per CA|TS standards.

Action 2.5.1: CA|TS registration of the tiger sites.

Action 2.5.2: Field assessment of the tiger sites and propose for accreditation to CA|TS.

4.4. Objective III: Reduce human-tiger conflict

Rationale

Human–wildlife conflict is one of the most critical threats faced by many wildlife species today (Dickman, 2010). Conflict between people and felids is one of the most urgent wild cat conservation issues worldwide, yet efforts to synthesize knowledge about these conflicts have been few. The severity of conflict increases with felid species' body mass and is therefore of greatest significance for the conservation of the larger species (Inskip & Zimmermann, 2009).

In Bhutan, restrictions on the use of common grazing lands by farmers and a culture of lax livestock husbandry practices, have exacerbated the conflict (Wang & Macdonald, 2009) and eroded the Buddhist ethic of tolerance towards predator. In addition, the land-sharing ethic that characterizes the regulation of Bhutanese protected areas allows natural resource use (e.g., grazing, agriculture, and collection of non-wood forest products) within park boundaries (Wang, 2010), which increases the chances of conflicts. Accordingly, farmers in central Bhutan ranked livestock predation, together with crop damage, as the most serious threats to their livelihood, and several farmers expressed a desire to exterminate problem wildlife (Wang & Macdonald, 2006).

Output 3.1: Understood human tiger conflict scenario in Bhutan

Action 3.1.1: Carry out hotspot mapping highlighting spatio-temporal characteristics of the conflict.

Action 3.1.2: Assess social characteristics (social dynamics and tolerance level), severity and impacts of the conflict.

Action 3.1.3: Develop and maintain human- tiger conflict data base both at central and field level.

Output 3.2: Enhanced prevention of human tiger conflict in Bhutan.

Action 3.2.1: Conduct mass education and awareness on the conflict scenario and preventive measures, policy, strategy and science of human-tiger conflict in Bhutan.

Action 3.2.2: Improve livestock management through improved breeds and enhanced guarding practices.

Action 3.2.3: Install low-voltage electric fences to minimize loss of crop and cattle to wildlife.

Action 3.2.4: Establish and strengthen visitor information centers at field offices.

Output 3.3: Mitigation measures put in place in case of conflict occurrence

Action 3.3.1: Establish and strengthen HWC committee at national and community level.

Action 3.3.2: Develop a standard conflict reporting system for Bhutan.

Action 3.3.3: Develop national policy for ex-gratia payment in the event of loss of human life or injury.

Action 3.3.4: Strengthen and support the livestock insurance and compensation schemes.

Action 3.3.5: Initiate community based ecotourism in the tiger landscapes.

Action 3.3.6: Link and establish PES schemes in the tiger landscapes.

4.5. Objective IV: Increase science based information on tiger, prey and their landscape

Rationale

It is often said "you can't manage what you don't measure". A fundamental approach to effective conservation and management must be guided by rigorous science. And information generated through science-based gauge must be put into use in various formats.

Monitoring of wildlife population is one of the most important management programs that helps managers and decision makers to detect the extent and direction of wildlife population changes (Karanth et al., 2003; Mills, 2012; Oli & Mills, 2013). Targeted, or hypotheses based monitoring (Nichols & Williams , 2006) should be incorporated as part of our programs for tigers and other wildlife in Bhutan. This will not only detect the changes in the wildlife population trends, but also help identify the cause of such changes. For example, if poaching is a primary threat for tiger conservation in Bhutan, then designing monitoring protocols to detect poaching activities will provide information on the severity of poaching and its impact to tigers. This will enable managers to take appropriate management actions, rather than waiting to see the trend of

population decline and then beginning to ask if poaching or disease or other factors are the main cause of the decline.

Camera trapping has become one of the most important tools for monitoring the tiger populations. This should be carried out on regular basis in the protected areas. Such monitoring should be expended to other tiger habitat at national level every 5 years. To monitor tiger movements and fine scale resources selection and to address and prevent human wildlife conflicts, radio-telemetry studies must be conducted. Social demographics and public perception monitoring should be carried out every 5 years in the protected areas.

Output 4.1: Tiger and prey population periodically monitored using robust scientific design and analysis.

Action 4.1.1: Establish long term monitoring protocol for tigers and prey species.

Action 4.1.2: Conduct nationwide tiger population revalidation survey every five years.

Action 4.1.3: Evaluate tiger and prey distribution and produce demographic reports.

Action 4.1.4: Conduct survey on prey using standard methodology (sign surveys, distance sampling, point counts, double observation, and dung surveys).

Action 4.1.5: Strengthen national database of tigers and other wild animals.

Action 4.1.6: Train and equip tiger research and monitoring teams.

Action 4.1.7: Conduct economic valuation of tiger habitats in Bhutan.

Output 4.2: Established and strengthened information on tiger ecology and movement through study and identify important environmental and anthropogenic variables in relation to tiger habitat use and selection.

Action 4.2.1: Compile all available data and information on tigers and prey species within DoFPS.

Action 4.2.2: Conduct study to assess habitat condition for tiger and prey.

Action 4.2.3: Conduct radio collaring of tigers at different habitats to study the behavior and spatial movement ecology.

Action 4.2.4: Enhance capacity of field staff on animal handling and management.

Action 4.2.5: Perform population viability assessment of tiger and prey population using statistical and mathematical models (population projection and carrying capacity).

Action 4.2.6: Conduct dietary selection by tiger and prey species

Output 4.3: Established genetic database of tigers in Bhutan.

Action 4.3.1: Establish genetic lab to perform genetic analysis of tigers and its co-predators

Action 4.3.2: Train relevant staff on genetic analysis and profiling.

Action 4.3.3: Establish and strengthen genetic database of tigers and prey.

Action 4.3.4: Produce report on genetic profiles of tigers in Bhutan.

Output 4.4: Assess impacts of potential disturbance regimes and disasters on tiger and prey population.

Activity 4.4.1: Assess impact of climate change on tiger and prey habitats and develop adaptation plan.

Activity 4.4.2: Assess disease threat to tigers or their prey from livestock and feral animals and monitor where necessary.

Activity 4.4.3: Strengthen wildlife clinic and laboratory.

Activity 4.4.4: Assess the impact of feral dogs on wildlife population and manage dog population.

Chapter V: Plan Implementation and Monitoring

5.1. Institutional Arrangements

The plan implementation will be coordinated by NCD in collaboration with the functional divisions, UWICER, Global Tiger Center, field offices and other relevant agencies. However, the activities will be implemented by the field offices through larger landscape based projects with RGoB funding, Bhutan for Life Project (BFL) and other donor funded projects or through smaller site bases projects.

5.2. Work Plan and Budget

The major portion of funding for this five year tiger action plan is secured from the 12th FYP of the RGoB and the BFL as most of the activities are aligned. However, funding from other donors like WWF, Bhutan Trust Fund for Environmental Conservation, United Nations Development Program, Bhutan Foundation and other international donors will be sourced to cover tiger conservation works outside the protected areas where funding is not secured.

The total budget required for the implementation of the tiger action plan for the next five years is **Nu. 619.63 Million.** The majority of the budget will be met from RGoB and BFL contribution while the funding gap will be sourced from other donors.

Table 1: Work plan and budget

Vision: "A viable population of tigers and their prey, coexisting with humans in an interconnected landscape"						
Goal: By 2023 tiger population in Bhutan increased by 20 percent from the 2015 baseline through enhanced protection and improved habitat.	**(Budget in Million Ngultrums)**					
Activities	Year I 2018-19	Year II 2019-20	Year III 2020-21	Year IV 2021-22	Year V 2022-23	**Sub-Total**
Objective I: Reduce poaching of tiger by 90 percent at the end of plan period.						
Output 1.1: Current wildlife protection in Bhutan assessed.						
Action 1.1.1: Conduct protection assessment and develop poaching hotspot map, identify priority areas for enforcement and enhance SMART rollout.	3.60					3.60
Output 1.2: SMART patrol program fully implemented by all the field offices.						
Action 1.2.1: Finalize setting up SMART data model & reporting requirements for Bhutan.	0.50					0.50
Action 1.2.2: Train data officers on SMART software for tactical patrolling.	0.90					0.90
Action 1.2.3: Carry out regular SMART patrolling in all field division.	30.00	30.00	30.00	30.00	30.00	150.00
Action 1.2.4: Develop mechanisms to share intelligence reports among the field offices.	0.50					0.50
Action 1.2.5: Develop and maintain database of patrolling and surveillance reports at the field offices and headquarter.	1.00	1.00				2.00
Action 1.2.6: Carry out refresher course and capacity building on SMART patrolling.			1.50	1.50		
Output 1.3: Strengthened infrastructure and equipment support for anti-poaching effectiveness.						
Action 1.3.1: Set up Forest Protection and Enforcement Unit (FPEU) in each forest division and protected areas.	0.20					0.20
Action 1.3.2: Strengthen Forest Protection and Enforcement Section under Forest Protection and Enforcement Division.	0.50	0.50				1.00
Action 1.3.3: Set up and equip guard posts in strategic locations.	5.00	5.00	10.00	10.00	5.00	35.00
Action 1.3.4: Support frontline staff with field gears to patrol remote areas.	6.00	6.00	6.00	6.00	6.00	30.00
Output 1.4: Improved communication systems for protection.						
Action 1.4.1: Set up repeater for wireless communication in appropriate locations.	1.00	1.50	1.50	1.50	1.00	6.50

Action 1.4.2: Maintain and improve existing communication system.	1.00	1.00	1.00	1.00	1.00	5.00
Output 1.5: Awareness campaigns conducted on significance of tiger conservation.						
Action 1.5.1: Conduct education and awareness campaigns among communities on ills of wildlife poaching.	0.50	0.50	0.50	0.50	0.50	2.50
Action 1.5.2: Organize religious discourses on the spiritual linkage of conservation and human wellbeing.	0.10	0.10	0.10	0.10	0.10	0.50
Action 1.5.3: Identify & support nature club in schools as ambassador of conservation.	1.50	1.50	1.50	1.50	1.50	7.50
Action 1.5.4: Observe Global Tiger Day at appropriate locations.	0.50	0.50	0.50	0.50	0.50	2.50
Output 1.6: Strengthened capacities of law enforcement divisions under MoAF.						
Action 1.6.1: Strengthen and support legal services under MoAF	0.50	0.50				1.00
Action 1.6.2: Conduct awareness workshop on FNCRR and other relevant legislations for all the field divisions.	1.50		1.50		1.50	4.50
Action 1.6.3: Train field staff in basic enforcement skills including wildlife crime detection and prosecution.		2.00		2.00		4.00
Output 1.7: Enhanced cooperation and coordination among the law enforcement agencies.						
Action 1.7.1: Conduct workshop on detection of illegal wildlife trade with law enforcement agencies.	0.80		0.80		0.80	2.40
Action 1.7.2: Develop protocols for recording and reporting of illegal wildlife trade.	0.10					0.10
Action 1.7.3: Formalize inter-agency intelligence led enforcement initiatives at national level.	0.20					0.20
Action 1.7.4: Strengthen on ground intelligence led enforcement initiatives.	1.00	1.00	1.00	1.00	1.00	5.00
Output 1.8: Strengthened transboundary cooperation on tiger conservation.						
Action 1.8.1: Organize regular meetings and workshops at transboundary level to discuss issues, challenges and best practices.	0.40	0.40	0.40	0.40	0.40	2.00
Action 1.8.2: Arrange exchange visits for the forestry officials.		0.90			0.90	1.80
Action 1.8.3: Coordinate and collaborate with park official and other stakeholders from India on synchronized anti-poaching patrol, tiger monitoring and other activities.	0.50	0.50	0.50	0.50	0.50	2.50

Objective II - Manage critical tiger habitats within and outside protected areas.						
Output 2.1: Critical tiger and their prey habitats zoned and delineated within and outside the protected area network.						
Action 2.1.1: Identify and map critical tiger habitat for protection and management interventions.	0.80					0.80
Action 2.1.2: Conduct stakeholder consultation meeting to harmonize critical tiger habitats with developmental master plans.	0.25	0.25				0.50
Output 2.2: Critical tiger habitats managed as per the habitat management guidelines.						
Action 2.2.1: Carryout grassland management including controlled burning and weed eradication.	3.50	3.50	3.50	3.50	3.50	17.50
Action 2.2.2: Initiate habitat improvement through enrichment plantation of native palatable species and removal of invasive species.	7.00	7.00	7.00	7.00	7.00	35.00
Action2.2.3: Maintain and improve the existing cattle grazing lands (tshamdos) for wild herbivores.	4.00	4.00	4.00	4.00	4.00	20.00
Action 2.2.4: Maintain natural water holes and saltlicks and create new ones on need basis.	3.00	3.00	3.00	3.00	3.00	15.00
Output 2.3: Principles of smart-green infrastructure adopted and implemented for infrastructure development in the critical tiger habitats.						
Action 2.3.1: Organize sensitization workshops on smart-green infrastructure with relevant stakeholders.	0.50		0.50			1.00
Action 2.3.2: Organize exposure trips for relevant stakeholders to understand and appreciate the features of smart-green infrastructure.		1.00		1.00		2.00
Action 2.3.3: Incorporate smart-green features in the national and local infrastructure development plans.				0.50		0.50
Action 2.3.4: Enforce and monitor smart-green features in infrastructure development in the tiger habitats.					0.25	0.25
Output 2.4: Tiger and prey habitat change and management interventions studied and monitored.						
Action 2.4.1: Identify and establish permanent plots in tiger habitats at different ecological zones.	1.00	1.00				2.00
Action 2.4.2: Assess the effects of road and infrastructural developments on the habitat connectivity for tiger and prey.				0.20	0.20	0.40

Output 2.5. At least 5 tiger sites (PAs and forest divisions) managed as per CA|TS standards.						
Action 2.5.1: CA|TS registration of the tiger sites.	0.20	0.20	0.20	0.20	0.20	1.00
Action 2.5.2: Field assessment of the tiger sites and propose for accreditation to CA|TS.	1.00	1.00	1.00	1.00	1.00	5.00
Objective III. Reduce human-tiger conflict.						
Output 3.1: Understood human tiger conflict scenario in Bhutan.						
Action 3.1.1: Carry out hotspot mapping highlighting spatio-temporal characteristics of the conflict.	0.78					0.78
Action 3.1.2: Assess social characteristics (social dynamics and tolerance level), severity and impacts of the conflict.		0.50				0.50
Action 3.1.4: Develop and maintain human- tiger conflict data base both at central and field level.	1.00					1.00
Output 3.2: Enhanced prevention of human-tiger conflict in Bhutan						
Action 3.2.1: Conduct mass education and awareness on the conflict scenario and preventive measures, policy, strategy and science of human-tiger conflict in Bhutan.	1.00	1.00	1.00	1.00	1.00	5.00
Action 3.2.2: Improve livestock management through improved breeds and enhanced guarding practices.	3.00	3.00	3.00	3.00	3.00	15.00
Action 3.2.3: Install and maintain low-voltage electric fences to minimize loss of crop and cattle to wildlife.	2.50	2.50	2.50	2.50	2.50	12.50
Action 3.2.4: Establish and strengthen visitor information centers at field offices.	5.00	5.00	5.00	5.00	5.00	25.00
Output 3.3: Mitigation measures put in place in case of conflict occurrence.						
Action 3.3.1: Establish and strengthen HWC committee at national and community level.	1.00	1.00				2.00
Action 3.3.2: Develop a standard conflict reporting system for Bhutan.	0.20					0.20
Action 3.3.3: Develop national policy for ex-gratia payment in the event of loss of human life or injury.	3.00	3.00				6.00
Action 3.3.4: Strengthen and support the livestock insurance and compensation schemes.	5.00	5.00	5.00	5.00	5.00	25.00
Action 3.3.5: Initiate community based ecotourism in the tiger landscapes.		4.00	4.00	4.00	4.00	16.00
Action 3.3.6: Link and establish PES schemes in the tiger landscapes.			0.50	0.50	0.50	1.50

Objective IV: Increase science based information on tiger, prey and their landscape.						
Output 4.1: Tiger and prey population periodically monitored using robust scientific design and analysis.						
Action 4.1.1: Establish long term monitoring protocol for tigers and prey species.	0.20	0.20				
Action 4.1.2: Conduct nationwide tiger population revalidation survey every five years.		30.00	30.00			60.00
Action 4.1.3: Evaluate tiger and prey distribution and produce demographic reports.				1.00		1.00
Action 4.1.4: Conduct survey on prey using standard methodology (sign surveys, distance sampling, point counts, double observation, and dung surveys).		5.00	5.00			10.00
Action 4.1.5: Strengthen national database of tigers and other wild animals.			1.00	1.00		2.00
Action 4.1.6: Train and equip tiger research and monitoring teams.		4.00	4.00			8.00
Action 4.1.7: Conduct economic valuation of tiger habitats in Bhutan.				0.50	0.50	1.00
Output 4.2: Established and strengthened information on tiger ecology and movement through study and identify important environmental and anthropogenic variables in relation to tiger habitat use and selection.						
Action 4.2.1: Compile all available data and information on tigers and prey species with DoFPS.	0.20					0.20
Action 4.2.2: Conduct study to assess habitat condition for tiger and prey.		0.70	0.70			1.40
Action 4.2.3: Conduct radio collaring of tigers at different habitats to study the behavior and spatial movement ecology.	1.50		1.50	1.50		4.50
Action 4.2.4: Enhance capacity of field staff on animal handling and management.	1.50		1.50		1.50	4.50
Action 4.2.5: Perform population viability assessment of tiger and prey population using statistical and mathematical models (population projection and carrying capacity).				0.20	0.20	0.40
Action 4.2.6: Conduct dietary selection by tiger and prey species		0.50				0.50
Output 4.3: Established genetic database of tigers in Bhutan.						
Action 4.3.1: Establish genetic lab to perform genetic analysis of tigers and its co-predators	5.00	5.00	5.00			15.00
Action 4.3.2: Train relevant staff on genetic analysis and profiling.		2.00	2.00	2.00		6.00
Action 4.3.3: Establish and strengthen genetic database of tigers and prey.				1.00	1.00	2.00
Action 4.3.4: Produce report on genetic profiles of tigers in Bhutan.					0.50	0.50

Output 4.4: Assess impacts of potential disturbance regimes and disasters on tiger and prey population.						
Activity 4.4.1: Assess impact of climate change on tiger and prey habitats and develop adaptation plan.	0.50	0.50	0.50			1.50
Activity 4.4.2: Assess disease threat to tigers or their prey from livestock and feral animals and monitor where necessary.	1.00	1.00	1.00	1.00		4.00
Activity 4.4.3: Strengthen wildlife clinic and laboratory.	2.00	2.00	2.00	2.00		8.00
Activity 4.4.4: Assess the impact of feral dogs on wildlife population and manage dog population.		1.50	1.50	1.50	1.50	6.00
Grand Total						**Nu. 619.63 Million**

5.3. Monitoring and Evaluation

An annual progress report of the plan implementation will be submitted by the respective protected area and forest division to DoFPS. NCD with support from field offices and other implementing partners will monitor the annual work progress and report to DoFPS on the overall plan implementation on annual basis. Plan evaluation will be done at mid-term and at the end of the plan period by DoFPS. Plan monitoring and evaluation will be carried out as per the results framework table.

Table 2. Results Framework

Vision: "A viable population of tigers and their prey, coexisting with humans in an interconnected landscape"			
Goal: By 2023 tiger population in Bhutan increased by 20 percent from the 2015 baseline through enhanced protection and improved habitat.			
Narrative Summary	**Objectively Verifiable output Indicators**	**Means of Verification**	**Lead implementing Agency**
Objective I: Reduce poaching of tiger by 90 percent at the end of plan period.			
Output 1.1: Current wildlife protection in Bhutan assessed.	State of wildlife protection known	Assessment Report	FPED & NCD
Action 1.1.1: Conduct protection assessment and develop poaching hotspot map, identify priority areas for enforcement and enhance SMART rollout.			
Output 1.2: SMART patrol program fully implemented by all the field offices.	Protection enhanced through SMART patrolling	Patrol reports	FPED, NCD, Field Offices
Action 1.2.1: Finalize setting up SMART data model & reporting requirements for Bhutan.			
Action 1.2.2: Train data officers on SMART software for tactical patrolling.			
Action 1.2.3: Carry out regular SMART patrolling in all field divisions.			
Action 1.2.4: Develop mechanisms to share intelligence reports among the field offices.			
Action 1.2.5: Develop and maintain database of patrolling and surveillance reports at the field offices and headquarter.			
Action 1.2.6: Carry out refresher course and capacity building on SMART patrolling.			
Output 1.3: Strengthened infrastructure and equipment support for anti-poaching effectiveness.	Field offices equipped with additional infrastructure, equipment and trained staff.	Physical verification	NCD & Field Offices
Action 1.3.1: Set up Forest Protection and Enforcement Unit (FPEU) in each forest division and protected areas.			
Action 1.3.2: Strengthen Forest Protection and Enforcement Section under Forest Protection and Enforcement Division.			
Action 1.3.3: Set up and equip guard posts in strategic locations.			

Action 1.3.4: Support frontline staff with field gears to patrol remote areas.			
Output 1.4: Improved communication systems for protection.	Communication system improved	Physical verification	FPED & NCD
Action 1.4.1: Set up repeater for wireless communication in appropriate locations.			
Action 1.4.2: Maintain and improve existing communication system.			
Output 1.5: Awareness campaigns conducted on significance of tiger conservation.	Public aware of the importance of tiger conservation	Awareness materials (audio-visual, posters, etc), Reports	NCD, GTC & Field Offices
Action 1.5.1: Conduct education and awareness campaigns among communities on ills of wildlife poaching.			
Action 1.5.2: Organize religious discourses on the spiritual linkage of conservation and human wellbeing.			
Action 1.5.3: Identify & support nature club in schools as ambassador of conservation.			
Action 1.5.4: Observe Global Tiger Day at appropriate locations.			
Output 1.6: Strengthened capacities of law enforcement divisions under MoAF.	Frontline staff capable of handling wildlife cases	Training and workshop reports	NCD, FPED & Legal Services, MoAF
Action 1.6.1: Strengthen and support legal services under MoAF			
Action 1.6.2: Conduct awareness workshop on FNCRR and other relevant legislations for all the field divisions.			
Action 1.6.3: Train field staff in basic enforcement skills including wildlife crime detection and prosecution.			
Output 1.7: Enhanced cooperation and coordination among the law enforcement agencies.	Cooperation and coordination with law enforcement agencies strengthened	Workshop proceedings, Protocol Documents	NCD, FPED, RBP, RBA, BAFRA, DRC, Judiciary
Action 1.7.1: Conduct workshop on detection of illegal wildlife trade with law enforcement agencies.			
Action 1.7.2: Develop protocols for recording and reporting of illegal wildlife trade.			
Action 1.7.3: Formalize inter-agency intelligence led enforcement initiatives at national level.			
Action 1.7.4: Strengthen on ground intelligence led enforcement initiatives.			
Output 1.8: Strengthened transboundary cooperation on tiger conservation.	Strengthened transboundary tiger conservation	Meeting resolutions, Joint tiger monitoring reports	NCD, FPED, GTC & Field Divisions
Action 1.8.1: Organize regular meetings and workshops at transboundary level to discuss issues, challenges and best practices.			
Action 1.8.2: Arrange exchange visits for the forestry officials.			

Action 1.8.3: Coordinate and collaborate with park official and other stakeholders from India on synchronized anti-poaching patrol, tiger monitoring and other activities.			
Objective II - Manage critical tiger habitats within and outside protected areas			
Output 2.1: Critical tiger and their prey habitats zoned and delineated within and outside the protected area network.	Critical tiger habitats zoned both within and outside PAs	Maps available for use by the field offices	NCD & GTC
Action 2.1.1: Identify and map critical tiger habitat for protection and management interventions.			
Action 2.1.2: Conduct stakeholder consultation meeting to harmonize critical tiger habitat maps with developmental master plans.			
Output 2.2: Critical tiger habitats managed as per the habitat management guidelines.	Critical tiger habitats well managed	Progress reports	NCD, FPED & Field Divisions
Action 2.2.1: Carryout grassland management including controlled burning and weed eradication.			
Action 2.2.2: Initiate habitat improvement through enrichment plantation of native palatable species and removal of invasive species.			
Action2.2.3: Maintain and improve the existing cattle grazing lands (tshamdos) for wild herbivores.			
Action 2.2.4: Maintain natural water holes and saltlicks and create new ones on need basis.			
Output 2.3: Principles of smart-green infrastructure adopted and implemented for infrastructure development in the critical tiger habitats.	Smart green infrastructure principles adopted and implemented	Meeting resolutions, tour reports, infrastructure development plan	DoFPS, MoWHS, CDB
Action 2.3.1: Organize sensitization workshops on smart-green infrastructure with relevant stakeholders.			
Action 2.3.2: Organize exposure trips for relevant stakeholders to understand and appreciate the features of smart-green infrastructure.			
Action 2.3.3: Incorporate smart-green features in the national and local infrastructure development plans.			
Action 2.3.4: Enforce and monitor smart-green features in infrastructure development in the tiger habitats.			
Output 2.4: Tiger and prey habitat change and management interventions studied and monitored.	Habitat dynamics and impacts of interventions understood	Assessment reports, physical verifications	NCD, UWICER, GTC & Field Divisions
Action 2.4.1: Identify and establish permanent plots in tiger habitats at different ecological zones.			
Action 2.4.2: Assess the effects of road and infrastructural developments on the habitat connectivity for tiger and prey.			

Output 2.5. At least 5 tiger sites (PAs and forest divisions) managed as per CA|TS standards.	10 Tiger sited accredited and managed as per CA|TS standards	CA|TS Accreditation Certificate	NCD & Field Divisions
Action 2.5.1: CA|TS registration of the tiger sites.			
Action 2.5.2: Field assessment of the tiger sites and propose for accreditation to CA|TS.			
Objective III. Reduce human-tiger conflict.			
Output 3.1: Understood human tiger conflict scenario in Bhutan	Information on human-tiger conflict available	Maps, Assessment reports, Database	NCD, UWICER, GTC & Field Divisions
Action 3.1.1: Carry out hotspot mapping highlighting spatio-temporal characteristics of the conflict.			
Action 3.1.2: Assess social characteristics (social dynamics and tolerance level), severity and impacts of the conflict.			
Action 3.1.3: Develop and maintain human- tiger conflict data base both at central and field level.			
Output 3.2: Enhanced prevention of human-tiger conflict in Bhutan.	Human-tiger conflict prevention measures in place	Awareness materials, reports	NCD, DoL & Field Divisions
Action 3.2.1: Conduct mass education and awareness on the conflict scenario and preventive measures, policy, strategy and science of human-tiger conflict in Bhutan.			
Action 3.2.2: Improve livestock management through improved breeds and enhanced guarding practices.			
Action 3.2.3: Install and maintain low-voltage electric fences to minimize loss of crop and cattle to wildlife.			
Action 3.2.4: Establish and strengthen visitor information centers at field offices.			
Output 3.3: Mitigation measures put in place in case of conflict occurrence.	Timely response to human-tiger conflict cases	Meeting resolutions, Committee by-laws, Guideline	DoFPS (NCD, Field Divisions), DoL
Action 3.3.1: Establish and strengthen HWC committee at national and community level.			
Action 3.3.2: Develop a standard conflict reporting system for Bhutan.			
Action 3.3.3: Develop national policy for ex-gratia payment in the event of loss of human life or injury.			
Action 3.3.4: Strengthen and support the livestock insurance and compensation schemes.			

Action 3.3.5: Initiate community based ecotourism in the tiger landscapes.			
Action 3.3.6: Link and establish PES schemes in the tiger landscapes.			
Objective IV: Increase science based information on tiger, prey and their landscape.			
***Output 4.1:** Tiger and prey population periodically monitored using robust scientific design and analysis.*	Information on tiger and prey population updated	Protocol document, Survey report, Training report	NCD, UWICER, GTC & Field Offices
Action 4.1.1: Establish long term monitoring protocol for tigers and prey species.			
Action 4.1.2: Conduct nationwide tiger population revalidation survey every five years.			
Action 4.1.3: Evaluate tiger and prey distribution and produce demographic reports.			
Action 4.1.4: Conduct survey on prey using standard methodology (sign surveys, distance sampling, point counts, double observation, and dung surveys).			
Action 4.1.5: Strengthen national database of tigers and other wild animals.			
Action 4.1.6: Train and equip tiger research and monitoring teams.			
Action 4.1.7: Conduct economic valuation of tiger habitats in Bhutan.			
Output 4.2: Established and strengthened information on tiger ecology and movement through study and identify important environmental and anthropogenic variables in relation to tiger habitat use and selection.	Information on tiger ecology and movement in Bhutan strengthened	Research articles, training reports	NCD, UWICER, GTC & Field Offices
Action 4.2.1: Compile all available data and information on tigers and prey species with DoFPS.			
Action 4.2.2: Conduct study to assess habitat condition for tiger and prey.			
Action 4.2.3: Conduct radio collaring of tigers at different habitats to study the behavior and spatial movement ecology.			
Action 4.2.4: Enhance capacity of field staff on animal handling and management.			
Action 4.2.5: Perform population viability assessment of tiger and prey population using statistical and mathematical models (population projection and carrying capacity).			
Action 4.2.6: Conduct dietary selection by tiger and prey specie.			
Output 4.3: Established genetic database of tigers in Bhutan.	Genetic database of Bhutanese tigers established	Training reports, Database, Report on genetic profile	NCD, UWICER, GTC & Field Offices
Action 4.3.1: Establish genetic lab to perform genetic analysis of tigers and its co-predator.			

Action 4.3.2: Train relevant staff on genetic analysis and profiling.			
Action 4.3.3: Establish and strengthen genetic database of tigers and prey.			
Action 4.3.4: Produce report on genetic profiles of tigers in Bhutan.			
Output 4.4: Assess impacts of potential disturbance regimes and disasters on tiger and prey population.	Impacts of potential disturbance regimes and disasters on tiger understood	Research articles, Assessment reports	NCD, UWICER, GTC & Field Offices
Activity 4.4.1: Assess impact of climate change on tiger and prey habitats and develop adaptation plan.			
Activity 4.4.2: Assess disease threat to tigers or their prey from livestock and feral animals and monitor where necessary.			
Activity 4.4.3: Strengthen wildlife clinic and laboratory.			
Activity 4.4.3: Assess the impact of feral dogs on wildlife population and manage dog population.			

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Cambodia Tiger Action Plan 2011 – 2022

(Provisional Interim 1st Draft, March 2011)

Forestry Administration

Provisional Interim 1st Draft, March 2011

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Tigers & their Conservation in Cambodia

The Tiger in Cambodia: 1954 -1993

During the 1950's, Charles Wharton conducted an ecological study of the Kouprey Bos sauveli in Northern Cambodia, and observed herds of Eld's Deer Cervus eldii, Gaur Bos gaurus, Banteng Bos javanicus, and Wild Water Buffalo Bubalus bubalis in such numbers that he compared the area to the game lands of East Africa. Tigers and leopards resided in areas of dense forest and emerged at night to hunt prey in the open forest. (Wharton 1957).

Through the 1960's, Cambodia was an internationally famous big game hunting destination (Engle 1981). A licensed hunter could shoot 14 heads of protected animals during the December-May period, including Bull Asian Elephant, Gaur, Banteng and Wild Water Buffalo. Tigers and Leopard were so common they could be shot year round (Cambodia Ministere De L'Information 1960.)

For example, in 1957 an American trophy hunter traveled to Chhep Distrcit in Preah Vihear with French and Cambodian associates to shoot a tiger. Tigers were so common that only five days were planned for this effort. A banteng was shot for bait a day after setting up camp. That night a tiger discovered the banteng and fed. The following night the tiger was shot when it returned to feed on the banteng again (Engle 1981).

Beginning in 1970, over 30 years of civil unrest put an end to sports hunting, and also drastically reduced the number of wild animals in Cambodia. During the period of unrest, various armed forces were based in and moved about the most remote areas. Extensive hunting was conducted for meat and the international trade. Industrial scale logging was carried out.

The beginning of modern countrywide conservation in Cambodia: 1994 - 1997

Conservation formally began on 1st November 1994, when King Sihanouk signed a Royal Decree creating 23 protected areas around the country covering 33,000 km2. A five-page Tiger Action Plan (TAP) was prepared that year, noting that nothing was being done on the ground due to a lack of trained personnel and funding.

The TAP described a 1994 visit to wildlife markets in Phnom Penh and Poipet on the Thai border (Sabu 1994) that found 18 Tiger skins. Based on estimated turnover reported by the traders of 10 to 16 skins per month, it appeared that 100 to 200 Tigers a year were being exported from Cambodia, since about 1990.

Most of the Tigers were brought in by soldiers posted to remote areas in the Northern Plains and Cardamom Mountains. Skins sold for $150 to $1,200, depending on their condition; bones sold for c. $100/kg. Live Tigers (presumably cubs) were regularly brought to the traders and sold to Thailand for about $2,500 each.

1st Cambodia-wide survey of Wildlife Trade: 1999

In a 1999 attempt to assess this trade more accurately, a survey of 24 Cambodian wildlife markets and 12 international checkpoints was carried out by Cambodian Wildlife Protection Office (Sun hean 2000) Eight live, wild caught tigers, 36 tiger skins, 5 kg of tiger bone, 6 tiger skulls, 43 tiger canine teeth, more than 50 tiger claws, and 1 tiger penis were observed in trade during the 14-week survey.

Data were obtained on where tiger parts are sold, trade routes, and prices paid. Phnom Penh and Poipet were the largest markets. Tiger skins usually went through Poipet to Thailand for decoration, and Tiger bones and other parts usually went through Phnom Penh to Vietnam & China for medicinal purposes

Initial identification of Cambodia Tiger Conservation Units: 1998 - 1999

The first systematic countrywide assessment of status and distribution of Tiger and prey was carried out in 1998 by the Forestry Administration's Wildlife Protection Office, currently Department of Wildlife

and Biodiversity. 153 hunters and 156 district and province officials in 13 forested provinces were interviewed (Weiler et al. 1998 & Nowell et al 1999).

In 1999, the results of the survey were presented at six provincial workshops attended by 209 provincial officials to obtain province-level input on a conservation strategy. The surveys and workshops determined that the best remaining Tiger Conservation Units (TCU) were the Northern Plains, Cardamom Mountains, and Eastern Plains. Three regional offices were established by the Wildlife Protection Office which managed a Tiger and prey monitoring network of community rangers from 2000 to 2005.

The WPO projects were funded by the Taiwan Council of Agriculture, CAT Action Treasury, University of Minnesota, Save the Tiger Fund and US Fish and Wildlife Service Tiger Fund.

Other NGO-supported conservation projects were also developed in all three TCUs during this period and many have continued and evolved to present. Save the Tiger Fund and USFWS provided co-funding to MOE, WWF, WCS, CI, WildAid, Birdlife International and PRC for Tiger-specific projects. From 1997-2010, a total of 15 Save the Tiger Fund Grants and 17 USFWS Tiger Fund Grants supported tiger conservation in Cambodia.

First national consensus estimate of Cambodia Tiger Population: 2004

Several NGOs working on tiger conservation held a meeting in 2004 to review all available tiger data for the Global Tiger Conservation Landscape delineation exercise (Sanderson *et al.* 2006). Tiger records from a range of methodologies including camera traps and field surveys by biologists and community wildlife rangers were analyzed, resulting in an estimated 5 to 20 tigers Eastern Plains TCU, 5 to 20 tigers Cardamoms TCU and 1 to10 tigers Northern Plains TCU, for an estimated Cambodia total of 11 to 50 tigers in 2004. That assessment is still the basis for the IUCN 2010 CITES Red List estimate of 11 to 50 tigers in Cambodia, with a notation that the total may now be less than 30.

Cambodia joins the Global Tiger Forum: 2004

In October 2004, Cambodia officially joined GTF. In November 2004, a Cambodia Delegation attended the 3rd General Assembly of the Global Tiger Forum in Hanoi, marking the beginning of Cambodia participation in GTF as a full active member.

Revision of Tiger Conservation Units: 2005

In response to the Save the Tiger Fund-led 2005 global Tiger Conservation Landscape (TCL) review and update, the Wildlife Protection Office initiated and supported supplementary analysis of TCUs/TCLs).

A broad consortium of Tiger experts, field biologists, policy-makers, and conservation organizations were gathered together to review all relevant information, which produced a single Cambodia consensus TCL map and document, published as Appendix 6 in the final TCL document (Weiler et al 2006).

Revised TCLs were identified in the Cardamom Mountain Range evergreen forest, Eastern Plains dry forest, and Virachey National Park mountainous evergreen forest (as part of the Southern Annamites Cambodia/Laos/Vietnam Trans-boundary TCL.) These were the only areas in Cambodia with evidence that some Tigers remained at that time.

The survival of Tiger in these landscapes was severely threatened, due primarily to poaching for the international trade, prey hunting and habitat loss. The Northern Plains TCU was not included in the revised TCL identification because there was no confirmed evidence that any Tigers remained after 2003, and extensive land clearing and post-conflict re-settlements had greatly reduced the extent and quality of much of that TCL habitat.

Cambodia Tiger Profile: 2010

In early 2010, MOE, FA, CI, Wildlife Alliance, WWF & WCS were contacted by DWB requesting all confirmed Tiger records from 2005-2009 from all protected forests and protected areas in the Northern Plains, Cardamom Mountains, Eastern Plains, and Virachey landscapes. The data was for updating the Cambodia Tiger Status for the Global Tiger Initiative and a baseline for preparing the Cambodia National Tiger Action Plan.

The resulting *Cambodia Profile* was published in *Avoiding the Unthinkable: What will it cost to Prevent Tigers Becoming Extinct in the Wild?* J. Walston K.U. Karanth, and E.J. Stokes. 2010, prepared for the World Bank GTI by WCS. The purpose of the report is to help both donors and Tiger range states prioritize Tiger

Conservation areas and activities. It was submitted to World Bank in late March. The *Cambodia Profile* concludes that:

- Only a few scattered individual tigers remain in Cambodia, based on the analysis of all confirmed tiger records from all organizations in Cambodia from 2005 – 2010.
- There is no evidence of a resident breeding population anywhere in Cambodia & therefore no Source Site for Tiger recovery.
- The Eastern Plains Landscape is the best Potential Source Site for tiger recovery in Cambodia, through translocation & reintroduction of wild tigers from other sites.

Global Tiger Initiative Cambodia National Consultation, 25 May - 4 June 2010

A. Key points from End of Mission Note

The 25 participants represented MAFF, the Ministries of Environment (MoE), Planning (MoP), Economy and Finance (MEF); the World Bank Cambodia, WCS, WWF, Conservation International, Wildlife Alliance and PRCF (People Resources and Conservation Foundation).

There is significant activity and interest in the GTI process and it is being used to push the debate on tiger conservation in Cambodia. Beyond the mission consultation on the 25th there have been a number of other government-led consultations and meetings, which is partly why the 25th was so well attended.

There is strong government-NGO interaction in Cambodia and it was heartening to see a healthy discussion combining scientific data, objective analysis, and the Real Politik of getting things through the system in the country.

B. Tiger status and Tiger Conservation Landscapes in Cambodia

The *Cambodia Profile* was presented. There was a general discussion of the latest reviews of wild tigers in Cambodia and the group generally agreed on some key facts that were important in order for the process to proceed onto what conservation action was necessary.

The consultation participants reached a consensus that there is no evidence that a resident breeding population of Tigers remains in any Tiger Conservation Landscape (TCL) in Cambodia. Only a few scattered individual Tigers remain, likely less than 10 country wide and less than 5 in the Eastern Plains. However, DNA analysis of carnivore scat located by scent dog surveys was still pending, so no formal population estimate update was prepared.

The Eastern Plains Landscape (EPL) was identified as the best potential source site for eventual tiger re-introduction, which is of sufficient size and quality to support a breeding population embedded in a larger block of habitat that will enable tiger dispersal and repopulation of the larger landscape.

The consultation was a major milestone and significant turning point for Cambodia tiger conservation. The consultation outcomes became the basis for the Cambodia National Tiger Recovery Priorities and the subsequent confirmation of the Eastern Plains as the priority Tiger Recovery Landscape.

International Tiger Forum, St. Petersburg, Russia, November 2010

The Cambodia Delegation consisted of 5 high-level officials from the Ministry of Agriculture, Forestry and Fisheries, Forestry Administration & Department of Wildlife and Biodiversity, the Cambodia Tiger Project International Advisor and the WWF Cambodia Director.

Global Tiger Recovery Program was endorsed in St. Petersburg by the governments of all 13 Tiger Range Countries

Cambodia National Tiger Recovery Priorities, as summarized in the GTRP:

1. Secure at least one inviolate Potential Tiger Source Site, free from habitat conversion and human interference
2. Increase capacity and effectiveness of law enforcement agencies in wildlife and habitat conservation
3. Integrate habitat management into landscape plans

4. Implement consistent tiger and key prey monitoring protocols in Potential Source Sites

5. Strengthen trans-boundary collaboration with neighboring countries to reduce wildlife poaching and cross-border illegal activities.

As the Global Tiger Recovery Program was being endorsed in St. Petersburg by the governments of all 13 Tiger Range Countries, on November 23 in Phnom Penh, Forestry Administration spokesman Thun Sarath announced: (Cambodia Daily, November 24, 2010)

On November 23 in Phnom Penh, Forestry Administration spokesman Thun Sarath announced that: (Cambodia Daily, 24/ 11/ 2010)

- Cambodia plans to establish a protected tiger habitat which will likely be located in the Eastern Plains Region around the Mondulkiri Protected Forest Area
- Cambodia's National Tiger Action Plan will be based on the recovery program presented at St. Petersburg.
- Prime Minister Hun Sen has approved in principle
- The first thing will be to identify the boundary of the protected tiger habitat

Cambodia Tiger Landscapes Stakeholders Consultation, December 2010

Transitioning from NTRP to CTAP

To identify the and map the Tiger Recovery Site, the next step in the process was to convene the Directors, or their designated representative, of all 13 Protected Forests and Protected Areas in the Cardamom Mountains, Northern Plains, Southern Annamite Mountains and Eastern Plains landscapes.

These landscapes represent historic tiger range in Cambodia, and a full review was necessary before confirming a Tiger Recovery Landscape and identifying an inviolate potential Tiger source site within that landscape. The Consultation lasted two full days, with 54 key officials participating (40 from the field & 14 from Phnom Penh HQ.

- Global and Cambodia Tiger status was presented to the group.
- Each landscape unit representative gave a summary presentation on the status of tiger, prey, conservation status and threats.
- The National Tiger Recovery Priority objectives were presented
- The representatives were divided into 3 landscape working groups to develop recommendations for the Cambodia Tiger Action Plan.

Summary of key general conservation points made by field representatives

- Environmental education is important for local communities and for other stakeholders to change their attitudes and behavior regarding conservation and to understand protected forest and protected area benefits for their livelihoods and impacts of their activities.
- Local community livelihood upgrades through activities such as sustainable agriculture, agricultural land improvement and tourism development community are necessary in order to increase income that can help reduce pressure on protected forest and protected area and to contribute to conservation.
- Participatory Land Use Planning (PLUP) and protected forest/protected area boundary demarcation are important to suppress forestland cutting and to reduce conflicts, especially clear boundary demarcation between community land and protected forest/protected area.
- Community organizing is a foundation to ensure sustainable natural resource uses and help to prevent forestland clearing.
- Research, survey and monitoring is important for managing protected forest and nature protected area by helping increasing knowledge, improving data flow and decision making, especially regarding ungulate species density estimates for tiger recovery and presence of tiger present and other key wildlife.
- Law enforcement strengthening and governance has been helping reduce wildlife and forest crimes remarkably through patrolling inside and outside protected forest and nature protected areas and by collaborating with relevant parties and developing local information sharing network.

- Significant challenges are Hydropower dam construction, Mineral exploration, Newcomers, Road improvements, Hunting, Forestland clearing & plantation development.

Landscape Discussion Group results

Cardamom Mountains Landscape

Threats & challenges

- No clear research
- Educating and disseminating tiger conservation
- Cooperation and law enforcement with associated institutions is still limited
- Conservation understanding is limited (especially wildlife and tiger)
- Local people's poverty
- National and international needs
- Development needs
- Lack of human resources, finance and materials

Recommendations on draft of national tiger recovery program

- CTAP should focus on next five years; then review and revise
- Restudy wildlife presence and habitat status thoroughly
- Protect and conserve through limiting access

Northern Plains Landscape

Threats & Challenges

- Insufficient patrol force
- Insufficient means and materials
- Finance
- Human resources
- Limited cooperation
- Newcomers and population growth
- Limited education and dissemination
- Associated institutions (competency); suppressing participation
- Some illegal crime committed by powerful people
- Decrease in habitat (forest crime, agri-industry and mine business)
- Market needs
- Local infrastructure

Recommendations

- CTAP should focus on next five years; then review and revise
- Create special law for conservation area
- Law enforcement officials shall have clear cadre
- Increase ungulate species through breeding prevention
- Held meeting once per 3 or 6 months
- Organize an agreement to prevent wildlife crime and across border forest

Eastern plains & Southern Annamites Landscapes

Threats & Challenges

- Lack of officers, and knowledge is limited
- Many snares and explosives (remain from war)
- Limited participation from local authorities and communities
- Limited education and dissemination, and poverty
- Limited law enforcement equipment
- Forest disturbance by humans
    1. Luxury wood harvest,
    2. Resin tapping,
    3. Wildlife snaring
- Local middlemen active in wildlife trade
- Limited communication with neighboring countries

Recommendations

Source Site

- Map of tiger sanctuary is acknowledged by local and national authorities
- Disseminate from national to local levels

Law enforcement

- Form informant group
- Update MIST to local and national levels

Monitoring

- Train the trainers
- Develop sampling strategy

Trans-boundary

- Encourage active participation by the relevant border competencies

Indochinese Tiger Overview

Sub-species genesis

Based on genetic analysis, Luo *et al.* (2004) identified *P. t. corbetti* (Indochinese Tiger) as the likely ancestral Tiger population, with the radiation into other subspecies taking place 72,000–108,000 years ago.

Of all the Tiger subspecies, *P. t. corbetti* showed the highest genetic diversity in microsatellite alleles, indicating a fairly stable evolutionary history, and alleles found in other subspecies were almost always a subset of those found in *P. t. corbetti*.

Until recently, mainland Southeast Asia tigers in Myanmar, Thailand, Malaysia, Laos, Cambodia & Vietnam were considered as a single subspecies, Panthera tigris corbetti (Indochina Tiger)

In 2004, the tigers of Peninsular Malaysia were recognized as a new subspecies, *Panthera tigris jacksoni*, (Malayan Tiger) when a genetic analysis found that they are distinct in mtDNA and micro-satellite sequences from tigers of northern Indochina, *P. t. corbetti* (Luo *et al*., 2004).

Based on DNA, two subspecies are currently provisionally accepted by IUCN on the Cites Red List.: Panthera tigris corbetti (Northern Indochinese Tiger) and P. tigris jacksoni (Southern Indochinese or Malayan tiger). However, some specialists note that there is no morphological basis for this division.

Mazak and Groves (2006) found no clear morphological differences (in cranial measurements or pelage characteristics) between tigers from Peninsular Malaysia and those elsewhere in Indochina, and argue for inclusion in *P. t. corbetti*.

P. t. jacksoni is <u>*provisionally accepted*</u> by IUCN. The geographic division between *P. t. jacksoni* and *P. t. corbetti* is unclear as tiger populations in northern Malaysia are contiguous with those in southern Thailand (T. Lynam 2008).

On a regional scale, the 2 proposed subspecies are effectively managed as separate conservation units: Malayan Penninsula (south of the Isthmus of Kra) and the remainder of mainland Southeast Asia (Myanmar, Thailand, Laos, Cambodia & Vietnam.

Dinerstein *et al.* (1997) argued that a taxonomic approach to tiger conservation would seek to conserve only genetic variation, but that an ecological-based approach was needed to account for behavioral, demographic and ecological variation across tiger range. Sanderson *et al.* (2006) grouped tigers by biome (habitat type) and six bioregions that have some congruence with recognized subspecies: Indian sub-continent, Indochina, Peninsular Malaysia, Sumatra, Russian Far East, and China/Korea.

This distinction has important implications for Tiger re-introduction, in that depending on interpretation, the availability of tigers for translocation from and to particular sites could be severely constrained.

(This section based on IUCN 2010 Red List tiger analysis and a 2010 report by Lynum.)

Current Tiger Status in Southeast Asia

A century ago, tigers (Panthera tigris Linnaeus, 1758) were so common in parts of Southeast Asia as to be considered pests, and governments sponsored their killing. Habitat loss and fragmentation, market-driven poaching and loss of prey have since led to the disappearance of Indochinese tigers from most their former range.

Despite 15 years of dedicated tiger conservation funding, the future for the subspecies appears grim, unless very focused efforts can be applied to stabilize and recover subpopulations. Evaluating where to place conservation efforts should consider the vulnerability (likelihood of extinction) and irreplaceability. (likelihood that an area contributes uniquely to regional conservation) of tiger subpopulations. (Lynum 2010)

There are only 6 Source Sites (confirmed to have resident breeding populations of tigers) in all of Southeast Asia: 2 in Thailand, 1 in Laos & 3 in Malaysia. There are no proven Source Sites in Myanmar, Vietnam & Cambodia. (Lynum 2010)

Cambodia Wildlife law & enforcement

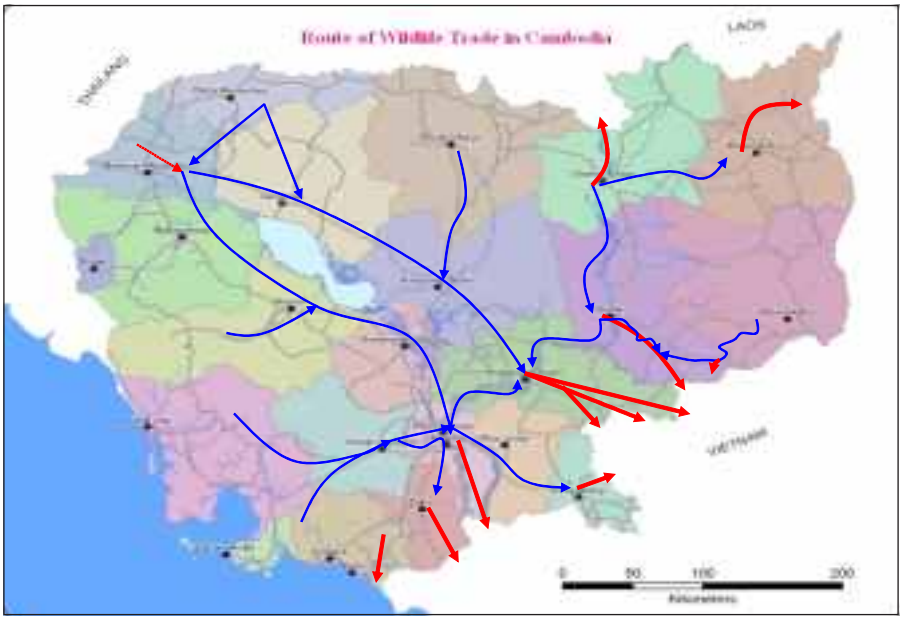
The Tiger is fully protected by the Cambodia Wildlife Protection Act, 2007. Moreover, the Forestry Law, 2002 prohibits hunting, killing, trading or exporting of

Tiger. Any individual convicted of such an offence can be punished by 5-10 years in prison and confiscation of all evidence. These regulations are enforced in Cambodia, as the following incident demonstrates.

Map 1. Source Sites and Potential Source Sites in the Range of the Indochinese Tiger

Yor Ngon was interviewed in 1999 by the CAT/WPO Tiger Project and identified as probably the most prolific large mammal hunter in Cambodia. He hunted all over the country and claims to have killed at least 19 tigers, 40 leopards, 30 elephants, 43 bears and more than 500 gaur and banteng in his career. CWRP had informed government officials and NGOs

Map 2. Regional Tiger Trade routes



Map 3. Cambodia Wildlife Trade routes

about his activities in the Eastern Plains, Northern Plains and Cardamom Mountains.

In 2004 he was detained by a WWF/FA team in northeastern Cambodia and signed a no re-offence contract (Lic 2004.), but in March 2005 he was arrested by a WildAid/FA team in the Cardamoms transporting 25 bear jaws and 82 bear paws and claws. The court sentenced him 7 years in prison.

This is believed to have been the first significant jail sentence in Cambodia for a wildlife poacher. Unfortunately the improved law enforcement evolved too late to prevent the crash of Tiger populations in Cambodia.

The National Rapid Wildlife Rescue Team

The Project started in 2001 with Technical and financial support by Wildlife Alliance. The Team is comprised of 4 Forestry Administration Officer & 8 Military Police.

FA officials

- lead operational team
- implement forest law
- court communication
- file cases
- care and release of live wildlife

Military Police

- cooperative force
- ensure team security
- apprehend perpetrators
- help take care of and release live wildlife

Illegal wildlife transportation methods

- by car
- transfer from one car to another
- change car number plate
- use modern cars
- by bus
- by boat across border

Illegal wildlife inventory

- Kept in many houses
- Kept hidden in forest
- Kept underground

Challenges

- Law enforcement is limited with poor people
- In Some cases, prosecutor does not permit an operation
- Border access operation is complicated (geography and situation)
- Several crimes happen at the same time but different places
- Information received from informant is not clear

Conclusions

- Illegal wildlife trading in Cambodia today threatens many wildlife species
- Wildlife crimes have changed from major scale to small one, causing difficulty to follow up, monitor and crackdown

Photo 1. The Rapid Wildlife Rescue Team confiscates a tiger skin from a home in Phnom Penh after receiving a tip. This is the only known confiscation of a tiger skin in Cambodia from 1997 to 2011.

Improvements

- Shall form information exchange system within region; ASEAN WEN
- Facilitate and ensure financial sustainability for monitoring and law enforcement
- Increase national and international cooperation to suppress and crack down on wildlife crimes generally.

Results -2001-2010

Rescued 43,463 individual Live Wildlife

Confiscated 21,062 individual dead wildlife specimens

Confiscated 6,788 kg of wildlife meat, bones & skins

Apprehended 2,171 wildlife traders

Collected $98,471 in fines

Tiger poaching trend analysis

The photo above is an instructive metaphor for what happened to Cambodia's tigers in the 1990's. The photo below was taken by Uch Seiha, currently a Forestry Administration official, in September 1997 while he was conducting field research for his university degree. A hunter was driving his motorbike about 10 kilometers from his home at Bor Nork Village, Krakor District, Pursat Province. The area is on the northeastern edge of the Cardamom Mountains landscape. The hunter encountered the tiger and shot several time with an M16 rifle, hitting the tiger once in the head. The tiger charged and fell dead a meter away from the hunter.

The tiger was subsequently sold to a wildlife trader in neighboring Battambang Province for about $2400. In the nine years since, no Cambodian or foreign researcher has obtained a single photo of a tiger, dead or alive, anywhere in the Cardamom Mountains, despite extensive camera trapping and surveys supported by CAT, FFI, WildAid and CI.

Tiger poaching numbers were obtained primarily from the WPO Community Wildlife Ranger Patrols. The Chart shows a dramatic drop in tiger poaching in every region and countrywide from a total of 85 tigers poached in 1998 to just 2 poached in This large drop in the number of tigers poached annually is likely the result of a final rapid crash in tiger numbers due to years of heavy hunting pressure rather than a significant increase in the effectiveness of conservation measures.

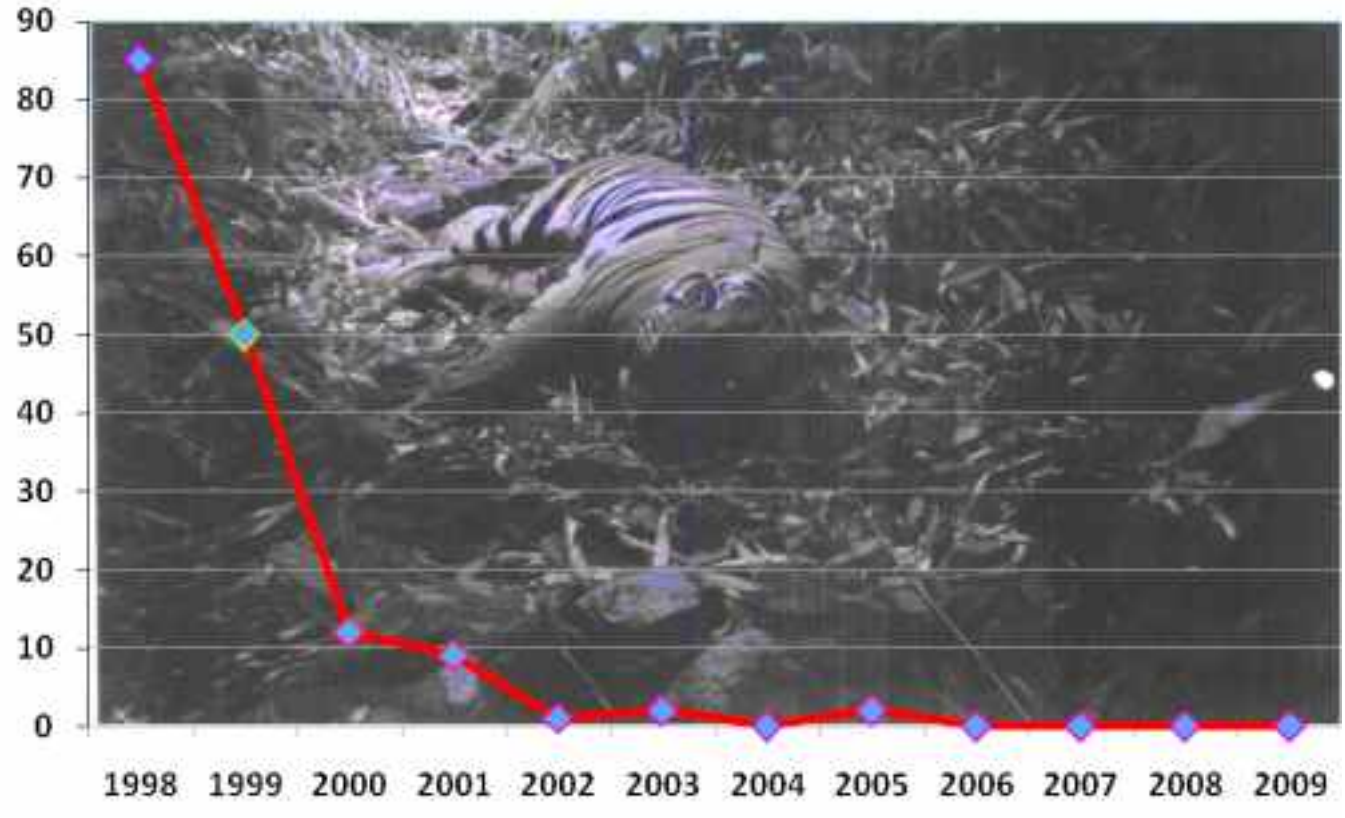
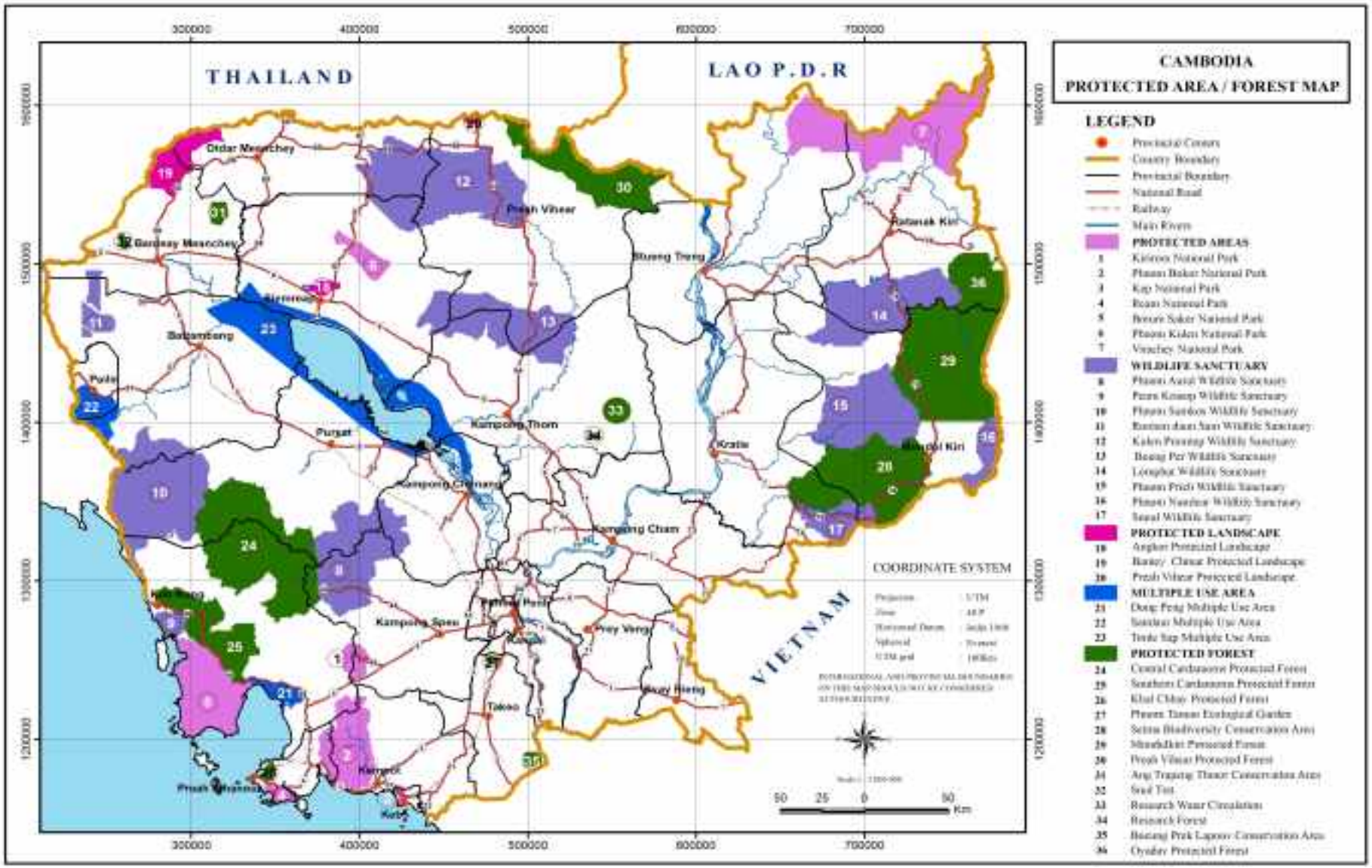


Photo 1. Cambodia Known Tiger Poaching Totals 1997-2010



Map 2. Cambodia Protected Areas & Forests

The explanation for this lies in an analysis of the chart context. There is no formal data on tiger poaching prior to 1998. However, it is likely that the high levels of tiger kills shown for 1998 & 1999 were occurring every year beginning by 1990, which is when a rapid increase in poaching pressure across the species range occurred from Siberia to India as tiger poaching became a worldwide rather than local phenomenon. (Kenney et al. 1995)

Furthermore, in 1989, the Vietnamese army withdrew from Cambodia, opening up vast areas of countryside to uncontrolled hunting. The Vietnamese occupation had established tiger trade links between Cambodia and China, which continued after the occupation.

In The Long-term Effects of Tiger Poaching on Population Viability, (Kenney et al. 1995), modeling showed that as poaching continues over time, the probability of population extinction increases sigmoidally. The rapid decrease in number of tigers poached countrywide in Cambodia after 1998 is most likely due to a crash in tiger populations resulting from over a decade of high levels of poaching. Cambodia's remaining low numbers of tigers are relics of this crash and extinction is now imminent.

Summary of 2011 tiger status by landscape

National Parks and Wildlife Sanctuaries are managed by Department of Nature Protection and Wildlife Sanctuaries, General Department for Administration of Nature Conservation and Protection, Ministry of Environment. (DNPWS)

Protected Forests are managed by Department of Wildlife and Biodiversity, Forestry Administration, Ministry of Agriculture, Forests and Fisheries. (DWB)

- **Central Cardamoms PF & Southern Cardamoms PF:** No confirmed Tiger records since 2005.
- **Botum Sokor NP and Phnom Samkos WS:** No confirmed records since 2005.
- **Phnom Aural WS:** Sets of Tiger tracks were measured and photographed in 2008 by the Manager of the Kampong Chhnang Sector of Phnom Aural WS.
- **Bokor National Park:** In 2004, a female Tiger with a missing right front paw from a snare was photographed near the garbage dump. Due to her injury she was unable to capture normal prey.
- **No photo of a Tiger**, dead or alive, has since been obtained since anywhere in the Cardamoms TCL, despite extensive camera trapping by 5 NGOs and 2 Government Ministries.

Northern Plains Landscape (*After the 2005 Tiger Conservation Landscape revision, this geographic landscape was no longer considered a Cambodia TCL).*

- **Kulen Promtep WS & Preah Vihear PF:** No confirmed records since 2003. Only one camera trap photo ever obtained in the Northern Plains, in Kulen Promtep WS, 2001. Supporting NGO: WCS.

Southern Annamites Cambodia / Laos / Vietnam Transboundary TCL

- **Virachey NP:** 3940 camera trap nights in 2000-2001 produced 3 pictures of one individual Tiger (WWF). Tiger tracks reported by VNP Rangers in two locations in 2006 and one location in 2008. A Border Police Officer reported to VNP Rangers that he saw a Tiger in Veun Sai District in 2008. Supporting NGOs: Conservation International, POH KAO des Tigres et des Hommes, Save Cambodia's Wildlife.

Cardamom Mountains Tiger Conservation Landscape (TCL)

TCL Landscape Unit	Management responsibility	Size (km2)	Supporting NGO
Botum Sokor NP	DNPWS	1,769	WA
Central Cardamoms PF	DWB	4,013	CI
Phnom Aural WS	DNPWS	2,538	None
Phnom Samkos WS	DNPWS	3,338	FFI
Southern Cardamoms PF	DWB	1,442	WA
Bokor NP	DNPWS	1,580	WA
Total km2		11,343	

Eastern Plains Tiger Conservation Landscape

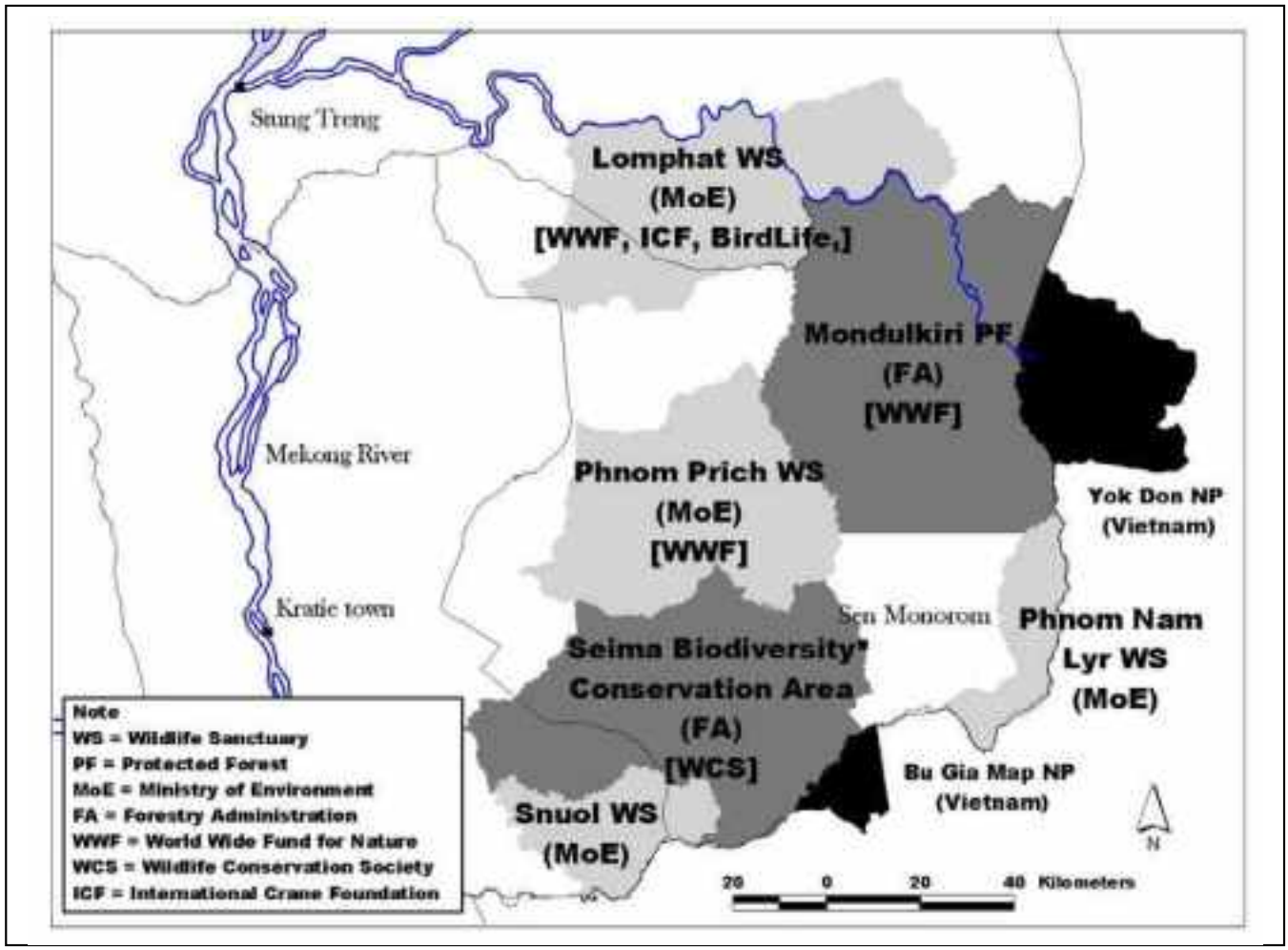
TCL Landscape Unit	Management responsibility	Size (km2)	Supporting NGO
Lomphat WS	DNPWS	2,500	PRC, Birdlife
Mondulkiri PF	DWB	4,300	WWF
Oyadav PF	DWB	1,000	None
Phnom Prich WS	DNPWS	2,220	WWF
Seima PF	DWB	3,050	WCS
Total km2			

- **Lomphat Wildlife Sanctuary:** Photo of Tiger obtained in 2005 in western LWS. Tiger tracks found in western LWS in 2009. Casts made of the tracks (PRC & Freeland). Tiger tracks found west of the boundary of LWS in 2010; measured and photographed.

- **Phnom Prich Wildlife Sanctuary:** No photos ever obtained, despite years of extensive camera trapping continuing to present. Tiger Detection Dog Surveys were in conducted in 2009-2010, but only Leopard scat has been identified to date through DNA analysis. Tiger racks were measured and photographed by trained rangers in 2010 (WWF).

- **Mondulkiri Protected Forest:** The first Tiger photo taken in the Mondulkiri Protected Forest was obtained in November/December 2005. A second picture of a Tiger in the same area was taken about 10 days later. In 2007, a third Tiger picturess were taken in the same general area. None have been obtained in the MPF since, despite extensive and continuing efforts.

Tiger Detection Dog Surveys were in conducted in



Map 4. Eastern Plains Tiger Recovery Landscape management units status

2009-2010. 201 Carnivore scat were located and are currently undergoing DNA analysis. (WWF)

1. 13 specimens were initially recorded as possible tiger scat, but DNA analysis has been completed and all are leopard
2. 178 specimens were initially recorded as probably leopard scat; DNA analysis currently underway
3. 10 specimens were initially recorded as probable wild dog scat. DNA analysis currently underway.

- **Seima Protected Forest:** Eight camera trap pictures obtained of at least three different Tigers in 2003. None have been obtained since, despite extensive and continuing efforts. Casts of confirmed Tiger tracks were made in 2007. Tiger Detection Dog Surveys were in conducted in 2009-2010, but no Tiger scat was found. (WCS).

- **Oyadav Protected Forest:** No surveys or management for past two years. No tiger records from initial 6-month survey in 2006 and monthly monitoring 2007-2008.

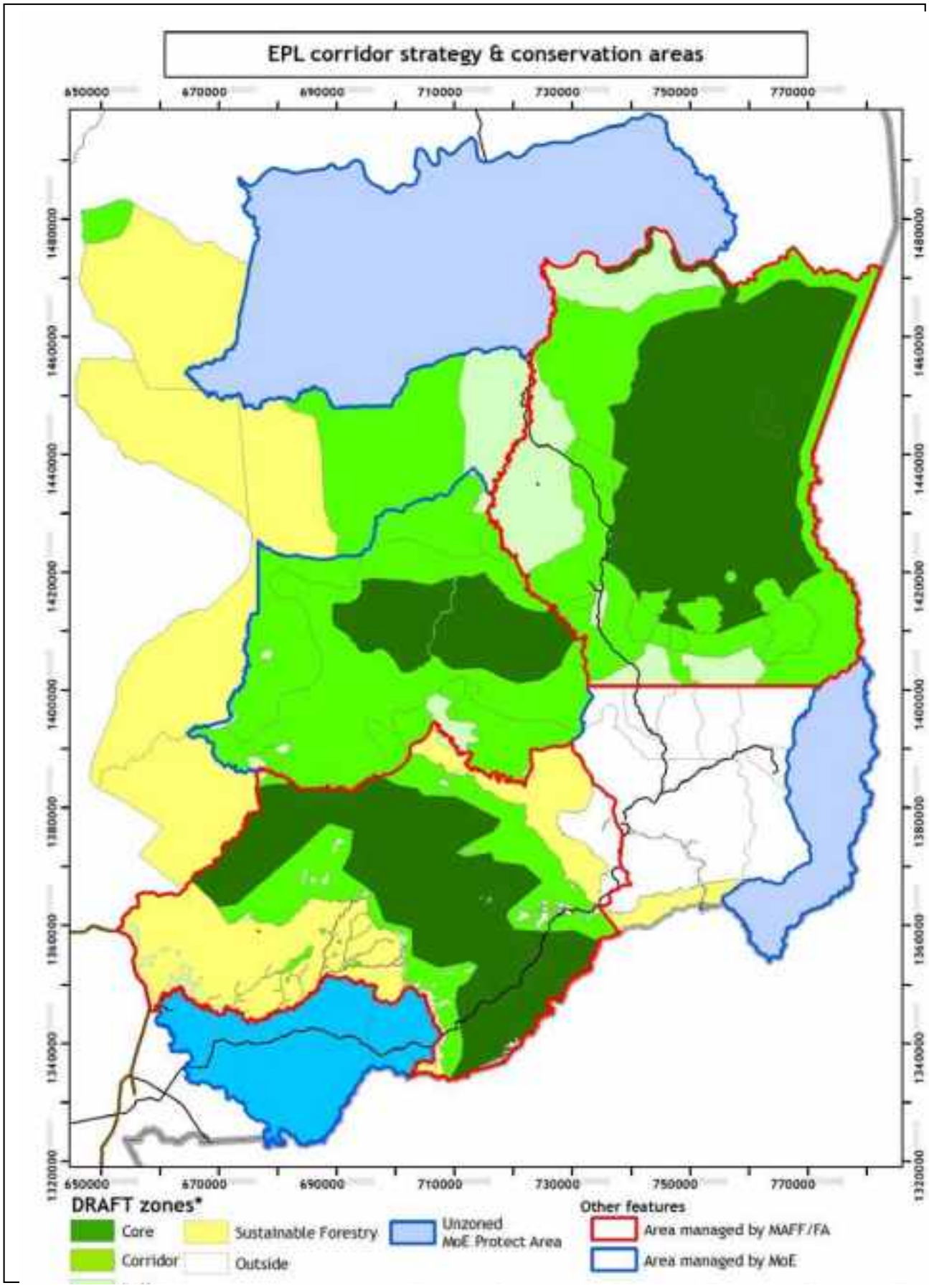
Why Restore Cambodia Tigers?

Although Tigers are extremely vulnerable or even extinct in Cambodia's Eastern Plains, the site is irreplaceable for tigers because it represents the only large (>10 000 km) block of dry forest habitat available in the region, and therefore meets the criteria for conservation efforts because it contributes uniquely to regional conservation of tiger subpopulations. (Lynum 2010) The Eastern Plains were classified as Global Priority in the 2005 TCL revision. A reintroduction program is the only option to recover tigers there. Therefore Cambodia's contribution to the Global Tiger Recovery Program is to restore this landscape.

In conclusion, despite the current dire state of the tiger, the Eastern Plains TCL has the best potential in Indochina for Tiger reintroduction, due to a large area of suitable habitat within in a mosaic of interconnected Tiger permeable protected areas and forests under intensive long-term government management with strong NGO technical and financial support.

Effective on the ground law enforcement and monitoring have been established on the Eastern Plains TCL with strong long-term support by conservation NGOs. Evidence that prey species have stopped declining and are possibly increasing in eastern Cambodia is starting to emerge. The National and Provincial governments are strongly committed to conservation is this region.

Conservation activities should be continued and expanded to lay the groundwork for reintroduction of Tigers.



Map 5. Eastern Plains Tiger Recovery Landscape Corridors & core zones

The inviolate Tiger Recovery Source Site is proposed within the core of the Mondulkiri Protected Forest.

Tiger Prey & habitat of the Eastern Plains Landscape photo portfolio

Photo 4. Wild Pigs

Photo 5. Elds deer

Photo 6. Banteng

Photo 8. Scent dog Tiger Survey in MPF

Photo 9. Gaur

Photo 10. Tiger, MPF proposed Tiger Recovery Site, 2005

Further Details of the NTRP/CTAP below will be developed after this 1st draft is reviewed, discussed at the National Stakeholders Workshop, revised, approved and published.

Cambodia Tiger Strategy & Action Plan

Cambodia Vision, Goal & Strategy

Cambodia's long-term goal by 2022 is to restore and conserve at least one defined, delimited and inviolate Tiger Source Site within a well defined Tiger Conservation Landscape that is tiger permeable and can potentially hold at least 50 tigers.

Objective 1

Secure at least one inviolate Potential Tiger Source Site, free from habitat conversion and human interference

Activities

- Identification of suitable source site for eventual re-introduction of wild tigers
- Clear mandate for management of the source site for tiger recovery
- Designation of tiger source site
- Demarcate boundary of inviolate areas for tiger conservation

Outcomes

- Establish potential tiger source site
- Develop management plan for recovery of wild tigers in source site

Objective 2

Increase capacity and effectiveness of law enforcement agencies in wildlife and habitat conservation

Activities

- Recruit and train law enforcement officers in wildlife conservation, conservation ethics, legal statutes, law enforcement & investigation and MIST
- Training for judiciary in legal statues
- Necessary field equipment and transportation, sufficient budge for maintaining and operational activities
- Adequate management infrastructure (e.g. patrol stations and patrol routes
- Frequency and efficiency of regular patrols monitor illegal activity within the source site and protected areas in the broader landscape
- Strict monitoring of law enforcement operations using MIST and full integration of monitoring into conservation area management

Outcomes

- Reduced environmental crimes that threaten tiger and tiger prey
- Strengthened enforcement and implementation of national wildlife and forestry legislations to protect tigers and its prey.

Objective 3

Integrating habitat management into landscape plans

Activities:

- Conduct an assessment of suitable tiger habitats in the potential source sites
- If needed create artificial micro-habitat for tiger and its prey species
- Integrate legal designations of tiger source sites through consultation with relevant stakeholders, capacity building, and coordination
- Awareness raising-program for the tiger source site

Outcomes

- Science-based tiger conservation objectives are fully considered and integrated with conservation planning working group and other relevant agencies

Objective 4

Implement consistent tiger and key prey monitoring protocols in Potential Source Site

Activities

- Establish and train tiger research and monitoring teams
- Establish a baseline for tiger and key prey species within the tiger source sites
- Establish Adopt and implement tiger and prey monitoring protocols in the tiger source sites

Outcomes

- Standardized indicators of key prey and tiger recovery provided on regular basis
- Indicators fully integrated into management planning and resource allocation

Objective 5

Strengthen trans-boundary collaboration with neighboring countries to reduce wildlife poaching and cross-border illegal activities

Activities

- Set up collaboration mechanism to combat illegal trans-boundary activities driven by international demand for wildlife products
- Establish and train law enforcement team
- Conduct annual coordination meetings for exchange of experiences on law enforcement patrol activities

Outcomes

- Increased number of anti-poaching patrols along the border
- Increased communication between key agencies in the Cambodia and neighboring countries as well as CITES Interpol and NGOs, concerning the wildlife trade, routes and intelligence

Policy

- Designate an inviolate Potential Tiger Source Site in the Eastern Plains Landscape
- Inter-ministerial cooperation and coordination to ensure sustainable management of land-use across the Eastern Plains Tiger Conservation Landscape.
- Trans-boundary agreement between Cambodia and neighboring countries on combating wildlife crime across the border.
- Review of existing wildlife laws governing penalties for poaching and trade in species of high commercial value

Capacity

Need to improve technical skills (patrolling, investigation, monitoring, reporting) in enforcement agencies and community to monitor and manage conservation areas and community managed areas.

- Scientific skills, resources and personnel needed within FA, GDANCP, relevant stakeholders, and education system to conduct biological monitoring of tigers and prey.
- Increased operational resources, including infrastructure and transport, for effective patrolling and monitoring.
- Greater awareness of the threats to tiger survival and improved perception of the conservation value of tigers in local communities.

Stakeholders

- Policy makers
- Government agencies at national and provincial level
- Community representatives and organizations,
- Local and international NGOs
- Development agencies and financing institutions

Performance Indicators

- Formal documentation designating Potential Tiger Source Site.
- Number of trained and equipped law enforcement staff dedicated to Source Site and Conservation Landscape.
- Documentation that law enforcement monitoring is fully integrated into management planning.
- Documentation that standardized annual tiger and prey monitoring protocols are implemented.
- Documentation of trans-boundary collaboration in controlling cross-border illegal activities.

Costs

- All major conservation management activities in Cambodia are currently supported by NGOs and/or international donors
- Continued strong financial support from the international community will be essential for restoring Tigers to the country.

- Government agencies have greatly improved their capacity for conservation management, and have initiated preparation of a National Tiger Action Plan
- The government plans to work closely with conservation NGOs and donors to develop long-term costs and sustainable funding of effective Tiger conservation

Financing Options

- International Development Agencies: ADB and JICA implement regional development projects and could facilitate trans-boundary activities of the NTRP.
- GEF: Complimentary to potential GEF-5 biodiversity priority areas and activities.
- International NGOs: Currently supporting FA and GDANCP within the landscape.
- REDD: Sustainable financing opportunities are being investigated in the landscape and have the potential to contribute to conservation area management in the long-term.
- Tourism: Increased revenues from well managed and appropriate tourism development.
- National budget: in kind institutional support from the government.

Transboundary Collaboration

- Collaboration with Thailand, Laos and Vietnam to control Trans-boundary wildlife trade
- Potential Trans-boundary Tiger conservation activities in collaboration with Vietnam for the Cambodia Eastern Plains and Yok Don National Park. and other Vietnam Protected Areas bordering the Cambodia Eastern Plains Tiger Conservation Landscape.
- Encourage and participate in GTI Regional Workshop on Transboundary Tiger Conservation Landscapes.

Strategy for long term restoration of tiger populations in key landscapes

- Evaluation of possible translocation of wild Tigers from Source Sites in other countries
- Consideration of the Tiger Sub-species issue in relation to potential sources of Tigers for translocation
- Evaluation of captive tiger breeding, re-wilding & re-introduction
- Encourage and participate in GTI Regional Workshop on translocation, reintroduction and rehabilitation of tigers

Phnom Tamao Wildlife Rescue Center

- Key role to recovery, save and care wildlife confiscated from perpetrators and from hunting. , Contributes to education, tourism, research, and science.

CHINA TIGER RECOVERY PLAN
2010 - 2022

National Plan for Recovery of Wild Tiger Population

A number of factors that have arisen as a result of historical developments have placed the wild tiger population in China in an extremely endangered state. In response?a series of measures have been taken in the form of laws and regulations, in development of nature reserves, in restoration of habitat, in cracking down poaching and illegal trade to save the wild tiger populations in China . Such efforts have led to a gradual but constant trend of increase in the population of wild tigers, and of the extension and improvement of their habitats in China. Furthermore, China will determinedly continue its efforts to extend and ameliorate various habitats for the wild tiger population, whilst also exploring the reintroduction of captive bred tigers into their original range areas. The state will strengthen management and law enforcement in the field of conservation, and facilitate the spread of information for public education in order to create an optimum environment that will allow for a successful recovery of wild tiger population. This should result in a significant growth of wild tiger populations and large-scale extension of the ameliorated habitats across China by 2022, while biodiversity found in the range areas of wild tigers would receive stricter protection and become much richer as a result of recovery.

1. Basic Information

1.1 Basic Information of the Population of Wild Tigers in China

Four subspecies of tiger are found in China: The Siberian (Amur) tiger (Panthera Tigris altaica), South China tiger (Panthera Tigris amoyensis), Indo-Chinese tiger (Panthera Tigris corbetti) and Bengal tiger (Panthera Tigris Tigris). The total sum of the wild individuals of all four subspecies existing in China is estimated to be about 40-50.

For the Amur tiger (P.T. altaica), the number of wild individuals has grown from 12-16 by end of the last century to the current population of 18-22. Their range of distribution is currently limited to the mountain areas connecting Jilin and Heilongjiang provinces with Russia and the eastern mountains nearby. For the South China tiger, despite occasional reports of sporadic traces suggesting its presence, there has not been a confirmed expert sighting for more than 20 years in the wild. For the Indo-Chinese tiger, there are about 11-16 wild individuals living in Xishuangbanna and Huanglianshan Nature Reserve, an area of Yunnan province bordering with Laos and Vietnam. For the Bengal tiger, there are about 8-10 wild individuals living in the forests of southeastern Tibet, bordering India. Given the limited technology and reduced capacity of surveys and monitoring available in the past, more scientific and

reliable methods using more sophisticated technology need to be adopted today in order to create a more accurate picture of both the current population dynamics and the current habitat of wild tigers in China.

1.2 Great Efforts the Chinese Government Has Undertaken to Save Wild Tigers

China is not only a tiger range State, but the tiger has a long history in Chinese culture. Due to its great ecological and cultural significance, the Chinese government has been continuously contributing its great efforts in improvement of laws and regulations, huge investment of substantial?financial and personnel resources, enhancement of law enforcement etc. to save the wild tigers from its endangered state, and by now, a series of outcomes have been achieved from the efforts as following:

1.2.1 In 1988, the State Council of China approved listing of tiger as the species under national key protection at the first class so as to save and protect them legally.

1.2.2 China has established 33 nature reserves and more than 70 conservation management stations in the range area of wild tigers to form a basic network of tiger conservation to undertake patrolling of the habitat and anti-poaching of wild tigers and their prey animals to secure the populations of wild tigers and their habitats.

1.2.3. Since 2000, in combination with the national programs for Natural Forest Protection, Recovery of Farmland for Forest, and Wildlife Conservation & Nature Reserve Development, China has been actively facilitating the recovery and amelioration of habitats for wild tiger populations.

1.2.4. China has started a pilot trial of governmental compensation for injury of local residents and

their domestic, and property losses caused by wild tigers and their prey animals since 2007.It has greatly facilitated the public understanding and support for the protection of wild tigers from local communities in wild tiger distribution areas, with their legitimate rights being safeguarded.

1.2.5. China has been continuously enhancing law enforcement to fight against illegal activities of poaching of wild tigers and smuggling and illegal trading of tiger products including tiger bone and skins, and a number of illegal cases have been arrested with criminals being punished severely. The efforts have effectively resulted in decline of the concerned illegal activities. In December of 2009, the State Forestry Administration of China issued yet another special notification to require further law enforcement efforts in combating smuggling and illegal trade of tiger products, and strengthening regulation and supervision of captive bred tigers as well sealed storage of their carcasses and body parts.

1.2.6. China has been vigorously carrying out a series of public awareness and education campaigns on tiger conservation, which has greatly improving public understanding of tiger protection. Now, public support has become important social force for tiger conservation.

1.2.7. Since 1993, China has not approved the sale or use of any tiger bone even for medical purposes, enduring huge economic losses to fulfill its international obligations. It is a tremendous contribution for global tiger conservation. Meanwhile, China has implemented a permit system for activities concerning captive breeding of bred tigers while stringent requirements in technology, condition, provenance and other categories has been applied. Also, for the activities concerning captive breeding of tiger, a series of technical tools including written documents, micro-chipping and storage of DNA samples for every individuals are adopted to ensure strict supervision.

1.2.8. China has been paying its highlight to international cooperation on tiger conservation and has signed bilateral governmental protocols with India and Russia. It has also conducted a series of collaborative activities in field survey of wild tiger, information exchange, personnel training, law enforcement seminars etc. with other countries and organizations. Now, the collaborative activities have resulted in remarkable achievements.

1.3 Problems Facing China and its Strategy

Careful analysis of the major limiting factors facing the restoration and expansion of the extant wild tiger populations and their habitats in China has revealed the following: 1) Wild tigers live in limited and fragmented areas where they are isolated from each other and have difficulty in accessing other suitable habitat; 2) Poor habitat quality and a severe insufficiency in prey resources; 3) Human activities seriously interfere with the activities of wild tigers and their prey, illegal hunting and snaring still exists, directly threatening wild tigers in particular; 4) Severe genetic problems are faced by extremely small populations as a result of limited effective breeding opportunities leading to inbreeding or no breeding options whatsoever. Furthermore, the fact that wild tigers can harm humans and their domestic livestock, as well as requirements restricting certain activities therefore affecting the livelihood of local communities for the sake of wild tigers protection, will all affect the effectiveness and sustainability of conservation measures.

Given the above problems, a comprehensive study needs to be conducted over the tigers' distribution area to ascertain the current status of the habitat in the surrounding areas as well as the local current livelihood. Systematic engineering measures need to be taken and policy guarantees need to be provided to promote the expansion and improvement in quality of habitat and to reduce interference from human beings. Field patrolling and law enforcement and supervision need to be strengthened to fight against illegal hunting of tigers and other wild animals and to curb smuggling and illegal operations involving tiger products. Continuous and systematic scientific research and monitoring need to be developed to ensure timely understanding of the population dynamics and evaluation of habitat quality, so as to provide a basis for an intensification of efforts to aid conservation and habitat improvement. Methods need to be enhanced for the prevention of damages to humans and domestic stock by wild tigers and a compensation system relating to direct losses needs improving. Further, a pilot area must be established for the re-introduction of South China Tiger in the initial stage. Based on experience gained thereof and relevant study results, the natural release area will be gradually extended to meet the requirements for stable and sustainable living of at least 2-3 wild populations of the subspecies.

Another crucial item requiring attention is that it is only with the understanding and support of local

people for wild tiger populations and habitat conservation that the objectives of conservation can be assured. But successful conservation requires necessary constraints over the methods of production and the way of life of local people to be put in place. It is easy to trigger conflicts between conservation activity and local communities that will directly hinder sustainable conservation. Therefore, while the conservation of wild tigers and their habitat is being strengthened, public education needs to be vigorously developed, and the needs of economic development and livelihood improvement for local residents must be taken into account at the same time. Proactive guidance shall be given to change the methods of production and ways of living that are incompatible with sustainable conservation, support shall be given for exploration into new means of local economic development that are favorable to sustainable conservation. Efforts shall also be made to promote the integration of policies concerning the protection of wild tigers and their habitat with those concerning local economic development and improvements in quality of life, to achieve coordinated and sustainable development.

2. Strategic Goals?2010-2022?

In order to save and facilitate the growth of wild tiger populations of each subspecies in the country, China will take a series of measures including vegetation rehabilitation, establishment of adequate ecological corridors between habitats, intensification of field patrols and monitoring of these conservation areas, exploration of tiger re-introduction, and the introduction of adequate methods of economic development in combination with a national program for protection of natural forest, recovery of farmlands for forests, nature reserve development, etc. It is expected to achieve a significant growth of wild tiger populations together with large-scale extension, and quality optimization of wild tigers habitats being achieved by 2022. Under the umbrella, biodiversity of the areas shall be also conserved much better and the livelihoods for local people shall be improved with the manners for their economic development becoming more tiger-friendly under appropriate guidance and assistance.

3. Priorities and Actions

China will focus on the following areas to promote population growth of wild tigers in the country based on population and habitat information, relevant conservation management, scientific research, law enforcement and supervision currently available.

3.1 Conservation, extension and amelioration of wild tiger habitats, and trial reintroduction.

Based on systematic research and scientific evaluation, measures will be adopted for vegetation rehabilitation, introduction of prey resources and an overall ban on hunting in current wild tiger distribution areas as well as their surrounding areas or in other adequate areas suitable for future connection through ecological corridors. The objectives are to achieve maximum expansion of tiger activity range and a notable improvement in habitat quality, and to achieve genetic exchanges among key isolated population groups through restoration and optimization of the habitat in ecological corridors to ensure the continuous growth of the wild tiger population by 2022. In addition, pilot areas will be established at adequate sites for the re-introduction of captive-bred South China Tiger into the wild so that monitoring and study of the released individuals can be conducted, and preparation can be undertaken for gradual expansion of the natural release area as well as establishment of wild populations of the subspecies.

Action 1: Survey and identify priority areas.

To identify priority areas for wild tiger conservation and restoration in this stage based on survey and subsequent evaluation of the current distribution area and areas planned for extension and natural release.
Main activities in this action consist of:

- To collect information on topography, vegetation, roads and residents in tiger distribution areas and the surrounding areas, develop field surveys and evaluate its biotope if necessary, come up with the extent of habitat and ecological corridors for future extension, and identify action zones for this stage.
- To survey, select and identify re-introduction zones for amoyensis in its historical distribution range.
- To conduct planning for the above zones following legal procedures in order to prevent irreversible damages to the biotope caused by inappropriate construction. The plan will be used to guide and guarantee the implementation of actions through a sequence of steps and stages.
- To establish GIS for action zones of wild tiger conservation and restoration.

Projected outcome: The conservation and restoration range will be identified with legal guarantees through effective planning, and the relevant GIS will provide effective data and information to support conservation actions.

Action 2: Habitat conservation, extension and optimization for wild Siberian (Amur) tigers.

In Jilin and Heilongjiang provinces, a series of measures including vegetation restoration and rehabilitation, overall ban on hunting, necessary and scientific introduction of prey resources, etc will be undertaken in the areas with Siberian tigers living in currently and their future potential range areas and in the corridor areas. It shall result in habitat extension and quality optimization and increase in prey density to satisfy the needs of population growth of Siberian tigers.

Main activities:

- To study and draft technical guidance of habitat restoration for wild population of Siberian tigers.
- To implement an overall ban on hunting in currently existing range areas of wild Siberian tigers and their surrounding areas and ecological corridors; study and draft habitat restoration plans by region and by category.
- To select, in different vegetation areas, one to two locations, for a pilot demonstration of habitat restoration through recovery farmland to forest, change of inappropriate forests and vegetation, maintaining necessary grasslands and introduction of prey resources according to scientific guidelines.
- To extend habitat progressively in project areas based on the successful pilot studies and demonstrations in habitat restoration.
- To explore the necessity and feasibility of reintroducing captive-bred Siberian tigers into the wild.

Projected outcome:

Adequate zones for Siberian tigers will be extended, the density of prey resources will be increased, and fragmented habitat will be improved, therefore better satisfying the needs of a growing population of Siberian tigers, and promoting effective genetic exchanges among isolated species and populations.

Action 3: Trial reintroduction of South China tigers.

Establish initial small-scale experimental areas selected through scientific assessment for the re-introduction of South China Tiger and ensure that such areas are conducive to the natural survival and reproduction of the re-introduced South China Tiger through vegetation revamp, implementation of an overall ban on hunting, and scientific introduction of prey resources. Extend such areas gradually to meet the needs of population growth based on the natural growth of their populations as well as study results.

Activities:

- To study and draft technical and management guideline for the re-establishment and management of trial habitats for reintroduction of South China tiger, and work out the detailed implementation plans to designate the trial areas.
- To undertake recovery of farmland for forests, change inappropriate forests and vegetations, maintain necessary grasslands, and reintroduce prey resources etc. in accordance with the guideline and implementation plan so as to prepare suitable habitats for the natural survival and reproduction of reintroduced South China tigers.
- To develop continuous monitoring and scientific assessment of the reintroduced South China tiger population and its habitat, identify and analyze problems and establish a working direction for next steps.
- To gradually extend the range of the trial areas to meet the natural growth needs of the reintroduced South China tiger populations based on scientific assessment.

  Projected outcome: the natural survival, reproduction and sustainable development of reintroduced South China tiger population shall be achieved, and the biodiversity in this zone will be effectively protected and managed, further optimizing biodiversity of this habitat.

Action 4: Habitat conservation, extension and optimization for Wild Indo-Chinese tigers.

In Yunnan province, to achieve large scale extension and quality optimization of the habitats for wild Into-Chinese tigers in priority areas including current distribution areas, their surrounding areas and

ecological corridors through changing inappropriate forests and vegetation, overall ban on hunting and necessary and scientific introduction of prey resources which will increase prey density etc.. It is expected to improve the capacity of the areas for the growth of the wild population of the subspecies.

Activities:

- To study and draft technical guidance of habitat restoration and management for wild Indo-Chinese tigers.
- To implement an overall ban on hunting in identified project areas including current distribution zones, the surrounding areas and ecological corridors of the tigers, study and draft habitat restoration plans by region and by category.
- To select, in different vegetation areas, one to two locations, for pilot demonstrations of habitat restoration through farmland returning to forestry, monoculture forestry rehabilitation, adequate grass cover maintenance in forested land and scientific introduction of prey resources.
- To extend habitat recovery progressively in project areas based on successful pilot studies and demonstrations.
- To explore the necessity and feasibility of releasing captive-bred Indo-Chinese tigers into the wild.

  Projected outcome: the areas suitable for wild Indo-Chinese tigers will be extended, the density of prey resources increased, and fragmented habitat improved, to better satisfy the needs of a growing population of the wild individuals.

Action 5: Habitat conservation, extension and optimization for Bengal tigers.

In Xizang, the future efforts will focus on quality improvement of the habitats and enhancement of patrolling and monitoring in the areas. When necessary, ecological corridors should be established and necessary vegetation restoration and introduction of prey resources should be undertaken scientifically to increase prey density to meet needs of a growing population of the tigers.

Activities:

- To study and draft technical guidance for habitats restoration and management of wild Bengal tigers.
- To implement an overall ban on hunting in identified project areas including current distribution range, the surrounding areas and ecological corridors of the tigers; study and draft habitat restoration plans by region and by category.
- To select, in different vegetation areas, one to two locations, for pilot demonstrations of habitat restoration through farmland recovery to forests, inappropriate forests and vegetation revamping, necessary grass cover maintenance and scientific introduction of prey resources.
- To extend habitat amelioration progressively in project areas based on the successful pilot demonstrations.

  Projected outcome: suitable habitat areas for wild Bengal tigers will be extended and in good linkage, density of prey resources increased to better satisfy the needs of a growing population of wild Bengal tigers.

3.2 Capacity building of conservation and monitoring units of wild tiger population and their habitats.

Efforts to strengthen the conservation and monitoring of tigers' population and habitat in wild tiger activity areas shall be made in the following aspects: intensify capacity building in management agencies in nature reserves and relevant conservation and monitoring agencies; improve infrastructure and replenish equipment; develop staff training with advanced technology; enhance quality of conservation and management staff; set up and perfect rules and regulations; and further promote standardized field patrol and monitoring. All these efforts are in line with the objective of ensuring the implementation of an overall ban on hunting to effectively prevent poaching and other human behaviors damaging tiger habitat, and to understand the population dynamics and habitat variation on timely basis in order to provide a scientific basis for an evaluation of conservation effectiveness and decision making for relevant conservation policies. The scope of Natural Reserves will be adjusted and a series of newly established conservation monitoring stations will be added in conservation 'blind zones' to achieve effective overall conservation measures and monitoring in wild tiger activity areas.

Action 6: Increase conservation and monitoring stations in range areas of wild tiger populations.

Study the distribution of existing conservation and

monitoring stations in priority areas for wild tiger conservation and restoration, add conservation and monitoring stations in blank areas, identify the area of responsibility, establish a coordination system, and achieve overall conservation and monitoring in the priority areas.

Activities:

- To study and analyze the institutional arrangement in existing monitoring agencies involved in wild tiger conservation and action zones, and identify blind zones in conservation monitoring.
- To add new conservation monitoring agencies in blind zones.
- To adjust the scope of the existing natural reserves based on actual situation and scientific assessment & according to legal procedures when necessary.
- To divide areas of responsibility in wild tiger conservation and action zones, to identify areas of responsibility for each conservation monitoring agency to ensure that all action areas are covered.

  Projected outcome: achieve overall improvements in conservation policy outcomes through monitoring in all wild tiger conservation and restoration action areas, with clearly defined responsibilities for each area.

Action 7: Capacity improvement for conservation and monitoring of wild tiger populations and their habitats.

Enhance the capacity of conservation monitoring agencies in the dynamic monitoring of wild tiger populations and habitat, in anti-poaching and coordination with local residents through perfecting regulations and systems, in improving facilities and equipment, and in increasing staff numbers and intensifying staff training.

Main activities:

- To allocate working staff and expand conservation monitoring management teams based on scope of responsibilities and degrees of difficulties of assignment.
- To improve working facilities in monitoring agencies, providing necessary equipment or renewing existing equipment available to working staff and make every attempt to introduce high-tech equipment for conservation monitoring.
- To study and draft conservation monitoring guidelines for wild tiger populations and its habitat to aid monitoringagencies in monitoring process according to a uniform plan.
- To organize professional training for monitoring staff.
- To set up coordination mechanisms among monitoring agencies through the establishment of regulations and systems, such as meeting systems, information notification systems, and joint action systems so as to ensure an overall and coordinated development on monitoring wild tiger populations and their habitat, anti-poaching, and joint community management.
- To assess conservation management results regularly to improve target-oriented monitoring measures and enhance efficiency.

  Projected outcome: a more standardized and a more effective development of conservation monitoring of wild tiger populations and their habitat, a more timely and accurate understanding of the tigers' population and habitat dynamics, and more effective measures to stop anti-poaching and habitat destruction behavior.

3.3 Coordination of wild tiger conservation with local society and economic development.

In order to obtain their understanding and support, close attention must be paid to the needs of local communities concerning social and economic development and to guide them in a way compatible with wild tiger protection. In this regard, the key activities to be developed are: First, set up special funds for compensation of damages to humans, animals and crops caused by wild tigers so as to recognize the legal rights and interests of the local residents. Second, strengthen awareness campaigns to enhance awareness of tiger protection among local residents and disseminate risk-prevention knowledge by guiding them to develop ways of production and living conducive to tiger conservation. This can be achieved by means of establishing poster boards, signboards, information booklets and community education dissemination campaigns. Third, to effectively prevent and reduce damages to humans, animals and crops caused by tigers and their prey by placing scattered households in a more concentrated development, and by building fences and isolation ditches in areas frequently experiencing conflict with

tigers and their prey. Fourth, study and explore the ways of livelihood and methods of production favorable to wild tiger and its habitat conservation, and extend such approaches through a system of pilots and demonstrations, micro-subsidies, technical guidance, and establishment of special funds so as to promote harmony of coordinated and sustainable development of local societies and economies with tiger conservation.

Action 8: Compensation for the injury to human and property losses caused by wild tigers and their prey.

Through the establishment of earmarked funds, clear standards and procedures of compensation, strengthened supervision and inspections to ensure that the damages to humans, livestock and crops of local residents caused by tigers and their prey are rationally compensated, their legal rights and interests are suitably safeguarded, and human-tiger conflicts are alleviated.

Main activities:

- for compensation of losses to humans, livestock and crops caused by tigers and their prey, study and draft criteria andprocedures for receiving compensation to ensure that local residents can successfully claim for any relevant losses they suffer.
- To establish special funds, study and draft utilization management and supervision methods of the funds, thus ensuring that relevant compensations are cashed on time.
- To regular and irregular checking over the use of funds, survey local residents over their attitudes towardscompensation.

  Projected outcome: strive to obtain the public's basic satisfaction over compensation schemes, maintain their understanding of and support for tiger conservation, prevent any mood shift of local residents unfavorable to tiger conservation.

Action 9: Active prevention of injury to humans and property losses from tigers and their prey.

Popularize personal safety knowledge among local residents; guide them in changing inappropriate behaviors and habitats through relocation of scattered households and establishment of prevention facilities so as to reduce frequency of loss to humans, livestock and crops caused by tigers and their prey.

- To popularize personal safety and conflict-prevention knowledge through desploying warning signs, distributing education booklets and developing awareness and educational activities.
- To reduce the interference of human activities with those of wild tigers, their prey and habitat through the gradual concentration of settlements, replacing scattered households situated in areas with frequent tiger activity or in key ecological corridors.
- To take active prevention measures to avoid tiger attacks on people and livestock in more populated areas through establishing fences and isolation belts etc.
- To guide local residents to change their habit activities of raising free-range poultry and domestic animals in theforests to avoid tigers attack at most level.

  Projected outcome: incidents of damage caused to humans and livestock by tigers and their prey will gradually decrease, losses reduced, interference of human activities with wild tigers, their prey and habitat alleviated progressively.

Action 10: Demonstrate economic development models favorable to wild tiger conservation based successful pilot trials.

Survey, study and evaluate the methods of production and livelihood favorable to tiger conservation; extend such models step by step; provide guidance for coordinated and sustainable development of local community economies in harmony with the tiger and its habitat conservation through pilot schemes and demonstration; and obtain wider understanding, support and participation of local communities in conservation.

Activities:

- To conduct systematic surveys on methods of production and livelihood in local communities; assess impacts ofvarious methods of production and livelihood on tigers, their preys and habitat; identify those economic behaviorsincompatible with conservation that need to be altered.
- To study, with the cooperation of local communities, alternatives to current methods of economic development unfavorable to tiger conservation; to encourage sections of the local population to adopt pilot schemes and initiatives through micro-subsidies and technical guidance based on scientific assessment.

- To conduct timely evaluations of economic benefits and conservation effectiveness of the pilot schemes and gradually extend economic development alternatives that are effective, marketable and favorable to tigerconservation through a combination of demonstrations and subsidies.
- To integrate a supporting reward and punishment system with methods conducive to the elimination of behaviors unfavorable to tiger conservation; and achieve the coordinated and sustainable development of tiger conservation and livelihood improvement of local residents.

  Projected outcome: the original methods of economic development practiced by local residents unfavorable to wild tigers conservation will be progressively altered; the economic activities favorable to conservation will gradually be extended; both improvements in conservation and in the livelihood of local residents are achieved; the willingness of the local residents to aid conservation will be further strengthened and local residents will become a major social force in the conservation of wild tigers.

3.4 Enhancement of law enforcement against poaching, smuggling and illegal trade of tiger products

In order to effectively curb poaching of tiger preys, smuggling and illegal trade of tiger products, law enforcement investigation, hotlines for public reporting illegal activities and international information exchanges must be adopted. This will provide a better understanding of the situation in key areas, key ports, border areas, markets and collection and distribution sites which are prone to smuggling and illegal sales of tiger products. For regional law enforcement agencies, efforts will be made to strengthen staff training and replenish equipment and detection devices so as to improve mechanisms that ensure more effective field patrols, creation of responsibility systems and vigorous law enforcement. All these will aid the effectiveness with which these law agencies can operate. Based on local circumstances, ad hoc joint inspections by law enforcement agencies and special crack-down operations will be conducted to implement a powerful policy of shock and awe. Besides this, a wide-ranging awareness and educational campaign will be developed to guide the public on voluntary resistance to illegal operations involving tiger products. A public reporting hotline will be established to encourage the public in the timely reporting of information on criminal activities such as smuggling and illegal operations involving tiger products. The public can, in this manner, play a pro-active role in law enforcement on wildlife protection, thereby increasing the strength and effectiveness with which law enforcement can function.

Action 11: Strengthen capacity building in enforcement agencies.

Collect information on poaching, smuggling and illegal trade of tiger products through various channels; identify key areas, key ports, border areas, marketing and distribution centers; strengthen the training of law enforcement agency staff of the above mentioned authorities; replenish enforcement equipment and detection devices; improve the enforcement system so as to enhance enforcement effectiveness and curb illegal activities.

Activities:

- To determine through in-depth analysis the key areas, key ports, border areas, markets, collection and distributionsites for smuggling and illegal trade of tiger products through collecting information reported by public; and conduct active surveys and analysis of the market to assess trend and directions in smuggled products.
- To increase the collection of anti-smuggling intelligence, and deploy control mechanisms to avert risks, to improve the capacity to investigate and to solve smuggling cases involving tiger products. Crack down severely on criminal gangs smuggling tiger products through investigation methods such as detailed surveillance of the delivery chains of illegal tiger products, from the source of the poaching to the end buyer.
- To coordinate law enforcement agencies to replenish and improve target-oriented equipment and detection devices in their agencies in the areas mentioned above.

  •To strengthen staff training and conduct law enforcement seminars in the above mentioned enforcement agencies to promote their awareness of responsibility on law enforcement as well as improve professional capacity.
- To establish an effective coordination mechanism to form joint forces of enforcement through the formulation of a patrol system, information notification system, joint conference system and accountability system etc.
- In areas where the situation is critical, multi-agency joint enforcement inspections and special

crack-downs will be conducted; results of the investigation and treatment of illegal cases will be published in timely manner to form a strong campaign of shock and awe which will effectively curb criminal activities such as smuggling and illegal operations involving tiger products.

Projected outcome: enforcement capacity against smuggling and illegal operations involving tiger products will be strengthened; enforcement effectiveness will be increased with efficient curbing of the momentum on smuggling and illegal operations involving tiger products.

Action 12: Wide-spread media and education campaigns on tiger conservation.

Further raise public awareness of tiger conservation through newspapers and magazines, radio and TV broadcasting as well as special topic media campaigns; popularize laws and regulations on conservation; advocate public on voluntary resistance towards smuggling and operations involving illegal tiger products; and advocate active reporting by members of the public on illegal activities to provide strong support for conservation law enforcement.

Activities:

- To explain to the public the damage inflicted upon wild tiger populations as a result of smuggling and illegal operations involving tiger products; to publicize related rules and regulations to strengthen the public's awareness of conservation through newspapers, magazines, radio and TV broadcasting.
- To conduct target-oriented awareness and educational campaigns through deploying information boards, warning signs and the organization of special topic awareness campaigns in key ports, border areas, markets, collection and distribution sites thus encouraging the public to take the initiative in giving up illegal activities such as the purchase of tiger products.
- To establish reporting phone lines; set up a reward and punishment system; and encourage the public to report on illegal activities.
- To widely disseminate information from important cases to facilitate the public understanding of the legal consequences of illegal activities, so as to achieve a more complete public education.

  Projected outcome: public awareness will be significantly raised, encouraging volunteered resistance to illegal operations involving tiger products and the use of such tiger products. The public will be more cooperative in reporting any illegal activities.

3.5 Extension of international cooperation and exchange on tiger conservation

A common understanding amongst tiger countries and international societies relating to tiger protection has been formed, and exchanges in knowledge and resources have strengthened the global campaign to save all wild tigers. The key for next step is to transform this common understanding formed amongst all sides into direct and joint action, especially in certain crucial areas, which are needed among the relevant international parties. China will proactively promote the mechanisms for coordination and cooperation among conservation management agencies and law enforcement units on both sides of its border, allowing rapid and effective information exchange, striving for joint monitoring activities in tiger range border areas and improving law enforcement effectiveness in border trading zones and ports through rapid exchange of law enforcement information; Communication and information exchange with concerned organizations including WCO, CITES, and Interpol should be strengthened. Various ways including international seminars, training courses and friend nature reserves etc. will be also adopted to increase exchange of wild tiger conservation expertise and technology accumulated from respective experiences in order to improve conservation and management on all sides.

Action 13: Improve mechanisms for more effective international cooperation on tiger conservation

Promote the implementation of more effective international cooperation mechanisms based on current international cooperation framework for wild tiger conservation, so as to achieve more effective exchanges of technical experience, information sharing and coordinated action.

Activities:

- To strengthen communications between tiger countries through international seminars and mutual visits; to understand the concerns from different parties, exchange and share technology and experiences in tiger conservation, in anti-smuggling and anti-illegal trade operations involving tiger projects; and analyze issues facing global wild tiger conservation and explore the directions in which joint efforts must move.

- To promote the establishment of information exchanges between and cooperation amongst grass-roots conservation agencies in tiger distribution areas in border zones.
- To promote the exchange of information and cooperation among grass-roots law enforcement agencies in border areas and ports.
- To strengthen communication and information exchange with concerned international organizations including WCO, CITES, and Interpol etc. to help and guide actual law enforcement actions, and to improve capacity of local law enforcement units by introduction of advanced technologies and experience through the channels.

  Projected outcome: achieve a multi-level, multi-format system for international information exchange and cooperation on wild tiger conservation, deepen mutual understanding and support amongst tiger range countries so as to enhance conservation effectiveness together.

4. Policy Framework

4.1 Existing Policies

4.1.1 Years of efforts have led to the establishment of relevant laws and regulatory frameworks for tiger conservation management in China. All tigers are under national key protection at first class - which not only clearly specifies the conservation of their habitat and natural reserves, but also clearly states that all activities relating to the hunting, domestication and reproduction of tigers without permit, the sale, procurement, transportation, and smuggling of tigers and tiger products, are criminal. Those engaged in poaching, the illegal killing or illegal purchase, sale or transportation of tigers and tiger products, will be sentenced to no less than 10 years imprisonment in addition to fines and the confiscation of personal property. Those serious activities engaged in smuggling tiger products can receive a sentence of imprisonment for life, and their personal property will be confiscated. Further, given the status of global population of both wild tigers and captive-bred bred tigers, the State Council of China issued general orders in 1993 to fully ban the use of tiger bones in medicine or trade. This is a huge contribution to global wild tiger conservation.

4.1.2 A conservation network has been established consisting of natural reserves and grass-roots conservation management stations in wild tiger distribution areas. Programs such as natural forestry conservation and farmland returning to forestry are implemented; nature reserves have been established and wildlife conservation measures such as the restoration of prey populations, compensation for injuries and damages to humans, domestic animals and crops, strengthened patrol in tiger habitat and capacity building etc. have been taken. All these efforts have led to obvious achievements in wild tiger habitat optimization and population growth.

4.1.3 Multiple-department, multiple-level and multiple-link wildlife law enforcement system and coordination mechanisms are already established in China consisting of departments such as forestry, public security, industry & commerce administrations and customs etc. Capacity building is continuously strengthened through the replenishment of equipment, information exchanges, staff training and improvement of established systems. Tiger related cases are listed as priority enforcement areas, and regular & irregular inspections as well as special actions are developed playing an active role in investigations into and the treatment of smuggling and illegal operations involving tiger products.

4.1.4 Chinese law explicitly requires: "when construction projects impact adversely on the environment of animals under state or local key protection regulations, the construction operator must submit environmental impact studies. The environmental protection agencies shall obtain comments from wildlife management departments of comparable administration levels during approval process." This provides a regulatory guarantee against unsuitable construction projects in the distribution areas of wild tigers.

4.1.5 Captive breeding of tigers is under strict supervision in China. A Permit system is in operation for the domestication and reproduction of tigers. A permit holder is required to establish and maintain strict management archives and a family tree system for each individual tiger. Particularly since 2007, microchip, gene samples and management information systems that can be searched via the internet have been adopted in

China, and the supervision of captive breeding agencies and individual tigers can be achieved through MIS.

4.2 Improvement Needed for Wild Tiger Protection Policy

To enhance conservation of wild tigers and their habitat, China needs to improve its current policy of wild tiger conservation in the following aspects: 1) any conservation plan for wild tigers and their habitat needs to be examined and approved according to legal procedures before becoming legally binding; 2) the systems relating to conservation management of wild tigers need to be further improved at the grass root level in the following aspects: field patrols, monitoring and evaluation, accountability and inter-departmental coordination; 3) the following need to be further elaborated and clarified to better combat smuggling and illegal operations involving tiger products: a market patrol system, an accountability system, a public reporting reward system, an inter-departmental coordination and joint action system etc.

5. Capacity constraints

China is a developing country, thus a lot of constraints in tiger conservation and the capacity to fight smuggling and illegal operations involving tiger products exist due to a previous long-term insufficiency in investment. The constraints mainly include:

- Limited application of advanced technology: the primary methods hereto used for field patrol and monitoring in most of the areas, as well as equipment and facilities are still, at best, primitive.
- Poor conservation management: technical guidance or working manuals for standardized patrol and monitoring are not even supplied in many places.
- Understaffing and poor quality of staff is relatively common.
- Severe shortages in support capacity to guide local communities to change their means of production and livelihood unfavorable to conservation.

6. Stakeholders

The stakeholders mainly include: central to local management authorities in charge of wildlife & plant conservation and natural reserves, public security authorities, industry and commerce agencies, customs bureaus, financial departments, local communities, traditional industries such as traditional Chinese medicine, research institutes, non-governmental conservation organizations, financial aid organizations, judicial organs, and media, etc.

7. Program Indicators

The following indicators will be employed to evaluate the outcomes:

The change in wild tiger population numbers, the expansion of tiger activity areas, variance of biotope found in the habitat, change in prey density, an increased occurrence of prosecution in cases involving law breaking relating to tigers or their habitat, improvements in the livelihood of local residents, establishment of monitoring stations and staffing for conservation management, and a change in threatening factors.
For the different priorities, different indicators will be employed to evaluate their results from the actions.

7.1 Conservation, extension and amelioration of wild tiger habitats

Evaluation indicators include: the number of GIS in wild tiger habitats, a change in wild tiger numbers, expansion of tiger activity boundaries, status of habitat rehabilitation demonstrations, change in prey density, tiger activities in ecological corridors, etc.

7.2 Capacity building of conservation and monitoring units of wild tiger populations and their habitats.

Evaluation indicators include: number of monitoring stations and range of their responsibilities, number of working staff, improvements in equipment and facilities, formulation and renewal of technical guidance and management manuals and relevant systems of patrol and monitoring, number and effectiveness of field patrols and monitoring, rate of occurrence of tiger-related criminal cases, and capture of illegal snares, etc.

7.3 Coordination of wild tiger conservation with local society and economic development.

Evaluation indicators include: injuries to humans and

domestic animals by wild tigers and their prey, crop losses, frequency of compensation distribution and amounts awarded, number of warning and awareness sign boards as well as the rationality of their locations, deployment of preventive measures against damages to humans, domestic stock and crops from tigers and their prey, understanding and application of personal safety knowledge among local residents, number of pilots and demonstrations applying methods of economic development favorable to tiger conservation, as well as annual income increases in pilot and demonstration households, a numerical increase of such demonstration households, an increased amount of supporting funds made available, a reduction of economic behavior unfavorable to tiger conservation, and etc.

7.4 Enhancement of law enforcement against smuggling and illegal trade of tiger products

Evaluation indicators include: the number of agencies and staff in key enforcement areas, an improvement in equipment and facilities, the formulation and renewal of different systems, the volume of training given to professional staff, records of market patrols and case investigations and treatment, the establishment of crime reporting hotlines and volume of reports, the investigation and treatment of reported cases, the number of joint inspections and special actions, the number of discovered illegal cases and their relevant treatment, etc.

7.5 Extension of international cooperation and exchange on tiger conservation

Evaluation indicators consist: the number of additional and/or renewed agreements or memorandums on international cooperation at all levels, the number of meetings, training sessions, mutual visits and participants at all levels, information exchange via different channels, the application and outcome of advanced international technology or management experiences, and etc.

8. Budget and Funding Sources

To ensure the implementation of the Actions mentioned above, huge amounts of funds are needed. A specific budget needs to be calculated according to the planning done in the different distribution areas of wild tigers.

Funds will be raised through the following channels based on the need for conservation actions:

- China central government and local government will provide necessary investment in combination with national programs for protection of natural forests and wildlife conservation & nature reserve development during the ecological con construction of "12th five-year plan".
- Potential domestic and foreign financial aid.

INDIA TIGER ACTION PLAN (XII PLAN PERIOD 2012-13 to 2017-18)

1. Tiger conservation

1.1 The Central Government, through the Ministry of Environment and Forests provides technical guidance and financial support to various State Government, inter alia, for tiger conservation.

1.2 The State Government are responsible day-to-day management and implementing the policies and plans relating to wildlife conservation

2. Background

2.1 "Project Tiger", now ongoing as a Centrally Sponsored Scheme, was launched by the Government of India in 1973 in nine reserves of different States (Assam, Bihar, Karnataka, Madhya Pradesh, Maharashtra, Odisha, Rajasthan, Uttar Pradesh and West Bengal) over an area of approximately 14,000 sq. km. Since then, the project coverage has expanded considerably to 46 tiger reserves (TR), encompassing an area of around 68518.8 sq.km. in 18 tiger States with 38632.18 sq.km. of notified core/ critical tiger habitats and 29886.62 sq.km. of buffer / peripheral areas in 18 tiger States. This amounts to 2.06% of the country's geographical area. The total core/critical tiger habitat of 46 tiger reserves amount to 5.6% of the country's forest cover. There are 668 protected areas in the country (September, 2012), out of which 46 have been designated as core/critical tiger habitats (6%).

The in-principle approval has been accorded by the National Tiger Conservation Authority for creation of two new tiger reserves, and the sites are: Ratapani (Madhya Pradesh) and Sunabeda (Odisha). Final approval has been accorded to Kudremukh (Karnataka), Rajaji (Uttarakhand) and Bor (Maharashtra) for declaring as a tiger reserve. The State Governments have been advised to send proposals for declaring the following areas as tiger reserves: (i) Suhelwa (Uttar Pradesh), (ii) Guru Ghasidas National Park (Chhattisgarh), (iii) Mhadei Sanctuary (Goa), (iv) Srivilliputhur Grizzled Giant Squirrel / Megamalai Wildlife Sanctuaries / Varushanadu Valley (Tamil Nadu) and (v) Dibang Wildlife Sanctuary (Arunachal Pradesh).

2.2 Due to ongoing conservation efforts under the Project in designated tiger reserves, India has the maximum number of tigers along with its source areas amongst the 13 tiger range countries in the world. Project Tiger has put the endangered tiger on an assured path of recovery, as revealed in the country level assessment of tiger, co-predators, prey and habitat. The recent (2010) findings in this context indicate a poor status of tiger population in areas outside tiger reserves and protected areas. The tiger population, by and large, in tiger reserves and protected areas of such States are viable, while requiring ongoing conservation efforts.

2.3 Project Tiger has a holistic, ecosystem approach. Its core–buffer strategy, protection and development initiatives gave a new perspective to the concept of wildlife management in our country and is a "role model" for in-situ conservation.

3. Present status of tiger, co-predators, prey and habitat

3.1 The second countrywide assessment of the status of tigers, co-predators and their prey was released in March, 2011. This assessment of 2010 is the second such countrywide assessment using the refined methodology as recommended by the Tiger Task Force. The findings indicate a countr2ywide 20% increase in the number of in the year 2010 with an estimated number of 1706 (1520-1909). In the year 2006 estimated number of tigers was 1411 (1165-1657). A decline of 12.6% in tiger occupancy from connecting habitats has also been reported. This has occurred in peripheral and dispersal areas having low densities outside tiger reserves and tiger source populations.

3.2 The increase in the number of tigers is due to the fact that tiger populations in Uttarakhand, Tamil Nadu, Maharashtra and Karnataka have shown an increase in tiger density. The inclusion of Sunderbans, some portions of North East and parts of Maharashtra have also contributed to the increase.

3.3 Tiger occurrence and density were dependent on availability of habitats that were remote, with minimal human disturbance and having a high availability of large wild prey (chital, sambar, gaur, and wild pig).

3.4 Tiger occupied forests in India were classified following landscape complexes:
(a) Shivalik Hills and the Gangetic Plain,
(b) Central India
(c) Eastern Ghats,
(d) Western Ghats,
(e) North-Eastern Hills and Brahmaputra Plains, and
(f) Sunderbans.

3.4.1 In Shivalik- hills and Gangetic Plain Landscape tigers occupied 6712 km2 of forested habitats with an estimated population of 353 (320 to 388) in five separate populations.

3.4.2 Central Indian Landscape (inclusive of Nagarjunasagar Srisailam of the Eastern Ghats) tiger presence was reported from 39,017 km2 with an estimated population of 601 (518 to 685) distributed in 20 tiger populations with a few other sporadic occurrences.

3.4.3 Western Ghats Landscape was 29,607 km2 and registered a decline of about 11.5% compared to that of 2006. The current tiger population was estimated at 534

(500 to 568) registering a rise of about 32 % since 2006.

3.4.4 Tiger occupancy of 4,900 km2 and population numbers between 118 to 178 tigers should be considered as minimal for the North East since systematic coverage of the entire landscape was not done.

3.4.5 Population estimation of the Sundarbans tigers was done with a combination of camera trapping and satellite telemetry. A tiger density of 4.3 (se 0.3) tigers per 100 km2 was estimated. The total population for the Indian Sundarbans was estimated to be between 64 to 90 tigers.

3.5 Currently, Nagarhole-Bandipur-Mudumalai-Wayanad-Moyar-Segur, Corbett, Sundarbans (India and Bangladesh) and Kaziranga-KarbiAnglong have the required number of tiger for long term survival without immigration. The remaining tiger populations require habitat connectivity for genetic and demographic viability.

3.6. Comparative status of tiger (2006 and 2010) [Table 1]

3.7. The Tiger Occupies Landscape Complex, the tiger reserves in India and the proposed / recommended Tiger Reserves in India has been shown in Map 1, Map 2 and Map 3.

4. Management Effectiveness Evaluation of Tiger Reserves

4.1 Independent assessment of tiger reserves based on International Union for Conservation of Nature criteria, as adapted to our conditions, was done for the first time in 2005-2006 for 28 tiger reserves.

This assessment was peer reviewed by International Union for Conservation of Nature experts. Both assessment as well as peer review reports were placed before the both the houses of in the Parliament. .

4.2 The second round of independent assessment based on refined criteria has been done in 2010-2011 for 39 tiger reserves. This is also based on globally used framework, as adapted to our conditions. In all, five independent teams conducted the evaluation using 30 indicators. The framework consisted of 6 elements: context, planning, inputs, process, outputs and outcomes.

4.3 The 39 tiger reserves were grouped in landscape clusters as followed in country level tiger estimation. An additional category comprising of tigers in 'red corridor' (areas affected by left wing extremism) was also included.

The outcome of the evaluation is as below:

Rating	Number of Tiger Reserves	Percentage
Very Good	15	38
Good	12	31
Satisfactory	8	21
Poor	4	10
Total	**39**	**100**

4.4 The Management Effectiveness Evaluation ratings of 2010-2011 and 2005-2006 have been compared for 28 tiger reserves, which were part of 2005-2006 evaluation. The 'very good' rating increased by 4%, the 'good' rating increased by 3%, 'satisfactory' rating decreased by 7%, while there is a status quo for the 'poor' rating [Table 2-Table 5 (c)].

5. General reasons for tiger decline in areas outside tiger reserves

The reasons for tiger decline in areas outside tiger reserves and protected areas are as below:

(i) Degradation of forest status outside Protected Areas / Tiger Reserves owing to:

(a) human pressure;
(b) livestock pressure; and
(c) ecologically unsustainable land uses.

(ii) Fragmentation leading to loss of gene flow from source populations.

(iii) Loss of forest quality in terms of prey biomass.

(iv) Tiger deaths due to man-animal conflict.

(v) Tiger deaths due to poaching.

(vi) Loss of reproduction owing to disturbance on account of heavily used infrastructure like highways, etc.

(vii) Lack of adequate protection in outside areas.

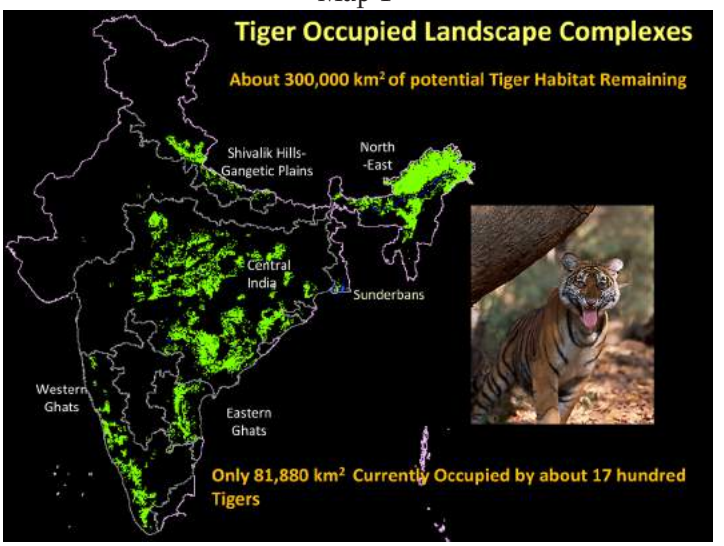
(viii) Insurgency or law and order problems.

6. Present approach to tiger conservation

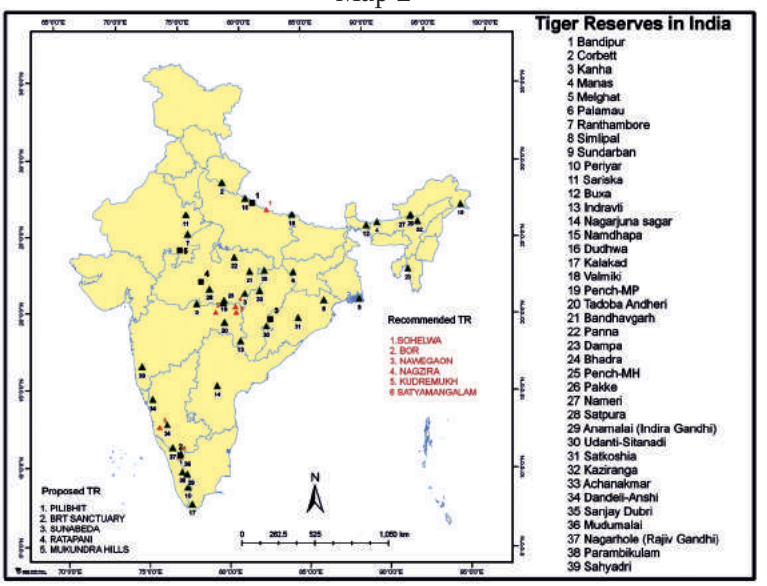
Owing to habitat fragmentation on account of ecologically unsustainable land uses, biotic pressure and poaching, the following approach is imperative.

6.1 Consolidating and strengthening the “source” population of tiger and its prey in tiger reserves, protected areas and tiger bearing forests.

Map 1



Map 2



Map 3

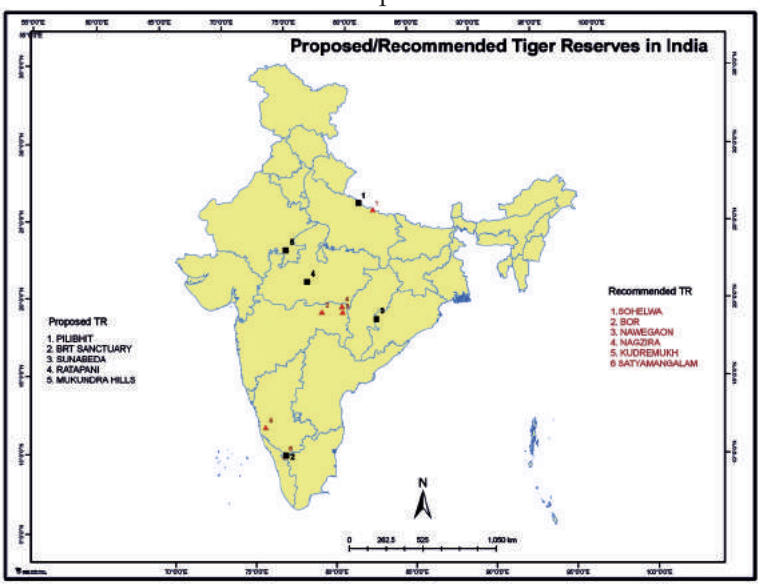


Table 1: Comparative status of tiger (2006 and 2010)

Landscape complex	Tiger estimation 2006			Tiger estimation 2010		
	Statistical Lower limit	Population estimate	Statistical Upper limit	Statistical Lower limit	Population estimate	Statistical Upper limit
Shivalik-Gangetic plains	259	297	335	320	353	388
Central Indian & Eastern ghats	486	601	718	518	601	685
Western ghats	336	402	487	500	534	568
Northeastern hills and Brahmaputra flood plains	84	100	118	118	148	178
Sunderbans	Not assessed	Not assessed	Not assessed	64	70	90
Total	**1165**	**1411**	**1657**	**1520**	**1706**	**1909**

Table-2: Management Effectiveness Evaluation Score (% age) of Landscape Clusters (2010-11)

Cluster Number	Cluster Name	States	No. of Tiger Reserves	Mean Management Effectiveness Evaluation Score%	Management Effectiveness Evaluation Score Range%
(1)	(2)	(3)	(4)	(5)	(6)
I	Shivalik- Gangetic Plain Landscape Complex and Central Indian Landscape Complex and Eastern Ghats Landscape Complex	Uttar Pradesh, Uttarakhand, Rajasthan, Maharashtra	8	64	56-73
II	Central Indian Landscape Complex and Eastern Ghats Landscape Complex	Madhya Pradesh	6	79	56-88
III	Shivalik-Gangetic Plain Landscape Complex and Central Indian Landscape Complex and Eastern Ghats Landscape Complex	Bihar, Chhattisgarh, Odisha, Andhra Pradesh, Jharkhand	8	42	33-63
IV	Western Ghats Landscape Complex	Karnataka, Kerala, Tamil Nadu	9	75	63-80
V	North East Hills and Brahmaputra Flood Plains and Sundarbans	Arunachal Pradesh, Assam, Mizoram, West Bengal	8	66	56-77
	TOTAL		**39**	**65**	**33-88**

Table-3 (a): Category-wise outcome of MEE Process (2010-11)

S. No.	Category	Name of Tiger Reserve
1.	Very Good	Annamalai, Bandhavgarh, Bandipur, Bhadra, Dandeli-Anshi, Kalakad-Mundanthurai, Kanha, Kaziranga, Mudumalai, Parambikulam, Pench (Madhya Pradesh), Periyar, Satpura, Sundarbans
2.	Good	Buxa, Corbett, Dampa, Dudhwa, Manas, Melghat, Nagarole, Pakke, Pench (Maharashtra), Ranthambhore, Tadoba-Andhari
3.	Satisfactory	Achanakmar, Nameri, Namdapha, Sanjay, Sayadari, Valmiki
4.	Poor	Satkosia

Table-3 (b): Category-wise outcome of MEE Process (2010-11) of Tiger Reserves falling in the 'Red Corridor'

S. No.	Category	Name of Tiger Reserve
1.	Very Good	---
2.	Good	Nagarjunasagar-Srisailam
3.	Satisfactory	Similipal
4.	Poor	Indravati, Palamau, Udanti-Sitanadi

Table-3 (c): Category-wise outcome of MEE Process (2010-11) of Tiger Reserves, which had recently lost all tigers

S. No.	Category	Name of Tiger Reserve
1.	Very Good	Panna
2.	Good	---
3.	Satisfactory	Sariska
4.	Poor	---

Summary of MEE Process of Tiger Reserves

Rating	Number of Tiger Reserves	Percentage
Very Good	15	38
Good	12	31
Satisfactory	8	21
Poor	4	10
TOTAL	**39**	

Table-4: Comparison of MEE Rating of Tiger Reserves in 2005-06 and 2010-11

Category	2005-06	%	2010-11	%
Very Good	09	32	10	36
Good	10	36	11	39
Satisfactory	07	25	05	18
Poor	02	07	02	07
TOTAL	**28**		**28**	

Table-5 (a): Performance of Headline Indicators (Top Ten)

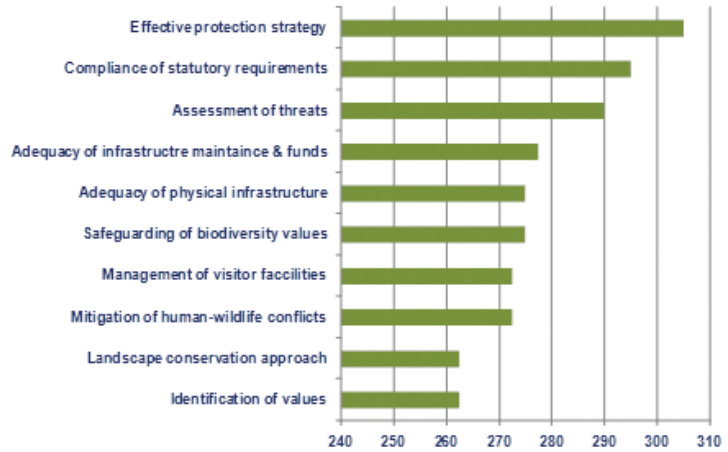


Table-5 (b): Performance of Headline Indicators (Middle Ten)

Table-5 (c): Performance of Headline Indicators (Bottom Ten)

This involves the following active managerial interventions, namely:

(i) Protection, antipoaching operations / intelligence networking;
(ii) Strengthening of infrastructure within tiger reserves;
(iii) Creation of inviolate space through relocation;
(iv) Capacity building of frontline staff, local people and officers and strengthening of training centres and training in related fields, including enforcement, intelligence networking, tourism activities, etc.

6.2 Managing the "source-sink dynamics" by restoring habitat connectivity.

This involves the following managerial intervention, namely:

(i) actively providing incentives to local people for the eco-system services and corridor values provided by them by not degrading the forest (payment for eco-system services);
(ii) incentives to local people for taking up plantations and protecting natural root stocks besides preventing free grazing;
(iii) encouraging stall feeding of cattle and fostering marketing of dairy products;
(iv) providing subsidized gas connection to local people for reducing their dependency on forest towards fuel wood collection.

6.3 Importance of a buffer zone vis-à-vis the tiger land tenure dynamics.

6.3.1 Tiger is a territorial animal, which advertises its presence in an area and maintains a territory. It is a well known fact that partial overlaps of resident male territories in an area do occur. However, the degree of overlap increases lethal internecine combats. Several female territories do occur in an overlapping manner within the territory of a male tiger. The tiger land tenure dynamics ensures presence of prime adults in habitat which act as source populations, periodically replacing old males by young adults from nearby forest areas (Plate 1).

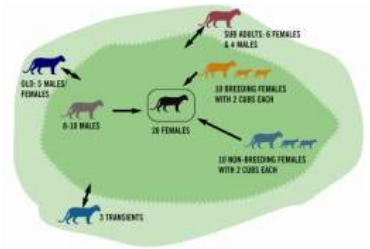


Plate 1: Tiger Land Tenure Dynamics. Minimum population of tigers in breeding age needed for maintaining a viable population (80-100 tigers), which require an inviolate space of 800-1200 square kilometres

6.3.2 The ongoing study and analysis of available research data on tiger ecology Indicate, that the minimum population of tigresses in breeding age, which are needed to maintain a viable population of 80-100 tigers (in and around core areas) require an inviolate space of 800 -1200 sq km. Tiger being an "umbrella species", this will also ensure viable populations of other wild animals (co-predators, prey) and forest, thereby ensuring the ecological viability of the entire area or habitat. Therefore, buffer areas with forest connectivity are imperative for tiger dynamics, since such areas foster sub adults, young adults, transients and old members of the population. The young adults periodically replace the resident ageing males and females from the source population area.

6.3.3 The buffer area, absorbs the "shock" of poaching pressure on populations of tiger and other wild animals. In case of severe habitat depletion in buffer areas, the source population would get targeted and eventually decimate.

6.4 Value of Corridors.

6.4.1 Isolated populations of wild animals face the risk of extinction owing to insularization. Habitat fragmentation adversely affects wildlife due to decreased opportunity available for wild animal movement from different habitats. This in turn prevents gene flow in the landscape. The equilibrium theory of island biogeography predicts greater species richness in large wildlife areas or in smaller areas connected by habitat corridors owing to increased movements of wild animals. Such connecting habitats, apart from facilitating animal movements also act as refuge for spill over populations from the core areas. They may also act as smaller "source" by facilitating breeding and movement of native wildlife populations to colonize adjoining habitats. Natural linear features like rivers or mountain ranges may act as boundaries for wildlife populations. However, disturbance of corridors on account of human interventions (highways, canals, industries, roads, railway tracks, transmission lines) is deleterious to wildlife.

6.4.2 "Source" populations are those which produce a surplus of animals which are potential colonizers. On the other hand, "Sinks" are those populations in which deaths exceed births, and their persistence depends on regular influx of immigrants (Plate 2).

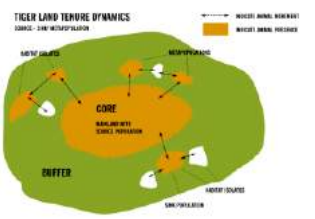


Plate 2: Tiger Land Tenure Dynamics

6.4.3 Patches of suitable habitats in the landscape may support wildlife populations (local populations), which may be separated from one another on account of various disturbance factors. Collectively, such patches of local populations are known as "regional populations". This general situation of sub divided populations interacting with one another in a landscape to supplement new genes through movement, is known as a "meta population". In the context of tiger land tenure dynamics, the core-buffer areas conform to the "island-mainland" or "coresatellite" form of meta population model. The core area of a tiger reserve provides a source of colonizers for the surrounding local populations of different sizes and varying degrees of isolation. The core area may not readily experience extinction owing to the protection inputs for maintaining its inviolate nature. However, the surrounding isolated patches in the buffer area may suffer from local extinction if wildlife concerns are not mainstreamed in the area. Therefore, a meta population management approach is required for the buffer zone as well as corridors to facilitate:

(a) supplementing declining local tiger populations;
(b) facilitating re-colonization in habitat patches through restorative management;
(c) providing opportunity to tiger for colonizing new areas through patches of habitats (stepping stones) between isolated populations (Plate 3).

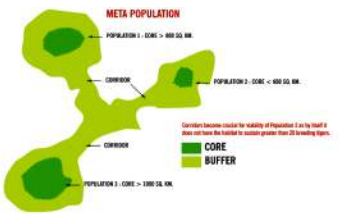


Plate 3: Meta population dynamics. Corridors become crucial for maintaining viability of Population 2 as by itself it does not have the habitat to sustain greater than 20 breeding tigers

6.5 Mainstreaming tiger and wildlife concerns in the landscape through smart practices with other sectors to prevent and address man-tiger conflicts.––involvement of different sectors, such as: forestry, agriculture, welfare activities through the district Collector sector, tourism, fisheries, tea-coffee estates, road and rail transport, industry, mining, thermal power plants, irrigation projects, temple tourism and communication projects operating in the landscape will be instrumental in effective addressing of man-tiger conflict and helpful in mainstreaming tiger and wildlife concerns.

Plate 4: Production Sectors in a Tiger Landscape

7. Milestone Initiatives taken for strengthening tiger conservation.

Several milestone initiatives have been taken in the last few years to strengthen tiger conservation in the country. The certain recommendations of the Tiger Task Force constituted by the National Board for Wildlife have been implemented. These initiatives, inter alia, include the following:

Legal steps

7.1. Amendment of the Wild Life (Protection) Act, 1972 in 2006 to provide enabling provisions for constituting the National Tiger Conservation Authority and the Tiger and Other Endangered Species Crime Control Bureau.

7.2. Enhancement of punishment for offence in relation to the core area of a tiger reserve or where the offence relate to hunting in the tiger reserves or altering the boundaries of tiger reserves, etc.

Administrative steps

7.3. Strengthening of antipoaching activities, including special strategy for monsoon patrolling, by providing funding support to tiger reserve States, as proposed by them, for deployment of antipoaching squads involving ex-army personnel or home guards, apart from workforce comprising of local people, in addition to strengthening of communication and wireless facilities.

7.4. Constitution of the National Tiger Conservation Authority with effect from the 4th September, 2006, for strengthening tiger conservation by, interalia, ensuring normative standards in tiger reserve management, preparation of reserve specific tiger conservation plan, laying down annual audit report before Parliament, constituting State level Steering Committees under the Chairmanship of Chief Ministers and establishment of Tiger Conservation Foundation.

7.5. Constitution of a multidisciplinary Tiger and Other Endangered Species Crime Control Bureau (Wildlife Crime Control Bureau) with effect from the 6th June, 2007 to effectively control illegal trade in wildlife.

7.6. The in-principle approval has been accorded by the National Tiger Conservation Authority for creation of two new tiger reserves, and the sites are: Ratapani (Madhya Pradesh) and Sunabeda (Odisha). Final approval has been accorded to Kudremukh (Karnataka), Rajaji (Uttarakhand) and Bor (Maharashtra) for declaring as a tiger reserve. The State Governments have been advised to send proposals for declaring the following areas as tiger reserves: (i) Suhelwa (Uttar Pradesh), (ii) Guru Ghasidas National Park (Chhattisgarh), (iii) Mhadei Sanctuary (Goa), (iv) Srivilliputhur Grizzled

Squirrel / Megamalai Wildlife Sanctuaries / Varushanadu Valley (Tamil Nadu) and Dibang Wildlife Sanctuary (Arunachal Pradesh).

7.7. The revised Project Tiger guidelines have been issued to State Governments for strengthening tiger conservation, which apart from ongoing activities, inter alia, include financial support to States for enhanced village relocation or rehabilitation package for people living in core or critical tiger habitats (from Rs. 1 lakh per family to Rs. 10 lakhs per family), rehabilitation or resettlement of communities involved in traditional hunting, mainstreaming livelihood and wildlife concerns in forests outside tiger reserves and fostering corridor conservation through restorative strategy to arrest habitat fragmentation.

7.8. A scientific methodology for estimating tiger (including co-predators, prey animals and assessment of habitat status) has been evolved and mainstreamed. The findings of this estimation and assessment are bench marks for future tiger conservation strategy.

7.9. The 18 tiger States have notified the core/critical tiger habitat (38632.18 sq. km.), and the buffer/peripheral area (29886.62 sq.km.) of all the 46 tiger reserves in the country, under section 38V of the Wild Life (Protection) Act, 1972, as amended in 2006.

Financial steps

7.10. Financial and technical help is provided to the State Governments under various Centrally Sponsored Schemes, such as Project Tiger and Integrated Development of Wildlife Habitats for enhancing the capacity and infrastructure of the State Governments for providing effective protection to wild animals.

International Cooperation

7.11. India has a bilateral understanding with Nepal on controlling trans-boundary illegal trade in wildlife and conservation, apart from a protocol on tiger conservation with China.

7.12. A protocol has been signed in September, 2011 with Bangladesh for conservation of the Royal Bengal Tiger of the Sunderban.

7.13. A sub-group on tiger and leopard conservation has been constituted for cooperation with the Russian Federation.

7.14. A Global Tiger Forum of Tiger Range Countries has been created for addressing international issues related to tiger conservation.

7.15. During the 14th meeting of the Conference of Parties to CITES, which was held from 3rd to 15th June, 2007 at

The Hague, India introduced a resolution along with China, Nepal and the Russian Federation, with direction to Parties with operations breeding tigers on a commercial scale, for restricting such captive populations to a level supportive only to conserving wild tigers. The resolution was adopted as a decision with minor amendments. Further, India made an intervention appealing to China to phase out tiger farming and eliminate stockpiles of Asian big cats body parts and derivatives. The importance of continuing the ban on trade of body parts of tigers was emphasised.

7.16. Based on India's strong intervention during the 62nd meeting of the Standing Committee of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) at Geneva from 23-27 July, 2012, the Convention on International Trade in Endangered Species of Wild Fauna and Flora Secretariat has issued a notification No. 2012/054 dated the 3rd September, 2012 to Parties to fully implement Decision 14.69 and report to the Secretariat by 25 September, 2012 (Progress made on restricting captive breeding operations of tigers etc.).

7.17. As a part of active management to rebuild Sariska and Panna Tiger Reserves where tigers have become locally extinct, reintroduction of tigers and tigresses have been done. The successful reintroduction of wild tigers in Sariska is a unique exercise and is the first of its kind in the world. A reintroduced tigress has recently littered and two cubs have also been camera trapped. The tiger reintroduction initiative at Panna (MP) has also been very successful and reintroduced tigers are breeding.

7.18. Special advisories issued for in-situ build up of prey base and tiger population through active management in tiger reserves having low population status of tiger and its prey.

Creation of Special Tiger Protection Force (STPF)

7.19. The policy initiatives announced by the Finance Minister in his Budget Speech of the 29th February, 2008, inter alia, contains action points relating to tiger protection. Based on the one time grant of Rs. 50.00 crore provided to the National Tiger Conservation Authority (NTCA) for raising, arming and deploying a Special Tiger Protection Force (STPF), the proposal for the said force has been approved by the competent authority for 13 tiger reserves. The States of Karnataka, Maharashtra and Odisha have already created and deployed the STPF.

7.20. In collaboration with TRAFFIC-INDIA, an online tiger crime data base has been launched, and Generic

Guidelines for preparation of reserve specific Security Plan has been evolved.

Recent initiatives

7.21. Implementing a tripartite Memorandum of Understanding (MOU) with tiger States, linked to fund flows for effective implementation of tiger conservation initiatives.

7.22. Special crack teams sent to tiger reserves affected by left wing extremism and low population status of tiger and its prey.

7.23. Chief Ministers of States having tiger reserves affected by left wing extremism and low population status of tiger and its prey addressed for taking special initiatives.

7.24. Steps taken for modernizing the infrastructure and field protection, besides launching 'Monitoring system for Tigers' Intensive Protection and Ecological Status (M-STrIPES)' for effective field patrolling and monitoring.

7.25. Steps taken for involvement of Non-Governmental Experts in the ongoing all India tiger estimation.

7.26. Initiatives taken for improving the field delivery through capacity building of field officials, apart from providing incentives.

7.27. The second round of country level tiger status assessment completed in 2010, with the findings indicating an increase with a tiger population estimate of 1706, lower and upper limits being 1520 and 1909 respectively, as compared to the last country level estimation of 2006, with an estimate of 1411, lower and upper limits being 1165 and 1657, respectively. At present, India has the maximum number of tigers and its source areas amongst the 13 tiger range countries in the world, owing to its long history of conserving the species through Project Tiger (2.06% of country's geographical area spread out in 46 tiger reserves in 18 States).

7.28. A report on Management Effectiveness Evaluation (MEE) of Tiger Reserves was released on 28th July, 2011, containing the second round of independent assessment based on refined criteria done in 2010-11 for 39 tiger reserves. Out of 39 tiger reserves, 15 were rated as 'very good', 12 as 'good', 8 as 'satisfactory' and 4 as 'poor'.

7.29. Providing special assistance for mitigation of human-tiger conflicts in problematic areas.

7.30. Regional Offices of the National Tiger Conservation Authority are operational at Nagpur, Bengaluru and Guwahati.

7.31. A 'Standard Operating Procedure' for dealing with tiger deaths has been issued, based on advisories of Project Tiger / National Tiger Conservation Authority, with inputs from Wildlife Crime Control Bureau, State officials and experts, fine tuned to meet the present challenges.

7.32. A 'Standard Operating Procedure' for dealing with straying tigers in human dominated landscape has been issued.

7.33. A 'Standard Operating Procedure' for disposing tiger/leopard carcass/body parts has `been issued.

7.34. The Revised Cost Estimates for Project Tiger was approved on 11.8.2011 for an upward revision of the cost estimates for the ongoing Centrally Sponsored Scheme of Project Tiger during the XIth Plan period from 650 crore to Rs. 1216.86 crore of central assistance to support States in village relocation from core areas of tiger reserves. Several new components were added to the Project, viz.:

(i) Change in the funding pattern in respect of North Eastern States (90:10)
(ii) Raising compensation for man-animal conflict to Rs. 2 lakhs
(iii) Acquisition of private land for making the core/critical tiger habitat inviolate
(iv) Establishment of Tiger Safari, interpretation/awareness centres under the existing component of 'co-existence agenda in buffer/fringe areas', and management of such centres through the respective Panchayati Raj Institutions
(v) Re-introduction of Cheetah

7.35. Launching of Phase-IV tiger reserve level, continuous monitoring of tigers using camera traps and building up data on photo captures of individual tigers.

7.36. Launching the creation of a national repository of camera trap photo IDs of individual tigers.

7.37. In-principle approval for use of CAMPA funds towards village relocation from core areas.

7.38. Completion of e-surveillance project in Corbett.

7.39. Comprehensive guidelines under section 38O 1 (c) of the Wildlife (Protection) Act, 1972 issued for Project Tiger and Tourism in Tiger Reserves on 15th October, 2012.

7.40. Under active management, permission accorded for translocation of wilded / straying tigers / tigresses from

high to low density reserves within States.

7.41. A bilateral arrangement has been recently formalized with Bangladesh on tiger conservation. Our delegations are interacting with Nepal and China within the framework of existing bilateral arrangements. A sub-group on tiger/leopard conservation has been constituted for cooperation with the Russian Federation, which has met recently.

7.42. Field level workshops for capacity building of field officers to deal with straying tigers have been organized at Tadoba and Dudhwa Tiger Reserves (2013).

7.43. NTCA teams sent for field appraisal of tiger deaths, Project Tiger implementation etc.

7.44. Process underway for providing enabling provisions in the Wildlife (Protection) Act, 1972, to strengthen our implementation of the CITES and towards enhancement of penalties for contravention of provisions of the Act.

7.45. Kawal (Telangana), Sathyamangalam (Tamil Nadu), Mukandra Hills (Rajasthan), Nawegaon-Nagzira (Maharashtra), Nagarjunasagar Srisailam (Telangana) and Pilibhit (Uttar Pradesh) have been notified by the State Governments as Tiger Reserve.

7.46. The next round (2014) of country level status assessment of tiger, co-predators, prey and habitat, using the refined methodology, in collaboration with tiger States and the Wildlife Institute of India has been initiated.

7.47. The next round (2014) of Independent Management Effectiveness Evaluation of Tiger Reserves has been initiated.

7.48. Economic Valuation of some tiger reserves initiated in collaboration with the Indian Institute of Forest Management.

7.49. Trial of Unmanned Aerial Vehicle for monitoring done in the Panna Tiger Reserve (Madhya Pradesh), in collaboration with the Wildlife Institute of India.

7.50. Assessment of Status, Density and Change in Forest Cover in and around tiger reserves of the Shivalik Gangetic Plain Landscape initiated in collaboration with the Forest Survey of India.

8. Thrust areas for the XII Plan period

8.1. Stepping up protection by supporting the States for raising, arming and deploying the Special Tiger Protection Force (so far, the STPF has been constituted only in Karnataka for Nagarahole; funding support has been provided to Uttar Pradesh, Uttarakhand and Rajasthan where process of constituting the same is ongoing. Funding has also been provided to Odisha for STPF constitution at Similipal Tiger Reserve).

8.2. Need for enhanced funding support to States for voluntary village relocation from core areas to provide inviolate space for tigers (800-1200 sq.km.) for a viable population (CCEA process ongoing).

8.3. Strengthening infrastructure and habitat management.

8.4. Use of information technology in wildlife crime prevention.

8.5. Capacity building of field personnel.

8.6. Addressing man-wildlife conflicts to prevent revenge killings.

8.7. Addressing the issue of livelihood dependency in the fringes of core/critical tiger habitats by supporting the States for managing the buffer/peripheral areas of tiger reserves as a multiple use zone through village level participatory planning for ecodevelopment with reciprocal commitments (out of 46 tiger reserves 45 have notified buffer area). The details of core and critical tiger habitats and buffer and peripheral areas notified by tiger reserves are at Appendix-A.

8.8. Launching Phase-IV tiger reserve level continuous monitoring with capacity building.

8.9. Active management involving translocation of tiger to suitable low density tiger habitats within a landscape.

8.10. Supporting field oriented research work.

8.11. Strengthening the Regional Offices of the NTCA at Nagpur, Guwahati and Bengaluru (AIGs posted at Nagpur and Bengaluru Regional Offices; IGFs are required to be posted in the 3 Regional Offices, besides an AIG at Guwahati).

8.12. Declaring and consolidating new tiger reserves (2 have been given in-principle approval, and for another 5, the States have been advised, besides final approval has been accorded to Kudremukh (Karnataka), Rajaji (Uttarakhand) and Bor (Maharashtra) for declaring as a tiger reserve.

8.13. Fostering awareness / supporting reserve specific communication strategy to elicit public support for tiger conservation with the active involvement of Panchayati Raj institutions.

9. Field strategies with sub-activities

9.1 Stepping up protection: (antipoaching squad/Tiger Protection Force deployment)

The antipoaching operations in tiger reserves are site specific. However, the following activities, inter alia, form part of the protection strategy in tiger reserves, namely:

(a) Raising, arming and deployment of Special Tiger Protection Force.
(b) Use of information technology in wildlife crime prevention.
(c) Launching M-STrIPES for field patrolling.
(d) Deployment of antipoaching squads.
(e) Establishing and maintenance of existing patrolling camps/chowkis and deployment of camp labourers for patrolling.
(f) Organising vehicular patrolling by constituting squads (Tiger Protection Force), comprising of field staff, labourers and police/SAF/ex-army personnel, with wireless handset and paraphernalia for apprehending offenders, apart from prescribing a patrolling calendar for the squad.
(g) Establishing and maintenance of wireless network.
(h) Organising surprise raids jointly with the local police in railway stations, local trains, bus-stops, buses, catchers and cafeteria.
(i) Ensuring special site-specific protection measures, during monsoon as 'Operation Monsoon' – considering the terrain and accessibility of Protected Areas.
(j) Deployment of ex-army personnel / home guards.
(k) Deployment of local work force for patrolling, surveillance of water holes, manning barriers.
(l) Procurement of arms and ammunition.
(m) Procurement/maintenance of elephant squads.
(n) Rewards to informers.
(o) Legal support for defending court cases.
(p) Procurement of vehicles, boats.
(q) Procurement field gear, night vision device.

9.2. Deciding inviolate spaces for wildlife and relocation of villagers from core or critical tiger habitats in Tiger Reserves within a timeframe and settlement of rights.

9.2.1. The Wild Life (Protection) Act, 1972, as well as the Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006, require that rights of people (Scheduled Tribes and other traditional forest dwellers) recognized in forest areas within core and critical tiger or wildlife habitats of tiger reserves or protected areas may be modified and resettled for providing inviolate spaces to tiger/wild animals. This requires payment of compensation (rights settlement in addition to the relocation package offered under the Centrally Sponsored Scheme at present). Chapter IV of the Wild Life (Protection) Act, 1972 (section 24) provides for acquisition of rights in or over the land declared by the State Government under section 18 (for constituting a Sanctuary) or section 35 (for constituting a National Park). Sub-section (2) of section 24 of the Wild Life (Protection) Act, 1972 authorizes the Collector to acquire such land or rights. Therefore, payment of compensation for the immovable property of people forms part of modifying or settling their rights which is a statutory requirement.

9.2.2. The ongoing study and the analysis of the available research data on tiger ecology indicate that the minimum population of tigresses in breeding age, which are needed to maintain a viable population of 80-100 tigers (in and around core) require an inviolate space of 800-1200 sq. km. Tiger being an "umbrella species", this will also ensure viable populations of other wild animals (co-predators, prey) and forest, thereby ensuring the ecological viability of the entire area and habitat. Thus, it becomes an ecological imperative to keep the core areas of tiger reserves inviolate for the survival of source populations of tiger and other wild animals.

9.2.3. The proposed package has following two options:

(a) Option I – Payment of the entire package amount (Rs. 10 lakhs per family) to the family in case the family opts so, without involving any rehabilitation or relocation process by the Forest Department.

(b) Option II – Carrying out relocation or rehabilitation of village from protected area or tiger reserve by the Forest Department.

9.3. Strengthening of infrastructure within Tiger Reserves.

The following activities, inter alia, would form part of reinforcing the infrastructure of Tiger Reserves (including support to new tiger reserves), namely:

(a) Civil Works (staff quarters, family hostels, office improvement, patrolling camp, house keeping buildings, museum, culverts).
(b) Maintenance, creation and upgradation of road network.
(c) Maintenance and creation of wireless tower.
(d) Maintenance and creation of fire watch tower.
(e) Maintenance and creation of bridges, dams, anicuts.
(f) Maintenance, creation of firelines and firebreaks.
(g) Maintenance and creation of earthen ponds.
(h) Procurement, maintenance of vehicles (Gypsy, Jeep, Truck, Tractor).
(i) Habitat improvement works.
(j) Procurement of hardware, software and Geographical Information System (GIS).
(k) Procurement of compass, range finder, Global Positioning System (GPS), camera traps.

(l) Procurement of satellite imageries for management planning.
(m) Map digitization facility for management planning.

9.4. Habitat improvement and water development.––

These, inter alia, may include, weed eradication, removal of gregarious plant growth from grasslands, grass improvement, water retention structures and the like. These initiatives would increase the forage and browse values of the habitat for wild animals.

9.5. Addressing man-animal conflict (ensuring uniform, timely compensation for human deaths due to wild animals, livestock depredation by carnivores, crop depredation by wild ungulates) (compensation for crop loss is a new component):

This would involve-

(a) payment of compensation for cattle lifting, death of human beings and crop depredation due to wild animals.
(b) creation of crop protection structures.
© procurement and deployment of traps, cages to catch problematic animals.
(d) procurement of tranquilizing equipments, rescue vehicles and drugs.

9.6. Co-existence agenda in buffer or fringe areas.

The fringe areas around tiger reserve have corridor value, and their ecological sustainability is important to prevent the area from becoming ecological sinks on account of over use of resources and unwise land use. This calls for delineation of buffer zone around a tiger reserve to incorporate such fringe areas so that it can fulfill the following objectives, namely:––

(a) providing ecologically viable livelihood options to local stakeholders for reducing their dependency on forests.
(b) conserving the forest area through restorative inputs involving local people for providing habitat supplement to wild animals moving out of core areas.

9.7. Rehabilitation of traditional hunting tribes living around tiger reserves.

There is an urgent need to launch a rehabilitation and development programme for the denotified tribes and tribes involved in traditional hunting, living around tiger reserves and tiger corridors. The following denotified tribes and communities are involved in traditional hunting of wild animals : Behelias, Ambalgars, Badaks, Mongias, Bavariyas, Monglias, Pardhi, Boyas, Kaikads, Karwal Nat, Nirshikaris, Picharis, Valayaras, Yenadis, Chakma, Mizo, Bru, Solung and Nyishi. While this list is not exhaustive, around 5,000 such families are required to be taken up under a welfare programme (forming part of NTCA initiatives) during the Plan period. The rehabilitation and welfare package should be evolved in a site specific, consultative manner with livelihood options, to include : wages for such people towards their deployment in foot patrolling for protecting wildlife, providing agricultural land with irrigation, basic health care, housing and related community welfare inputs and basic education facilities. The experience gained in the past for settling denotified tribes by the salvation army is required to be considered dispassionately while structuring the programme.

9.8. Research and field equipments.

The All India tiger estimation using the new methodology approved by the Tiger Task Force has resulted in a permanent monitoring protocol for the field units. The Phase-IV tiger reserve level would be launched to monitor the source populations of tiger. Further, assistance would be provided for fostering field oriented research and to equip the staff with facilities like Global Positioning System (GPS), camera traps, night vision, range finder and related accessories including hardware and software.

9.9. Staff development and capacity building.

This would involve-

(a) capacity building and training.
(b) providing project allowance and special incentives.
(c) Specialized training in the use of Geographical Information System (GIS), antipoaching operations.
(d) Specialized training in jurisprudence and wildlife forensics.
(e) Study tours for appraisal of good practices in other reserves.
(f) Dissemination workshops.
(g) Specialized training in park interpretation.
(h) Specialized training in management planning.

9.9.2 The above inputs are extremely important for enhancing the skill of field staff. Several instances of poaching occur for want of specialized training in crime detection and related skills.

9.10. Mainstreaming wildlife concerns in tiger bearing forests and fostering corridor conservation through restorative strategy involving locals to arrest fragmentation of habitats.

This would involve–

(a) Redressing man-animal conflict.
(b) Capturing problematic and aberrant wild animals.
(c) Monitoring of wild animals.

(d) Antipoaching operations.
(e) Habitat improvement measures.

9.11. Safeguards and Retrofitting measures in the interest of wildlife conservation.

Several tiger reserves are affected on account of heavily used infrastructure like roads, railway tracks etc. The high tension electric lines passing through many reserves cause mortality of wild animals due to electrocution by poachers. In the interest of wild animals several safeguards as well as retrofitting measures may be required, which would be supported on a site-specific basis.

9.12. Providing basic infrastructure.–– The expenditure for consultancy, field visits by expert teams, all India tiger estimation and continuous monitoring of tigers (Phase-IV), support for monitoring tigers outside tiger reserves through National Tiger Conservation Authority grant, developing a National Repository of Camera Trap Photo Database of tiger, strengthening of National Tiger Conservation Authority at the Center and Regional Offices, besides establishing a monitoring lab.

9.13. Independent monitoring and evaluation of tiger reserves.

The second round of independent monitoring has been completed using globally accepted indicators. This would be further refined and continued.

9.14. Establishment and development of new tiger reserves.

'Project Tiger' has a holistic ecosystem approach. Though the focus is on the flagship species 'tiger', the project strives to maintain the stability of ecosystem by fostering other trophic levels in the food chain. This is essential to ensure an ecologically viable population of tiger, which is at the 'apex' of the ecological food chain. The community pressures on forests are ever on the increase in developing countries and India is no exception. As a sequel, the tiger habitat has become fragile and weak at several places, warranting a focused conservation approach. Our protected areas and tiger reserves are analogous to "islands" in an ocean of the other-use patterns. Empirical evidences from 'island biogeography' indicate that "isolated" reserves lose their species rapidly owing to 'ecological insularization'. Further, apart from fragmentation, the situation is aggravated by degraded forest cover owing to biotic pressure, dislocated prey – predator ratio, absence of effective measures to ensure the desired level of protection and lack of eco developmental initiatives for the fringe dwelling stake holders to reduce their dependency on forest resources. Since 'Project Tiger' would go a long way in redressing the above situation, the Steering Committee of Project Tiger in its meeting held on the 23rd January, 2003 recommended inclusion of new tiger reserve areas so as to increase the total area of 'Project Tiger.'

9.15. Provision of Project Allowance to staff of Project Tiger.

The tiger States would be supported (100%) for Project Allowance to staff of tiger reserves.

9.16. Staff welfare activities.

Staff welfare inputs like residential accommodation for the children of frontline staff in nearby towns and villages, supply of kerosene, medicine, field kit, mosquito net, torch and the like would be supported.

9.17. Fostering Tourism/Ecotourism in tiger reserves.

'Tourism' in the context of Tiger Reserves is contemplated as "ecotourism", which needs to be ecologically sustainable nature-tourism. This is emerging as an important component of tourism industry. It is distinct from 'mass tourism', having sustainable, equitable, community based effort for improving the living standards of local, host communities living on the fringes of tiger reserves. Ecotourism is proposed to be fostered under Project Tiger to benefit the host community in accordance with tiger reserve specific Tourism Plan forming part of the Tiger Conservation Plan, subject to regulation as per carrying capacity, with a focus on buffer areas. Since, tourism has been happening in areas of national parks and wildlife sanctuaries which are now designated as core and critical tiger habitat, regulated low impact tourism (visitation) would be allowed in such areas subject to site specific carrying capacity. However, no new tourism infrastructure should be permitted in such core and critical tiger habitats. Further, the buffer forest areas should also be developed as wildlife habitats with the active involvement of local people living in such areas. This would provide extended habitat to tiger population for its life cycle dynamics, besides benefitting local people from ecotourism activities in such areas while reducing the resource dependency of people on core and critical tiger habitats and human-tiger interface conflicts. The opportunities for stakeholders would include management of low cost accommodation for tourists, providing guide services, providing sale outlets, managing excursions, organizing ethnic dances and the like.

10. Local livelihood under Project Tiger

In all, approximately 24 lakh mandays are generated annually with 50% central assistance amounting to around Rs. 24 crores (excluding matching 50% share

given by States) under 'Project Tiger'.

Many local tribes constitute such local workforce (besides non-tribals), such as Baigas, Gonds in Madhya Pradesh, Gonds in Maharashtra, Chenchus in Andhra Pradesh, Sholigas in Karnataka, Gujjars in Uttarakhand and Irulas in Tamil Nadu to name a few. The deployment of such local tribals has been fostered and encouraged in the last two years.

11. Details of funding allocation under Project Tiger since inception over various Plan periods.–

Project Tiger is an ongoing Centrally Sponsored Scheme of the Ministry of Environment and Forests, launched in 1973. Over the years, the project coverage has expanded considerably.

The provisions made in the Five Year Plans for the project since beginning are as below:

Five year Plan	Rs. in lakhs
IV Plan (only 1973-74)	2.53
V Plan (1974-75 to 1978-79)	387.25
Rolling Plan (1979-80)	63.90
VI Plan (1980-81 to 1984-85)	494.86
VII Plan	1475.42
1990-92	700.98
1991-93	549.81
VIII Plan	3890.09
IX Plan	7500.00
X Plan	15000
XI Plan	79219.96
Total	109284.8 or 1092.85 crores

Appendix-A

List of Core and Buffer areas of Tiger Reserves in India, notified under the Wildlife (Protection) Act, 1972, as amended in 2006 (as on 28.07.2014)

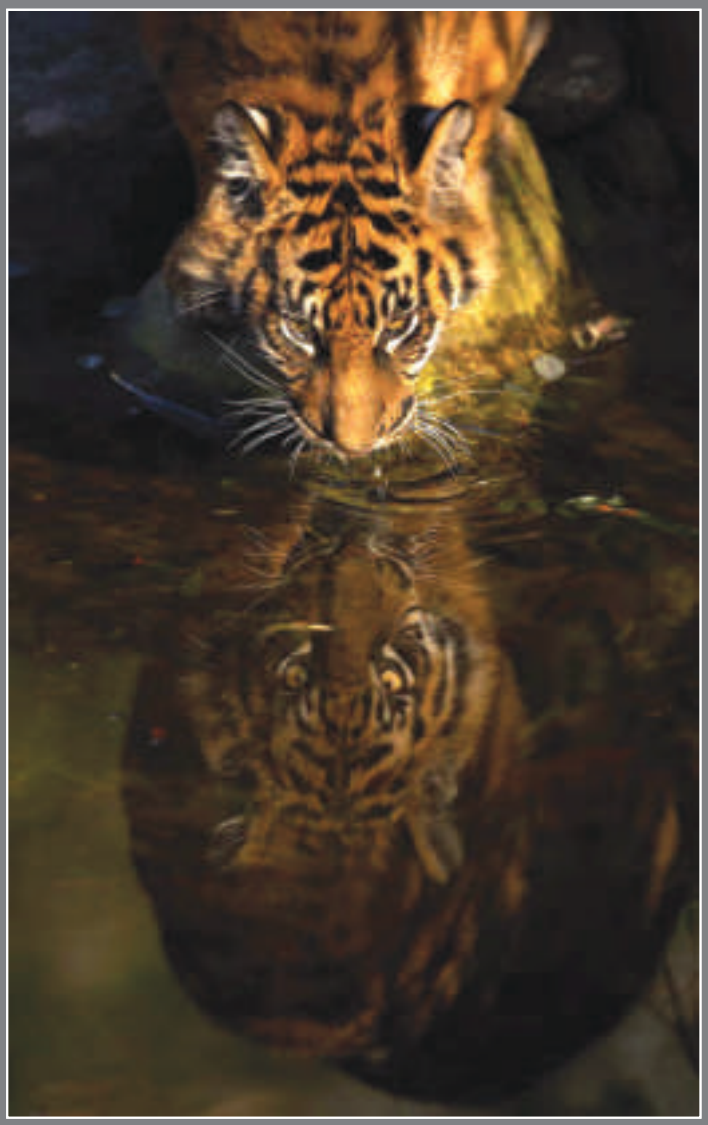
Sl. No.	Name of Tiger Reserve	State	Area of the core / critical tiger habitat (In Sq. Kms.)	Area of the buffer / peripheral (In Sq. Kms.)	Total area (In Sq.Kms.)
1	Bandipur	Karnataka	872.24	584.06	1456.3
2	Corbett	Uttarakhand	821.99	466.32	1288.31
	Amangarh (buffer of Corbett TR)	Uttar Pradesh	-	80.60	80.60
3	Kanha	Madhya Pradesh	917.43	1134.361	2051.791
4	Manas	Assam	840.04	2310.88	3150.92
5	Melghat	Maharashtra	1500.49	1268.03	2768.52
6	Palamau	Jharkhand	414.08	715.85	1129.93
7	Ranthambore	Rajasthan	1113.364	297.9265	1411.291
8	Similipal	Odisha	1194.75	1555.25	2750.00
9	Sunderbans	West Bengal	1699.62	885.27	2584.89
10	Periyar	Kerala	881.00	44.00	925.00
11	Sariska	Rajasthan	881.1124	332.23	1213.342
12	Buxa	West Bengal	390.5813	367.3225	757.9038
13	Indravati	Chhattisgarh	1258.37	1540.70	2799.07
14	Namdapha	Arunachal Pradesh	1807.82	245.00	2052.82
15	Dudhwa	Uttar Pradesh	1093.79	1107.9848	2201.7748
16	Kalakad-Mundanthurai	Tamil Nadu	895.00	706.542	1601.542
17	Valmiki	Bihar	598.45	300.93	899.38
18	Pench	Madhya Pradesh	411.33	768.30225	1179.63225
19	Tadoba-Andhari	Maharashtra	625.82	1101.7711	1727.5911
20	Bandhavgarh	Madhya Pradesh	716.903	820.03509	1536.938
21	Panna	Madhya Pradesh	576.13	1002.42	1578.55
22	Dampa	Mizoram	500.00	488.00	988.00
23	Bhadra	Karnataka	492.46	571.83	1064.29
24	Pench	Maharashtra	257.26	483.96	741.22
25	Pakke	Arunachal Pradesh	683.45	515.00	1198.45
26	Nameri	Assam	200.00	144.00	344.00
27	Satpura	Madhya Pradesh	1339.264	794.04397	2133.30797
28	Anamalai	Tamil Nadu	958.59	521.28	1479.87
29	Udanti-Sitanadi	Chattisgarh	851.09	991.45	1842.54
30	Satkosia	Odisha	523.61	440.26	963.87
31	Kaziranga	Assam	625.58	548.00	1173.58
32	Achanakmar	Chattisgarh	626.195	287.822	914.017
33	Dandeli-Anshi	Karnataka	814.884	282.63	1097.514
34	Sanjay-Dubri	Madhya Pradesh	812.571	861.931	1674.502
35	Mudumalai	Tamil Nadu	321.00	367.59	688.59
36	Nagarahole	Karnataka	643.35	562.41	1205.76
37	Parambikulam	Kerala	390.89	252.772	643.662
38	Sahyadri	Maharashtra	600.12	565.45	1165.57
39	Biligiri Ranganatha Temple	Karnataka	359.10	215.72	574.82
40	Kawal	Telangana	893.23	1125.89	2019.12
41	Sathyamangalam	Tamil Nadu	793.49	614.91	1408.40
42	Mukandra Hills	Rajasthan	417.17	342.82	759.99
43	Nawegaon-Nagzira	Maharashtra	653.674	-	653.674
44	Nagarjunsagar Srisailam (part)*	Andhra Pradesh	2595.72*	700.59*	3296.31*
45	Nagarjunasagar Srisailam (part) *	Telangana	2166.37*	445.02*	2611.39*
46	Pilibhit	Uttar Pradesh	602.7980	127.4518	730.2498
	TOTAL		**38632.18**	**29886.62**	**68518.8**

**Revised area details are awaited from the State Governments concerned after reorganization.*

CONSERVATION STRATEGY AND ACTION PLAN FOR THE SUMATRAN TIGER

(PANTHERA TIGRIS SUMATRAE)

INDONESIA 2007 - 2017



Ministry of Forestry
2007

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Herry Djoko Susilo (PHKA)

FRONT COVER PHOTOGRAPH
Harald Loeffler/Eye-of-the-Tiger.com

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Picture 5: WWF (left), WCS-IP (right above and below)
Picture 6: (FFI (left), WCS-IP (right above and below)
Picture 7: BKSDA NAD/FFI

Government of the Province:

MAIN SPONSORS:
(Coat of Arms)

MINISTER OF FORESTRY

THE REPUBLIC OF INDONESIA

REGULATION OF MINISTER OF FORESTRY

No.: P.42/Menhut-II/2007

On

CONSERVATION STRATEGY AND ACTION PLAN FOR THE SUMATRAN TIGER

(Panthera tigris sumatrae) 2007-2017

MINISTER OF FORESTRY

Having considered :

a. that to advance the conservation of the Sumatran tiger (Panthera tigris sumatrae) in its habitat, it is deemed necessary to have a conservation strategy and action plan that includes priorities, an integrated management approach and involves all parties and stakeholders;

b. that for the conservation of the tiger as specified in item a, it is deemed necessary to have a strategy and action plan;

c. that based on aforementioned items a and b, it is deemed necessary to enact a Regulation of the Minister of Forestry on the strategy and action plan for conservation of the Sumatran tiger (Panthera tigris sumatrae) of 2007 – 2017;

In view of :

1. Law No. 5 of 1990 on the Conservation of Natural Resources and their Ecosystems;
2. Law No. 5 of 1997 on Environmental Management;
3. Law No. 41 of 1999 on Forestry as amended by Law No. 19 of 2004 on the Enactment of Government Regulation in lieu of Law No. 1 of 2004 on the Amendment to Law No. 41 of 1999 on Forestry;
4. Law No. 32 of 2004 on Local Government;
5. Government Regulation No. 68 of 1998 on Wildlife Reserve Areas and Natural Conservation Areas;
6. Government Regulation No. 7 of 1999 on Preserved Plants and Animals;
7. Government Regulation No. 8 of 1999 on the Use of Wild Animals and Plants;
8. Presidential Decree No. 187/M of 2004 as amended by Presidential Decree No. 8/M of 2004 on the Composition of the Unity Indonesia Cabinet;
9. Decree of Minister of Forestry No. 355/Kpts-II/2003 on the Identification

of Wild Animal and Plant Specimens;

10. Decree of Minister of Forestry No. 447/Kpts-II/2003 on the Administration of Collecting, Catching and Distribution of Wild Animal and Plant Specimens;
11. Regulation of Minister of Forestry No. P.13/Menhut-II/2005 as has been amended several times, the most recently by Regulation of Minister of Forestry No. P.17/Menhut-II/2007 on the Organization and Working Procedures of the Ministry of Forestry;

DECIDE:

To enact : THE MINISTER OF FORESTRY'S REGULATION ON THE STRATEGY AND ACTION PLAN FOR CONSERVATION OF THE SUMATRAN TIGER (Panthera tigris sumatrae) 2007-2017.

FIRSTLY : To endorse and enact the strategy and action plan for the conservation of the Sumatran tiger 2007-2017, as described in the appendix integrated into this regulation.

SECONDLY : The strategy as specified in the FIRST decision is a framework for certain conservation programs and activities of the Sumatran tiger that are endorsed based on this regulation, and will serve a guidelines/guidance for the conservation of the Sumatran tiger.

THIRDLY : The documents of the Strategy and Action Plan for the conservation of The Sumatran tiger 2007-2017 contain the Strategy and Action Plan, and are subject to evaluation and update every 5 (five) years.

FOURTHLY : This regulation takes effect as of the enactment date.

Enacted in : Jakarta
On: 24th October 2007

Duly copied
Head of the Bureau of Law and Organization,
(Signed & Sealed)

SUPARNO
NIP. 080068472

MINISTER OF FORESTRY,
(Signed)

H. MS KABAN

C.c.:
1. The State Minister of Environment;
2. All Governors in Indonesia;
3. The Secretary General of Ministry of Forestry;
4. The Inspector General of Ministry of Forestry;
5. The Director Generals/Chairmen of Agencies within Ministry of Forestry;
6. The Chairman of the Indonesian Institute of Science;
7. The Deputy of Natural Science – the Indonesian Institute of Science;
8. The Head of Biology Research Center of the Indonesian Institute of Science;
9. The Heads of Technical Implementing Offices within the Directorate General of PHKA throughout Indonesia.

CONTENT

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LIST OF PICTURES

LIST OF ABBREVIATIONS

ASEAN WEN	:	Association of Southeast Asian Nations – Wildlife Law Enforcement Network
BAPEDALDA	:	Badan Pengendalian Dampak Lingkungan (Regional Environment Impact Management Agency)
BAPPEDA	:	Badan Perencanaan dan Pembangunan Daerah (Regional Development Planning Board)
BAPPENAS	:	Badan Perencanaan dan Pembangunan Nasional (National Development Planning Agency)
BKSDA	:	Balai Konservasi Sumber Daya Alam (Natural Resources Conservation Bureau)
CI	:	Conservation International
CITES	:	Convention on International Trade in Endangered Species of Wild Fauna and Flora
DICE	:	Durrell Institute of Conservation and Ecology, University of Kent at Canterbury, UK
DNS	:	Debt for Nature Swap
FFI	:	Flora and Fauna International
FKKHS	:	Forum Komunikasi Konservasi Harimau Sumatera (Communication Forum for the Sumatran tiger Conservation)
HPH	:	Hak Pengusahaan Hutan (Natural Forest Concessions)
HTI	:	Hutan Tanaman Industri (Industrial Forest Area)
IUCN	:	International Union for the Conservation of Nature and Natural Resources / World Conservation Union
KKH	:	Konservasi Keanekaragaman Hayati (Biodiversity Conservation, Name of a directorate within PHKA)
LIPI	:	Lembaga Ilmu Pengetahuan Indonesia (Indonesian Science Agency)
LSM	:	Lembaga Swadaya Masyarakat (Non Government Organization)
PHKA	:	Perlindungan Hutan dan Konservasi Alam (Forest Protection and Natural Conservation, Name of a directorate general within Ministry of Forestry)
POLRI	:	Kepolisian Negara Republik Indonesia (Indonesian Police Force)
SECP	:	Sumatran Elephant Conservation Project
SM	:	Suaka Margasatwa (Wildlife Reserve)
SOP	:	Standard Operating Procedure
SPU	:	Species Protection Unit
STTCP	:	The Sumatran tiger Trust Conservation Programme
TCL	:	Tiger Conservation Landscape
TNB	:	Taman Nasional Berbak (Berbak National Park)
TNBBS	:	Taman Nasional Bukit Barisan Selatan (South Bukit Barisan National Park)
TNBD	:	Taman Nasional Bukit Duabelas (Bukit Duabelas National Park)
TNBG	:	Taman Nasional Batang Gadis (Batang Gadis National Park)
TNGL	:	Taman Nasional Gunung Leuser (Gunung Leuser National Park)
TNKS	:	Taman Nasional Kerinci Seblat (Kerinci Seblat National Park)
TNS	:	Taman Nasional Sembilang (Sembilang National Park)
TNTN	:	Taman Nasional Tesso Nilo (Tesso Nilo National Park)
TNWK	:	Taman Nasional Way Kambas (Way Kambas National Park)
TRAFFIC	:	Wildlife Trade Monitoring Network
UPT	:	Unit Pelaksana Teknis (Technical Executive Unit)
WCS-IP	:	Wildlife Conservation Society - Indonesia Program
WWF	:	Word Wildlife Fund
YLI	:	Yayasan Leuser International (The International Leuser Foundation)
YPKHS	:	Yayasan Penyelamatan dan Konservasi Harimau Sumatera (The Sumatran tiger Preservation and Conservation Foundation)
ZSL	:	Zoological Society of London

FOREWORD

The Sumatran tiger (Panthera tigris sumatrae) is a rare animal found only in Sumatra. This animal, posed at the top of the ecological pyramid of Sumatra's forests, has been protected by the Indonesian government and categorized by IUCN (The International Union for the Conservation of Nature and Natural Resources / The World Conservation Union) as an endangered species. Further, CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora) prohibits trading and hunting of this animal.

The Indonesian government and other parties within and outside Indonesia have engaged in a long-standing effort to conserve the Sumatran tiger. However, the effort has been less than effective, mostly because it has not been coordinated with Sumatra's economic development. Currently there are only 300 Sumatran tigers spread over forests that have been fragmented due to logging and forest conversion.

The Sumatran tiger is a valued part of Indonesia's existing natural resources heritage. It is the last remaining tiger subspecies in Indonesia. The Bali tiger (Panthera tigris balica) and Javan tiger (Panthera tigris sondaica) have become extinct,and exist only as part of the history of Indonesian wild animals. Therefore, conservation of The Sumatran tiger is crucial and I welcome the establishment of the Strategy and Action Plan for Conservation of the Sumatran tiger 2007-2017.

I hope that the strategy and action plan contained in this document serve as guidelines for protecting the Sumatran tiger and a reference for concordant development to conserve this animal and its habitat in Sumatra. It is a challenge for economic development and wildlife conservation to co-exit harmoniously. But it is expected that all parties involved in the development of Sumatra, including the central government, the provincial government, the district government as well as national and local private enterprises, make their commitment to carrying out conservation of the Sumatran tiger as outlined in this document.

Finally, I express my gratitude to all parties who actively involved themselves to prepare this document. Hopefully, God Almighty will bless our efforts in implementing the Strategy and Action Plan for Conservation of the Sumatran tiger 2007-2017 for our mutual benefit.

Minister of Forestry
(Signed)
H. MS Kaban

ACKNOWLEDGMENT

We welcome the Strategy and Action Plan for the Conservation of the Sumatran tiger 2007-2017. This document signifies the concern, efforts and cooperation of relevant parties to conserve the endangered The Sumatran tiger. Serious conservation measures are critically required now, to avoid the extinction of this animal in the near future.

This plan was mutually prepared by several relevant parties. Therefore, it is expected that this document serves as a reference for conservation of the Sumatran tiger in its habitat. All parties, including the central government, provincial governments, district governments, and private sector, are expected to synchronize all initiatives and plans, in order to reach an optimal achievement to conserve the Sumatran tiger.

It is expected that all agents actively involved in the efforts to conserve the Sumatran tiger can uphold their commitment as specified in the aims and objectives herein, especially the decision about the conservation of habitat of this rare animal. It is expected that, by 2017, the population of the Sumatran tiger will have recovered and will be in accord with the economic development of Sumatra regions.

Finally, on behalf of the Directorate General of Forest Protection and Nature Conservation and the Ministry of Forestry of the Republic of Indonesia, we hereby express our gratitude for all contributions to the preparation of this document made by the Local Government of Nanggroe Aceh Darussalam Province, Jambi Province, South Sumatra Provice, Bengkulu Province, Riau Province, and Non-Governmental Organizations such as Wildlife Conservation Society – Indonesia Program, World Wildlife Fund Indonesia, Zoological Society of London, Flora & Fauna International, Yayasan Pelestarian dan Konservasi Harimau Sumatra, Taman Safari Indonesia, and businesses such as ConocoPhillips, Sinarmas Forestry, the Indonesian Forest Entrepreneurs Association, the Indonesian Palm Oil Entrepreneur Federation, Roundtable on Sustainable Palm Oil and Riau Pulp. Similar thanks go out to the Government of West Sumatra Province for hosting the National Workshop for the Conservation of The Sumatran tiger, Sumatran Elephant and Kalimantan Elephant on August 29 – 31, 2007.

We also express our gratitude and appreciation to the national and international speakers, donors and Aksenta as the facilitator for group discussions I, II and the national workshop in West Sumatra, and to all parties that helped prepare this document. Hopefully, this document will bring maximum benefits for all of us.

Director General of Forest Protection and Nature Conservation, Acting Executive,

I Made Subadia G.

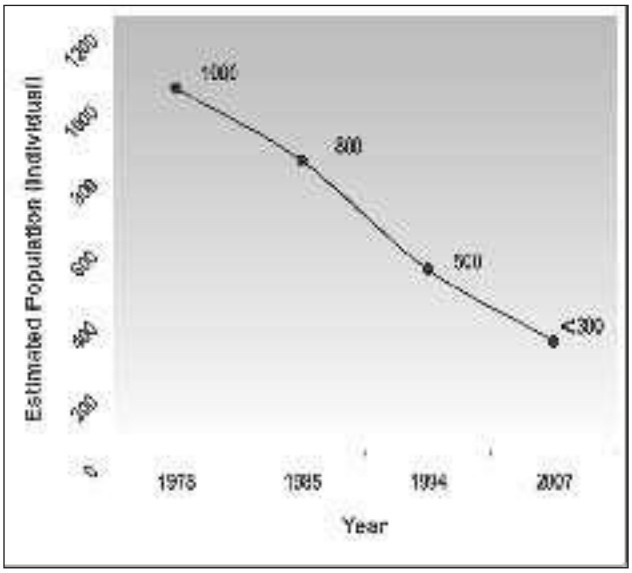
1. INTRODUCTION

1.1. BACKGROUND

Indonesia once boasted three of eight tiger subspecies in the world. Two of those subspecies, the Javan tiger (*Panthera tigris sondaica*) and the Bali tiger (*Panthera tigris balica*) were declared extinct in the 1940s and 1980s respectively (Seidensticker etc. 1999). Only the Sumatran tiger remains, living in fragmented and isolated habitats exclusively on the island of Sumatra. Measuring the smallest among all existing tiger subspecies (Kitchener 1999), the male Sumatran tiger is 240 centimeters long in average from head to tail and weighs 120 kilograms, whereas the female is 220 centimeters long head to tail, weighing 90 kilograms. (Picture 1; Save the Tiger Fund 2007).

The Sumatran tiger has been categorized as critically endangered by IUCN since 1996 (Cat Specialist Group 2002). In 1992, the tiger population was recorded at just 400, scattered throughout five national parks (Gunung Leuser, Kerinci Seblat, Way Kambas, Berbak and South Bukit Barisan) and two wildlife reserves (Kerumutan and Rimbang), while 100 tigers were said to roam elsewhere outside the seven conservation areas (PHPA 1994). That number is expected to continue decreasing (Picture 2; The Workshop on Tiger and Elephant 2007). The most up-to-date population estimate was based on a survey of conservation areas only.

Picture 1. A Sumatran tiger caught by hidden camera in Riau Province



In 8 out of at least 18 areas where the Sumatran tiger is found several organizations estimated a minimum population of 250 mature individuals. The remaining 10 areas have not been surveyed (Table 1). As each agency used different survey approaches, the conclusion requires careful consideration and cannot simply be compared to the 1992 estimation.

Increasing human encroachment into tiger habitats is the major threat to the Sumatran tiger, especially as humans continue to use forests for economic development purposes such as agriculture and mining, as well as for other infrastructure development as a result of settlement and transmigration. Besides causing habitat fragmentation, such activitiesoften lead to conflict between humans and tigers, resulting in victims on both sides, and finally driving the tiger from its habitat Human poverty and high overseas demand of illegal tiger body parts such as pelts, bones, teeth and meat has increased illegal hunting and trading of tiger body parts and derivative products. To save the Sumatran tiger from extinction, in 1994 the Indonesian government and other concerned parties issued the first action plan for the conservation of the Sumatran tiger. Action plan recommendations were to:

- Develop a management strategy to conserve the Sumatran tiger population;
- Preserve and protect the existing the Sumatran tiger population in its natural

habitat;
- Institute breeding initiatives to help the tiger population recover in its natural habitat;
- Develop a working network to support Sumatran tiger conservation in Indonesia.

To implement the action plan, the government increased measures to preserve and manage the Sumatran tiger in selected wildlife reserves such as Gunung Leuser National Park (TNGL), Kerinci Seblat National Park (TNKS), South Bukit Barisan National Park (TNBBS), Way Kambas National Park (TNWK), Tesso Nilo National Park (TNTN), Sembilang National Park (TNS) and Batang Gadis National Park (TNBG)

In response to Sumatra's rapid development during the last decade, the government, in cooperation with concerned parties, agreed to revise the 1994 Action Plan for the Conservation of Indonesian Tiger.

1.2. VISION, OBJECTIVE AND TARGETS

1.2.1. Vision

Conserve the Sumatran tiger while fostering harmonious tiger coexistence with development activities on Sumatra island.

1.2.2. Objective

To provide direction for the development and conservation management of the Sumatran tiger, especially in areas adjoined to Sumatran tiger habitat.

1.2.3. Targets
- At the very least, a stable population and landscape of the Sumatran tiger maintained until 2017.
- Public support for the conservation of the Sumatran tiger conservation and its landscapes increased.

Table 1. The Tiger Conservation Landscape in Sumatra, most recent survey data for the period of 1998-2007

TIGER CONSERVATION LANDSCAPE[a]								ESTIMATED POPULATION			
No.	Landscape	Location Code on Map	Priority	Size	Size of Habitat	Size of Habitat to TCL	Location for Survey on Population	Size of Area (ha.)	Estimated Population	Estimated Density (/100km2)	Source
1	Kerinci Seblat	5	I	2,816,200	1,965,300	69.79	Kerinci Seblat NP	1,399,320	136	0.05 -11.25	Linkie 2005
2	Bukit Tiga Puluh	7	I	710,600	541,700	76.23	Bukit Tiga Puluh	144,223	n/a[b]	n/a	ZSL Indonesia 2007
3	Kuala Kampar - Kerumutan	9	II	983,500	489,500	49.77	Kerumutan	n/a	n/a	1.27 - 5.5	WWF, PHKA, VA Tech (Sunarto et al.)
4	Bukit Balai Rejang Selatan	4	II	388,400	267,000	68.74	Bukit Balai Rejang Selatan Forest Complex	388,400	n/a[b]	n/a	WCSIP 2007
5	South of Bukit Barisan Selatan	3	III	210,700	111,500	52.92	Bukit Barisan Selatan NP	365,000	40-43	1.6	O'Brien et al. 2003
6	West of Rimbo Panti Batang Gadis	11	III	148,600	88,900	59.83	Batang Gadis NP	108,000	18-62	1.1 - 3.9	Wibisono et al. 2007
7	East of Rimbo Panti Batang Gadis	12	III	289,000	171,300	59.27	n/a	n/a	n/a	n/a	
8	Tesso Nilo	8	III	233,200	112,100	48.07	Tesso Nilo Forest Complex	233,200	n/a	0.64 -1.4	WWF, PHKA, VA Tech (Sunarto et al. 2006)
9	Bukit Rimbang Baling	6	III	439,500	229,800	52.29	Rimbang Baling Landscape	n/a	n/a	0.92 - 4.03	WWF, PHKA, VA Tech (Sunarto et al. 2006)
10	Berbak	10	IV	254,300	160,400	63.08	Berbak NP	162,700	n/a	n/a	
11	Leuser Ecosystem	14	IV	2,231,900	1,600,000	71.69	Gunung Leuser NP	1,094,692	n/a[b]	n/a	WCSIP 2007
12	Sibolga	18	IV	129,200	85,600	66.25	n/a	n/a	n/a	n/a	
13							Bukit Duabelas NP	60,500	1[c]	n/a	ZSL Indonesia 2007
14							Way Kambas NP	125,621	36	1.6 - 4,3	Franklin et al. 1999
15							Dangku NR	21,752	3[c]	n/a	ZSL Indonesia 2007
16							Ulu Masen Ecosystem	750,000	n/a[b]	n/a	WCSIP 2007
17							Meranti river- Kapas river Forest Complex	67,000	2[c]	n/a	ZSL Indonesia 2006, 2007
18							Senepis - Buluhala	106,000	21 - 42	2 - 4	Wells 2007

[a] *Sanderson 2006*

[b] *Tiger existence was found, but estimation on the population not conducted yet*

[c] *Estimated population is a minimum number of individual species identifie through hidden camera*

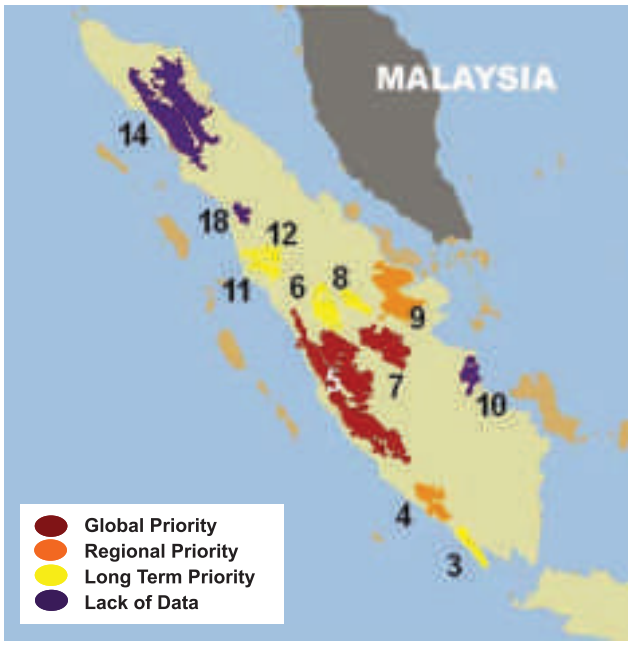
n/a *data is non existing*

2. CURRENT SITUATION

2.1. IN-SITU

2.1.1. Population and Distribution

The most up-to-date analysis on the global status of the Sumatran tiger designated 12 tiger conservation landscapes in Sumatra. While only two of those landscapes are categorized as a global priority – namely Kerinci Seblat Landscape and Bukit Tigapuluh Landscape – two others rank as a regional priority, namely: Bukit Balai Rejang Selatan and Kuala Kampar – Kerumutan (Picture 3; Box 1; Sanderson etc. 2006). According to recent studies, Sumatran tiger populations currently exist in at least 18 conservation areas and in both protected forests and production forests that are physically separate from one another (see Table 1). Based on the population trend described above, the Sumatran tiger population is decreasing over years (see Picture 2). Without an effective management intervention, Indonesia's last remaining tiger subspecies will be extinct in the near future. Picture 3. Tiger conservation landscapes that critically need conservation management priority (Sanderson etc. 2006).



Picture 3. Tiger conservation landscapes that critically need conservation management priority (Sanderson etc. 2006).

The Indonesian government in cooperation with national and international NGOs (Table 2) has conducted studies and management initiatives to save the Sumatran tiger. NGO contributions have helped significantly in conducting censuses as well as offering guidance to communities whose proximity to tiger habitat has resulted in conflicts between humans and tigers.

Table 2. The Sumatran tiger Conservation Areas and Organization Partners

No.	Location	Organization
1	TN Bukit Barisan Selatan	WCS
2	TN Way Kambas	STTCP
3	Bukit Balai Rejang Selatan	WCS
4	TN Kerinci Seblat	FFI/DICE
5	Riau (Lansekap Tesso Nilo Bukit Tigapuluh)	WWF
6	Senepis - Buluhala	YPKHS
7	Jambi (PT. Asiatic Persada)	ZSL
8	Sumatera Barat	Universitas Andalas
9	TN Bntag Gadis	CI, WCS
10	Ekosistem Leuser	WCS, YLI

2.1.2. Habitat and Prey

Similar to other tiger subspecies, the Sumatran tiger is adaptive to a wide range of environments as long as sufficient prey and water is available (Schaller 1967; Sunquist 1981; Seidensticker *et al*. 1999), and as long as there are no potential threats. In Sumatra, the tiger can be found in areas ranging from the lowland rain forest to mountainous areas, from zero to 3,000 meters above sea level. Tigers are found in several types of habitat such as primary forests, secondary forest, coastal forests, peat swamp forests, logging forests,

(Cervus unicolor) and wild boar (Sus scrofa) (Wibisono 2006). Occasionally, the Sumatran Tiger also hunts various alternative prey, such as kijang (barking deer / Muntiacus muntjac), kancil (mouse deer / Tragulus sp.), trenggiling (pangolin / Manis javanica), beruang madu (sunbear (Helarctos malayanus)) and kuau raja (great argus / Argusianus argus). The Bengal Tiger (Panthera tigris bengalis) in Nepal is known to take prey every 5-6 days. After taking prey the tiger normally remains in the prey area for 1-4 days, beginning its next hunt an average of 3 days later. (Seidensticker 1976). In India, the Bengal

Box 1. Tiger Conservation Landscape

Like all endangered wildlife, tigers need balanced human protection as well as appropriate management. They need protection from being hunted, access to sufficient prey and ample hunting territory. There are two approaches to ensure the conservation of tigers in their natural environment. Firstly, the protection of several tiger populations by creating several isolated conservation areas away from human activities. However, studies reveal that as apex predators, tigers require an extensive range of territory. Thus, it is difficult for tigers to coexist with humans, especially in heavily populated areas. A recent study in one wildlife reserve in India revealed that simply protecting tigersin several isolated areas is not sufficient (Dinerstein et al. 2006).

Secondly, an appropriate tiger conservation landscape should integrate tiger population core areas with natural corridors to enable tigers to roam freely from one core protected area to another. This approach requires full support from humans living in the surrounding area. A successful example of tiger population conservation is the Terai Arc Landscape Project in Nepal and South West India, an area recognized as having the highest human population density in South Asia. The Tiger conservation activities in the area implement a landscape concept which integrates core sites using corridors. The success of the project has encouraged the development of ecosystem services and improved the economy and welfare of the local people. The successful experience in the last ten years of conservation efforts in the region proves that wildlife conservation in the future will depend highly on spatial planning and ecological zoning which include development, human settlements, wildlife core areas, buffer zones and corridors as an integrated landscape to support the harmonious coexistence of humans and wildlife (Dinerstein et al. 2006).

Tiger eats an average of 50 ungulates per annum (Karanth et al. 2004). A female tiger regularly consumes 5-6 kilograms of meat per day (Sunquist 1981) and is well able to kill a barking deer weighing 20 kilograms every 3 days or a deer weighing up to 200 kilograms every several weeks (Sunquist et al. 1999).

A study in Malaysia confirmed that a female Indochina Tiger (Panthera tigris corbetti) consumes 1,613 – 2,041 kilograms annually, while the male consumes 1,936 2004). The biomass of tiger prey in Asia is no more than 500 kilograms per square kilometer (Seidensticker 1986). Known primary prey of the Sumatran Tiger include wild boar deer and forest goat which weigh, 32, 134, 21 and 120 kilograms respectively, on average (Karanth & Sunquist 1992). However, studies show that tigers prefer prey weighing approximately 107 – 114 kilograms (Bachi *et al.* 2003; Carbone *et al.* 1999).

2.1.3. Range Area and Density

A study conducted by Franklin et al. (1999) revealed that the home range of an adult female Sumatran tiger range between 40 – 70 square kilometers, while Griffith (1994 in Tilson et al. 1994) suggests that the home range of an adult male of Sumatran tiger varies from around 180 km2 at 100 – 600 meters asl. (above sea level), 274 km2 at 600 – 1,700 meters asl., and 380 km2at over 1,700 meters

asl. The home range of an adult male tiger can be twice as wide as the female (Franklin *et al.* 1999).

The home range is largely determined by prey availability. For example, a study

Table 3. Number of Sumatran tigers in National Conservation Institutions (Tumbelaka 2007)

No.	Location	Male	Female	Tootal	Note
1	KB (Zoo Park Raguram	13	10	23	August-06
2	Taman Safari (Safari Park) Indonesia, Cisarua	11	25	38	2 not identified yet their sexs, 13-Apr-07
3	Taman Safari Indonesia, Prigen		2	2	13-Apr-07
4	KB Bandung	9	3	12	August-06
5	KB Gembira Loka-Yoga	4	4	8	August-06
6	KB Semarang	1	1	2	August-06
7	KB Solo	2	5	7	August-06
8	KB Surabaya	3	14	17	August-06
9	KB Medan			5	5 not identified yet their sexs, August-06
10	KB Pematang Siantar	3	6	9	August-06
11	KB Bukittinggi	1	1	2	August-06
12	KB Jambi	1	1	2	August-06
	Total	48	72	127	

conducted by Santiapillai and Ramono (1985) estimates that the average density of Sumatran tiger may reach 1 adult individual/100 km2 in highland forests, increasing to 3 adult individuals per 100 km2 in the lowland forests. Other studies suggest that the average density of Sumatran tiger in highland forests is 1.1 adult individuals/100 km2 (Borner 1978) sharply increasing to between 2.3 – 3 adult individuals/100km2 in lowland forests (Nash & Nash 1985). Griffith (1994) suggests that there may be less prey at higher elevation, accounting for why a larger area is required to sustain a smaller tiger population.

2.2. EX-SITU

The Indonesian government only permits capture of the Sumatran tiger for raising and captive-breeding purposes by ex-situ conservation agencies, such as zoos and safari parks in Indonesia and overseas. In 2007, 127 Sumatran tigers were held in ex-situ conservation agencies in Indonesia (Table 3). Meanwhile some 244 Sumatran tigers were borrowed by or exchanged with other ex-situ conservation agencies overseas, as shown in Table 4. The ex-situ Sumatran tiger population is meant to preserve selective breeding stock for the worst case scenario, should the species become extinct in its natural habitat.

2.3. THREATS

2.3.1. Deforestation and Degradation

Deforestation and forest degradation in Sumatra are

Table 4. Number of Sumatran tigers in International Conservation Institutions (Tumbelaka 2007)

No.	Region	Number	Male	Number Female	Total
1	Africa	1	0	1	1
2	Sout America	1	0	1	1
3	USA	25	36	27	63
4	Asia	6	5	8	13
5	Austraila	10	14	9	23
6	Europe	47	48	48	69
7	Canada	1	1	1	2
8	New Zeland	3	2	4	6
9	Circus	5	20	19	39
	Total	99	126	118	244

Edited by Ligaya Tumbelaka from Muller (1999-2006

significant threats to the conservation of biodiversity on the island, especially that of large mammals requiring a wide ranging area such as the tiger (Picture 5). Wide swaths of forest have been cleared at an alarming rate over the last decade, shrinking and fragmenting the Sumatran tiger habitat into small pockets that are isolated from one another. Holmes (2003) estimates that almost 6,700,000 hectares of covered forest have been cleared in Sumatra between 1985 and 1997 (see Table 5). Meanwhile from 2000 to 2005, the Ministry of Forestry estimates that deforestation has claimed 1,345,500 hectares on Sumatra, at an annual average of 269,100 hectares.

Picture 5. Slashed and burned forest; settlements in TNTN and Bukit Balai Rejang Selatan areas.

Table 5. Estimate of lowland forest cover in Sumatra in 1985 – 1997 (Holmes 2003)

Estimate of Forest Cover in 1990 (ha)	Forest Cover in 1995 (ha)	Forest Cover in 1997 (ha)	Estimate of Deforestation in 1985 - 1997 (ha)	Estimate of Deforestation in 1985 - 1997 (%)
16,000,000	5,559,700	2,168,300	3,391,400	61

2.3.2. Hunting and Trading

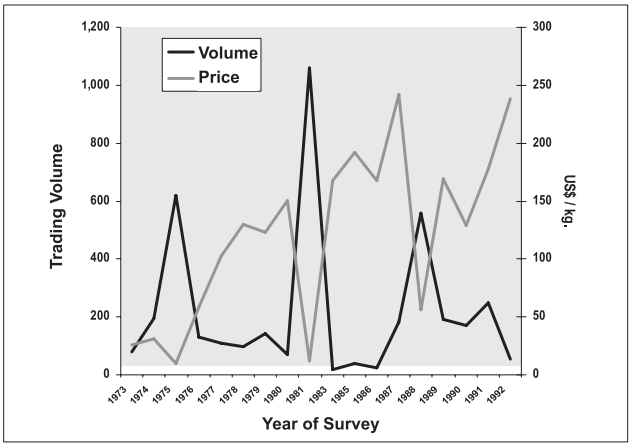
Illegal hunting is a significant threat to the existence and conservation of the Sumatran tiger (Picture 6) affecting not only the tiger, but also its prey. Illegal tiger hunting probably began in the early 1990s, in order to supply the black market with natural tiger body parts, especially its hide and bones. The tiger and its products are traded for several reasons. There is a strong market for tiger products in Asian traditional medicine for their perceived supernatural powers. In addition, tigers are traded for use as pets and status symbols (TRAFFIC SEA 2007; Table 6). Over 3,990 kilograms of Sumatran tiger bones were exported illegally from Indonesia to South Korea between 1970 and 1993 (Mills & Jackson 1994; Box 2). The price of tiger bones generally increases over time. In addition, as Picture 7 illustrates, tiger bone prices tend to increase on the international market when supply is down. In the South Korean market, tiger bone was sold at US $ 26 per kilogram in 1973, and US $ 238 per kilogram in 1992 (Mills & Jackson 1994). Historically, the hide and pelt are the most precious parts of a tiger. One mature Sumatran tiger pelt was valued at 150 – 350 gulden in the 1930s (Treep 1973) compared to more than US $ 2,000 in 2002 (Sheppard & Magnus 2004). Meanwhile profit for trading in other parts of the tiger reached US $ 1,000 in the 1970s, and more than tripled that amount by 2002. Studies estimate 253 tigers were removed from their natural habitat between 1998 – 2002 (Borner 1978; Table 7; Sheppard & Magnus 2004).

Table 6. Investigation of trading in Sumatran tiger parts in 22 big cities on Sumatra (TRAFFIC SEA 2007, unpubl.).

Items	2002	2006
Claw	175 +	43
Tooth	102 +	84
Beard	80 +	2
Complete pelt	24 +	1
Cut of pelt	20	37
Bone	8	32 kg
Offset	5	0

(+ equals more than)

Picture 6. Evidence of Sumatran tiger hide and bones in TNGL; a TNKS officer holds a Sumatran tiger pelt.



Picture 7. Comparison of tiger body part volume and price per kilogram exported from Sumatra to South Korea from 1978 to 1992 (reconstruction by Mills & Jackson 1993).

2.3.3. Conflict

Rapid human population growth and economic development within and around Sumatran tiger habitat limits the animal's ability to roam freely and in turn has increased humantiger conflicts. In recent years, humantiger conflicts have become the primary threat to Sumatran tiger conservation efforts (Picture 8). Records show that 48, 36 and 34 conflicts occurred in West Sumatra, Riau and Aceh respectively from 1978 to 1997 (Box 3). During that period, 146 persons were killed, 30 persons were injured and 870 cattle were killed in tiger confrontations (Nyhus and Tilson 2004).

Furthermore, records show that 40 persons were killed between 2000 and 2004 (PHKA). A study by TRAFFIC in 2002 found that at least 35 Sumatran tigers were killed in human-tiger conflict from 1998 to 2002.

Box 2. Poaching and Illegal Trading

Poaching is a real threat that directly decreasess wildlife populations. Illegal hunters often use traps with ropes or cables, pitfalls, poison and firearms to trap wild game such as bear (highly prized in Asian traditional medicine) and ungulates, common tiger prey. This sometimes results in unintentionally trapping and killing tigers. Paradoxically, though tigers serve a natural role in controlling pests such as wild boar, the tigers themselves are occasionally killed by traps set around agricultural areas to reduce those pests.

Based on data provided by the South Korea Customs Office, the TRAFFIC Species in Danger Report noted that 8,981 kilograms of tiger bones were smuggled into South Korea from 1970 to 1993, among them 3,994 kilograms, or 44%, from Indonesia. It is ironic that at least 2,619 kilograms were smuggled after Indonesia ratified the CITIES convention in 1979. Other data shows that Indonesia exported tiger bones to Taiwan in 1984 and imported tiger-content medicines from China in 1991 and 1992 (Mills & Jackson 1994).

In 2002, TRAFFIC surveyed 484 souvenir shops, gold and precious stone dealers, practitioners of Asian traditional medicine and bird shops in 24 large and small cities in 8 provinces in Sumatra, finding that tiger products are traded in all but 7 of the 24 cities. TRAFFIC conducted another survey in 2006, this time in only 22 large and small cities in 7 provinces in Sumatra except Nanggore Aceh Darussalam. The survey confirmed that tiger body parts are still openly traded throughout the region, in all but 9 of the 22 surveyed cities and towns.

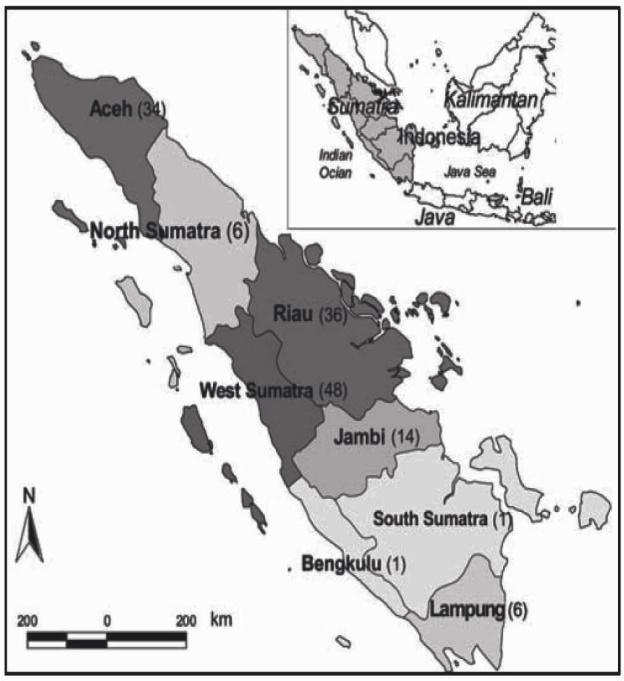
Table 7. Estimated number of total individual Sumatran tigers removed from their natural habitat in eight provinces in Sumatra from 1998 to 2002 (Sheppard & Magnus 2004).

Province	1998	1999	2000	2001	2002	TotalAverageSource
North Sumatra	1	1	4	n/a	n/a	62.4FFI-SECP 2002,
Aceh	n/a	2	2	1	n/a	51TRAFFIC 2002
Riau	19	17	9	12	10	6713.4FFI-SECP 2002, TRAFFIC 2002
West Sumatra	2	14	35	12	3	6513WWW 2002 STCP 2003
Jambi	2	9	1	5	22	397.8FFI 2001, FFI 2003
South Sumatra	2	4	1	2	n/a	91.8FFI 2002, WWF 2002
Lampung	19	8	12	6	12	5711.4WWW 2002
Bengkulu	n/a	2	1	n/a	1	40.8WWW 2002, WCS 2003
Total	45	57	65	38	48	253*51FFI 2002

Box 3. Human-Tiger Conflict in Sumatra

In general, human-tiger conflict on Sumatra follows three scenarios. In the first scenario, human and tiger activities do not significantly overlap and potential conflict is low. In this scenario there are clear borders between human and tiger activities; tigers do not have to venture out of the forest and human access into that forest is very limited. In interviews with inhabitants of 20 villages in TNWK, at least six persons were killed in human-tiger confrontations over more than forty years, from 1953 to 1996. Although the forest area borders on 27 villages with 590,000 inhabitants and the tiger population density is relatively high, human and tiger habitats are clearly divided by a river bordering almost two thirds of the park boundary. The second scenario producers more conflict, as humans have more resources, while those resorces are also required to adequately support the tigers. As a result, human and tiger activities overlap relatively often. resulting in more potential human-tiger conflict. This scenario is commonly found in protection forests where conservation activities are low, and also in agroforestry areas and multiple-use forest areas, where the density of both humans and tiger prey is high. In the third scenario, isolated human settlements have developed in the heart of forest with high tiger density. The rapid growth of transmigration settlements, roads and plantations in primary forests at the end of the 1970s and the early 1980s throughout Sumatra has increased human-tiger conflict on the island. Three provinces suffered from fatal tiger attacks during the period, namely West Sumatra, Riau and Aceh (respectively 46.8%, 52.5 and 63.7% attacks ending in fatalities). These three provinces also have the lowest rate of deforestation compared to other provinces in Sumatra (Whitten 1987, Collins *et al*. 1991). However, as the level of human-tiger conflict is quite high due to accelerated destruction of forest habitats, these threeconflict scenarios call for further examination (Unofficial translation from Nyhus & Tilson 2004).

Picture 8. Sumatran tiger killed in human-tiger conflict in Aceh.



2.3.4. Poverty

Sumatran people whose livelihoods depend on forest resources often hunt and eat tiger prey, which provides an animal protein source used to meet subsistence basic needs. However, due to poverty and limited employment opportunities some Sumatrans have turned to hunting wildlife to sell in local markets for increased economic gain rather than simply to meet subsistence needs. According to 2006 Statistic Bureau records, families living in Sumatra forests earn about Rp. 300,000 – Rp. 400,000 per month, an amount lower than the monthly minimum labor wage in each province in Indonesia.

Hunting tiger prey profoundly decreases the possibility for conservation of the Sumatran tiger, since the tigers' survival largely depends upon the availability of sufficient prey. Surprisingly, it is possible to openly and freely hunt tiger prey on Sumatra without provoking serious concern on the part of the authorities or the Sumatran tigerconservation activists. The situation worsens as local people continue to exhibit low awareness or knowledge of the importance of conserving natural resources for their own lives in the long run. Many people living in or near the forests
engage in illegal logging and deforestation for agriculture purposes, even though such activities not only cause destruction and fragmentation of the Sumatran tiger habitat but lower the quality of the forest ecosystem.

3. EXPECTED CONDITIONS, RECOMMENDATIONS AND ACTION PLANS

Based on discussions during the preparation of the Strategy and Action Plan for the Conservation of The Sumatran tiger, in general there are 5 expected conditions to be achieved in the next 10 years (2008 – 2017) including recommendations and actions to be carried in order to reach the expected conditions. The summary of targets is presented in Table 8.

3.1. THROUGHOUT SUMATRA, WITH THE SUPPORT OF THE RELEVANT PARTIES, SUMATRAN TIGER LANDSCAPES AND THE POPULATIONS THEY SUPPORT CAN BE RECOVERED, MAINTAINED OR EXPANDED.

The increasing need to convert land to forestry and non-forestry development throughout Sumatra is another effect of the rapid economic growth and human population in this area and has initiated most human wildlife conflicts including human-tiger conflicts. The situation worsens as forest residents demonstrate little awareness and concern about the importance of wildlife conservation, and local law enforcement on the matter is undeniably weak, particularly in the case of the Sumatran tiger. In addition to conservation areas, the Sumatran tiger is found in other areas such as conversion forests or production forests within the Industrial Forest Area (HTI) areas and Natural Forest Concessions (HPH) areas. The most recent study indicates that the Sumatran tiger populations living outside of conservation forests are relatively large but these tigers are not under protection of forest police, and will face greater threats from hunting activities and possibly more human-tiger conflict.

3.1.1. Recommendation

- Strengthen anti-poaching and illegal trade laws and increase the capacity of Ministry of Forestry and relevant law enforcement authorities to enforce laws against Sumatran tiger hunting and illegal trade.
- Develop the infrastructure aimed at preventing hunting and trading of the Sumatran tiger in order to improve the Ministry of Forestry's capacity to reduce the rate of the Sumatran tiger population decrease.
- Develop and increase connectivity of the Sumatran tiger's main habitats by creating corridors that expand the range area of the Sumatran tiger, and advance the legal status of such areas.
- Develop a long term monitoring program to be updated every three years that includes the Sumatran tiger's population status and ecology, habitat availability and the prevalence of threats facing the species both inside and outside of conservation areas throughout Sumatra.
- Develop range of conflict mitigation and management techniques that is acceptable to all stakeholders, including relocation, translocation and choosing areas for release into natural wild habitats.
- Develop and use tiger population restocking and translocation techniques to conserve the genetic diversity of Sumatran tiger populations located in critical habitats, in order to avoid the loss of genetic variation caused by genetic drift and inbreeding.
- Develop tiger shelters managed by communities, Non Government Organizations (NGO) and land owners to protect tiger populations living outside conservation areas.

3.1.2. Action Plan

- Perform surveys tiger conservation landscapes throughout Sumatra every three years to assess the status and distribution of the Sumatran tiger populations they contain. Employ an agreed common methodology for all of these surveys.

- Identify, research and monitor Sumatran tiger population, distribution, range area and habitat carrying capacity for tiger and prey outside tiger conservation areas, especially in forestry industry and mining concessions. Perform this activity periodically to evaluate how effectively the conservation management infrastructure is working. This activity will provide

inputs for the conservation priority for the Tiger Conservation Landscape (TCL) document.

- Identify and choose at least two sanctuaries that represent two types of Sumatran tiger habitats. These natural wildlife sanctuaries shall be developed to accommodate and receive live tigers that have been confiscated as a result of illegal possession, conflict or illegal hunting. This will prevent mature wild tigers from being delivered to ex-situ conservation agencies.

- Improve cooperation with POLRI and LIPI forensic laboratories in investigatory activities and/or in support of legal actions regarding protected species, wildlife, crime, and especially with respect to the Sumatran tiger.

- Improve the habitat protection and connectivity of the Sumatran tiger populations living outside conservation forests via: 1) the central government issuing protection status to a relatively large area that has high conservation value for the Sumatran tiger; 2) the local government issuing special protection status to a relatively narrow but essential area, or 3) land lease/purchase.
- Establish and replicate Species Protection Unit (SPU) teams in each Sumatran province, regency, and municipality where Sumatran tigers occur. The SPU members include Forest Police, LSM and community members. In addition, police liaison officers from every province and regency throughout Sumatra will be required.

- Establish a commission for illegal trading at the central government level that can be activated at any time whenever required to investigate and follow up special law enforcement operations that cannot be handled by the local authorities, especially large-scale trading syndicates and national distributors, buyers and exporters.

- Establish an ad-hoc conflict solution task force at the provincial level to assist and facilitate human-tiger conflict mitigation, especially in areas with high historically human-tiger conflict history (Jambi, Riau, West Sumatra, Nanggroe Aceh Darussalam).

3.2. Infrastructure Established And The Ministry Of Forestry's Capacity To Monitor And Evaluate The Conservation Of The Sumatran Tiger And Its Prey Increased.

The most intensive studies of population status and threats facing Sumatran large mammals are carried out mostly in conservation areas, with less attentions given to other land uses outside of these areas. With only partial and incomprehensive information available on the status and threats facing Sumatran large mammals, the capacity of government, conservation activists and donors to evaluate conservation intervention effects and manage decisions is weak. It is crucial that the government have adequate capacity to thoroughly evaluate the outcome of conservation efforts so that it can effectively meet its obligation to conserve resources.

However, capacity to provide comprehensive information on population status and threat level to large mammals throughout Sumatra is not currently available. Technical and institutional capacities are inconsistent; human and financial resources are unevenly distributed; conservation priorities vary among the Sumatran tiger conservation activists. It will therefore be necessary to synchronize our technical and financial resources and also our priorities.

3.2.1. Recommendation

- Improve capacity and strengthen the infrastructure local management authorities to monitor the population status and distribution of the Sumatran tiger in their region.

- Develop infrastructure and capacity by organizing training modules and an exchange program between tiger conservation teams. These mechanisms shall be managed by each conservation agency, NGO and community group.

- Develop an integrated center of information on the status of the Sumatran tiger that is accessible to all Sumatran tiger

conservation communities. The information center shall be managed by PHKA and will provide updated information on the status of Sumatran tiger conservation in a timeseries database.

- Prepare Sumatran tiger conservation management plans for each of the Sumatran tiger landscapes based on the national conservation strategy and action plan.

3.2.2. Action Plan

- Develop standardized survey methodological design and protocols for surveys of the Sumatran tiger and prey species populations and distribution. The protocol should include guidelines for survey design, basic data collection and data reporting.

- Map the concession areas and comprehensively review the status of the Sumatran tiger population occupying them as well as the corresponding ecological factors in order to identify possible areas of connectivity vital for conservation of the Sumatran tiger. Then, decide on the priority areas of Sumatran tiger conservation outside the concession areas.

- Develop a map of Sumatran tigers and large mammals that will be updated every three years, based on periodic surveys on the populations, their distribution and availability of habitats for tigers and other large mammals on Sumatra. The map shall serve as a national living document to evaluate conservation intervention performance.

- Perform periodic technical trainings on Sumatran tiger conservation and monitoring methods, comparison studies for PHKA officers in the Technical Executive Units (UPT), and provide apprentice programs in international conservation agencies and exchange/comparison studies for officers within UPTs. The training programs may be assigned to international agencies and other competent organizations.

- Improve staff capacity of PHKA and relevant institutions through special and integrated training/education programs, especially related to investigation methods, identification of wild animals and their body parts, as well as strategies for capture, patrol and the handling of legal cases.

- Establish a standard operating procedure (SOP) at the national level that investigates and provides intelligence in accordance with legal standards that follow the standards of the police department.

- Prepare and disseminate conflict mitigation protocols to each regency/municipality, conduct trainings in human-tiger conflict mitigation techniques for UPT PHKA officers and other relevant institutions, and develop conflict mitigation infrastructure in each UPT PHKA with a history of high human-tiger conflict.

- Establish protocols of best management practices for tiger conservation specifically designed for major industrial land uses, such as oil palm, Industrial Forest Areas, Natural Forest Concessions, oil and gas, and coffee and rubber.

- Develop training modules for Sumatran tiger conservation and conduct periodic trainings and exchanges between Sumatran tiger conservation practitioners from Sumatra's conservation organizations.

- Conduct a workshop and establish a national database that monitors the status and distribution of the Sumatran tiger and its prey. The database shall be online and realtime and will also accommodate an offline database.

3.3. Sumatran Tiger Management Outside Conservation Areas Reinforced With Support From Relevant Parties In Order To Encourage The Conservation Of The Sumatran Tiger And Its Habitat At Both Regional And National Levels

In general, many regional governments, communities, and forestry and mining concession holders share the opinion that conservation areas and wildlife hinder economic development and business opportunities. Conversely, many conservation activists are concerned that business-oriented regional policies cause the destruction of forests and the loss of natural diversity. In this era of democratization and decentralization, conservation and

development must strive to strike a win-win balance. Sumatran tiger conservation should accommodate stakeholder aspirations in order to exist in accord with development agendas, especially at the regional level.

3.3.1. Recommendation

- Develop mutual visions and missions and encourage stakeholders to align strategies and action plans for Sumatran tiger conservation with the regional development plan, especially in relation to forestry and non-forestry industry practices.

- Establish regional partnerships and encourage active participation of forestry and non-forestry businesses in the management of Sumatran tiger populations, especially in concession areas that overlap with tiger habitats.

- Develop intersectoral cooperation at the national level along with inter-regional involvement from Government and larger enterprises that operate in Sumatra in order to help conserve the Sumatran tiger.

3.3.2. Action Plan

- Establish common visions, missions and interests among Sumatran tiger conservation activists, regional governments and concession holders, particularly in the forestry and agricultural sectors.

- Perform workshops on Sumatran tiger conservation management and prepare action plans at the regional level. The purpose of the workshops is to translate and integrate the strategic plan into the regional development agendas and vice versa. The workshops can be assigned to operating agencies in relevant regions.

- Develop partnership programs for Sumatran tiger conservation among businesses, government, NGOs, and academic institutions at regional levels and provide appropriate supervision by regional steering committees .
- Reinforce the regulation framework and applicable laws through: 1) strengthening regulation reinforcement and law enforcement for certain industries, 2) integrating the Sumatran tiger conservation into the national development planning (BAPPENAS), 3) integrating conservation of the Sumatran tiger into regional development planning (BAPPEDA) and 4) integrating the ecological aspects of Sumatran tiger conservation into the criteria of environment impact analysis (BAPEDALDA).

- Strengthen law enforcement outside conservation areas through improving BKSDA efficiency as the single authority responsible for Sumatran tiger conservation in these areas. It may also be beneficial to involve industry security forces in some instances .

3.4. Working Network And Communication Infrastructure Established; Community Groups Committed To The Conservation Of The Sumatran Tiger Established

Since the issuance of the Indonesian Tiger Strategic and Action Plan in 1994, various organizations have worked on their own or jointly to save the Sumatran tiger. However, these groups have not been as effective as they could have been as they lacked an integrated vision and did not have guidelines to maximize the impact of their outputs. Further consolidation and coordination is required to achieve our conservation objectives.

Limited national financial resources pose a common obstacle to wildlife conservation, especially that of the Sumatran tiger. International support, both financial and technical, is definitely required to conserve the Sumatran tiger.

3.4.1. Recommendation

- Develop a powerful communication and partnership network, both at national and international levels that is able to improve cooperation in the exchange of information and the empowerment of local and national groups striving to conserve the Sumatran tiger.

- Develop an integrated and effective

surveillance mechanism that involves the regional government, PHKA, businesses and the community in order to track the performance of forestry and nonforestry industries in their exploitation and management of concession areas that overlap with Sumatran tiger habitats.

- Develop a sustainable funding mechanism to support short term and long term priority activites for Sumatran tiger conservation.

- Develop integrated, sustainable, and measurable education and community awareness programs .

3.4.2. Action Plan

- Establish a Communication Forum for Sumatran tiger Conservation (FKKHS), or Cats Specialist Group Indonesia. The forum shall act for and represent the Sumatran tiger conservation community in Indonesia and develop regional and international networks. Membership will include experts and tiger observers in Indonesia and overseas. The Forum shall cooperate with and provide recommendations to the Ministry of Forestry to ensure high quality, appropriate implementation of conservation strategies and action plans.

- Establish a Consortium for the Conservation of The Sumatran tiger. The Consortium shall cooperate with FKKHS to develop a funding mechanism and fund raising at national and international levels to support a long term the Sumatran tiger conservation program.

- Campaign for tiger conservation in all provinces in Sumatra and other regions, including Java and Bali, particularly with respect to law enforcement. Disseminate relevant laws and regulations on wildlife to the regional government apparatus, and law enforcement apparatus such as the courts, police, attorney's offices, quarantine, customs offices and the Indonesian National Armed Forces.

- Develop an effective and comprehensive education and awareness program. Conservation program field executives shall have the skill to train and interact with communities to translate the tiger conservation strategies.

- Establish a watch dog supervisory body of Sumatran tiger conservation in industry areas that functions, in general, to:
  1) identify and publicize industries that violate laws and regulations; and
  2) identify and publicize industries that promote environment friendly practices and actively participate in the Sumatran tiger conservation partnership.

- Establish independent funding to ensure the sustainability of regular forest patrols and rapid reaction units for conflict response by including the operational expenses in the government budget. The funding could be sourced from the private sector or from alternative funding mechanisms such as avoided deforestation schemes and/or via DNS.

- Develop international collaborations to stop transnational trade of wildlife, body parts and derivative products, especially aimed at intelligence sector, law enforcement campaigns and operations that involve PHKA, Interpol, ASEAN WEN and national and international NGOs.

3.5. A Useful And Sustainable Ex-situ Conservation Program Established In Accord With In-situ Sumatran Tiger Preservation Efforts

Tigers that attack humans and livestock are killed or captured and taken to zoos nearby without consideration for how such a response impacts the Sumatran tiger population in the wild. In addition, exsitu conservation policies made in the past are not adequate to resolve the problems of in-situ conservation that we face today. One of the strategic issues is that stakeholders do not adhere to the ex-situ conservation action plan as stipulated in the Strategy and Action Plan for Sumatran Tiger Conservation 1994 (Tilson et al. 1994) and the Indonesian Sumatran Tiger Masterplan (Darjadi et al. 1998). On the other hand, the breeding programs at institutions dealing with exsitu conservation can be said to be quite successful. To date, there are approximately 371 Sumatran tigers in captivity both domestically and abroad. One problem conservationists face today is the absence of policies that specifically regulate the use of breeding results for the recovery of Sumatran

tigers in the wild. In addition, there is a lack of communication among activists of ex-situ conservation. Furthermore, management of breeding techniques and treatment of tigers in many institutions that specialize in ex-situ conservation are still inadequate.

3.5.1.Recommendations

Align the action plan of ex-situ conservation as stipulated in the Strategy and Action Plan for Sumatran Tiger Conservation 1994 (Tilson *et al*. 1994) and the Indonesian Sumatran Tiger Masterplan (Darjadi *et al*. 1998) documents with the updated Strategy and Action Plan for Sumatran Tiger Conservation 2007 - 2017.

3.5.2. Action Plan

- Review and revise the action plan of exsitu conservation as stipulated in the Strategy and Action Plan for Sumatran Tiger Conservation 1994 (Tilson *et al.* 1994) and Indonesian Sumatran Tiger Masterplan (Darjadi *et al*. 1998) with the updated Strategy and Action Plan for Sumatran Tiger Conservation 2007 to 2017

- Implement the revised action plan of conservation ex-situ as stipulated in the Strategy document and Action Plan for Sumatran Tiger Conservation 1994 (Tilson et al. 1994) and Indonesian Sumatran tiger Masterplan, (Darjadi et al. 1998) in all institutions specializing in ex-situ conservation of the Sumatran tiger.

- Seek funding and technical management support, especially in the conservation institutions which do not meet minimum standards yet.

- Scientifically assess possibilities for the implementation of conservation loan/ breeding loan, and reintroduction programs.

Table 8. Stages of evaluation of the expected results of action plan.

EXPECTED CONDITIONS	SUCCESS INDICATORS	EXPECTED TARGET		
		2011	2014	2017
3.1. Sumatran tiger population and all of its landscapes in Sumatra are recovered and can be maintained or increased with the support of all stakeholders.	Biological and ecological population size of Sumatran tiger is in ideal number and its habitat and roaming areas are not reduced, but possibly even increased.	- Population and distribution of Sumatran tigers across its landscapes in Sumatra are identified and mapped accurately. - Two special protection areas for Sumatran tiger (sanctuaries) are identified. - Memorandum of cooperation with the forensic laboratory of LIPI and police. - At least two SPUs (Special Protection Unit) are formed in the main habitat of Sumatran tigers. - Commissions on anti-illegal wildlife trade are formed and work effectively. - The task force of human - Sumatran tiger conflict mitigation is formed and supported by adequate infrastructure.	- Population and distribution of Sumatran tigers across its landscapes in Sumatra are identified, accurately mapped and updated. - Cooperation on forensic with LIPI and Police operates effectively. - Strengthen the protection of Sumatran tiger habitat and corridors connecting its landscapes and ecological functions and get full support from stakeholders. - Two Species Protection Units (SPU) are newly formed in the main habitat of Sumatran tiger and work effectively with support from stakeholders. - Commission on anti-illegal wildlife trade works effectively. - Task force on Conflict mitigation works effectively.	- Population and distribution of Sumatran tigers across its landscapes in Sumatra are identified, accurately mapped and updated. - The Sumateran tiger population and all of its landscapes in Sumatra are recovered and can be maintained and increased with support of all stakeholders. - Cooperation on forensics with LIPI and Police run effectively. - Strengthen the protection of Sumatran tiger habitat and connectivity areas having high conservation value that connect main areas for Sumatran tiger conservation. - Two new SPUs formed in all Sumatran tiger habitats. - Commissions on anti-illegal wildlife trade are formed and work effectively. - Task force on Conflict mitigation works effectively.

Table 8. Continuation...

EXPECTED CONDITIONS	SUCCESS INDICATORS	EXPECTED TARGET		
		2011	2014	2017
3.2. Infrastructure is built and capacity for the Forestry Department to monitor and evaluate Sumatran tiger species conservation efforts is increased.	Forestry Department and its partners are able to conduct performance monitoring of Sumatran tiger conservation effectively.	- Document of standardized survey methods and protocol on population survey and distribution of Sumatran tigers are available and used by stakeholders. - Map of adjacent or overlapping forest concession and non-forest areas with Sumatran tiger landscapes is available in adequate scale and used by stakeholders. - Atlas of Sumatran tigers and their preys is available in adequate scale and in the form of spatial and non-spatial database and can be accessed online. - Document of training modules on Sumatran tiger conservation is available and used effectively in three provinces in Sumatra. - Capacity building program on Sumatran tiger conservation for PHKA staff and partners is established and run effectively. - Document of SOP on investigation and intelligence of violations or illegal use of Sumatran tiger is available and in use. - Protocol of human-tiger conflict mitigation is socialized and used effectively throughout all districts in Sumatra where Sumatran tigers live.	- Map of adjacent or overlapping forest concession and non-forest areas with Sumatran tiger landscapes is available in adequate scale and used by stakeholders. - Atlas of Sumatran tiger and its prey as well as online database work effectively and are updated regularly to improve the effectiveness of law enforcement efforts. - Capacity building program on Sumatran tiger conservation for PHKA staff and partners works effectively. - Protocol on best management practices is implemented by industries. - Document of training modules on Sumatran tiger conservation is available and used effectively in six provinces in Sumatra. - Document of protocol on Sumatran tiger breeding program is available and used effectively by ex-situ conservation institutions.	- Map of adjacent or overlapping forest concession and non-forest areas with Sumatran tiger landscapes is available in adequate scale and used by stakeholders. - Atlas of Sumatran tiger and its prey as well as online database work effectively and are updated regularly to improve the effectiveness of law enforcement efforts. - Capacity building program on Sumatran tiger conservation for PHKA staff and partners work effectively. - Protocol on best management practices is implemented by industries. - Document of training modules on Sumatran Tiger conservation is available and used effectively in all provinces in Sumatra. - Document of protocol on Sumatran tiger breeding program is available and used effectively by ex-situ conservation institutions.

Table 8. Continuation...

EXPECTED CONDITIONS	SUCCESS INDICATORS	EXPECTED TARGET		
		2011	2014	2017
		- Documents of protocol on best management practices for each type of industry is available. - Document of protocol on Sumatran tiger breeding program is available and used effectively by ex-situ conservation institutions.		
3.3. There is strengthened Sumatran tiger management outside conservation areas and involvement of parties to support Sumatran tiger conservation and its habitat both at regional and national levels.	Sumatran tiger conservation outside conservation areas receives full support from all stakeholders.	- Sumatran tiger conservation agenda is integrated into the regional development agenda in three provinces in Sumatra. - Partnership program on Sumatran tiger conservation in its landscapes both in forest concession and non-forestry areas is established in three provinces in Sumatra. - The parties responsible for the Sumatran tiger population outside conservation areas work effectively.	- Sumatran tiger conservation agenda is integrated into the regional development agenda in at least three provinces in Sumatra. - Partnership program on Sumatran tiger conservation in its landscapes both in forest concession and non - forestry areas is established in six provinces in Sumatra. - The parties responsible for the Sumatran tiger population outside conservation areas work effectively.	- Sumatran tiger conservation agenda is integrated into the regional development agenda in at least eight provinces in Sumatra. - Partnership program on Sumatran tiger conservation in its landscapes both in forest concession and non - forestry areas is established in eight provinces in Sumatra. - The parties responsible for the Sumatran tiger population outside conservation areas work effectively.
3.4. Network and communication infrastructure as well as community groups concerned about and responsible for the sustainability of Sumatran tiger are established.	Indonesian Sumatran tiger conservation community runs well and is affiliated with the global tiger conservation network.	- Sumatran tiger Conservation Communication Forum (FKKHS) and Sumatran tiger national network are established as effective artners of the government. - The Sumatran tiger conservation consortium is established and functioning. - The Sumatran tiger conservation, education and community awareness program is implemented and socialized.	- FKHHS functions properly and becomes an effective government partner. - The Sumatran tiger conservation, education and community awareness program is implemented and socialized. - Sumatran tiger conservation supervisory agencies in industrial estates work effectively. - Tiger fundraising starts to work.	- FKHHS functions properly and becomes an effective government partner. - The Sumatran tiger conservation, education and community awareness program is implemented and socialized. - Sumatran tiger conservation supervisory agencies in industrial estates work effectively.

Table 8. Continuation...

EXPECTED CONDITIONS	SUCCESS INDICATORS	EXPECTED TARGET		
		2011	2014	2017
		- Sumatran tiger conservation supervisory agencies in industrial estates are established and operational. - Eradication of cross country illegal trade on Sumatran tiger by PHKA has the full support of parties.	- Efforts to eradicate illegal trade in Sumatran tiger products run effectively and have the support of stakeholders.	- Sumatran tiger conservation fund accumulates as a trust fund and is used efficiently and effectively. - Efforts to eradicate illegal trade in Sumatran tiger products run effectively and have the support of stakeholders.
3.5. An effective ex-situ Sumatran tiger conservation program is established and supportive to the in- situ conservation programs.	Ex-situ Sumatran tiger conservation program effectively supports in-situ conservation program.	- Revise the action plan and master plan of ex-situ Sumatran tiger conservation. - Protocol on ex-situ conservation program is carried out by 50% conservation institutions owning Sumatran tiger. - Study is produced on reintroducing the Sumatran tiger to existing habitat.	- Protocol on ex-situ conservation program is carried out by all conservation institutions owning Sumatran tiger. - The scientific study on conservation / breeding loan scheme is available and Sumatran tiger reintroduction begins.	- Protocol on ex-situ conservation program is carried out by all conservation institutions owning Sumatran tiger. - Conservation / breeding loan scheme develops (based on the study) and Sumatran tiger reintroduction can be carried out effectively.

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Lao People's Democratic Republic
Peace Independence Democracy Unity Prosperity

NATIONAL TIGER ACTION PLAN FOR LAO PDR 2010 - 2020

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National Tiger Action Plan for Lao PDR 2010-2020

Division of Forest Resource Conservation
Department of Forestry
Ministry of Agriculture and Forestry
Government of Lao PDR

In collaboration with the

Wildlife Conservation Society – Lao PDR

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LIST OF ACRONYMS

CBD	–	Convention on Biodiversity
CITES	–	Convention on International Trade in Endangered Species
CTD	–	Camera trap day
DAFO	–	District Agriculture and Forestry Office
DAP	–	Dong Ampham NPA
DHS	–	Dong Huasao NPA
DKT	–	Dong Khanthung
DPV	-	Dong Phouvieng NPA
GOL	–	Government of Lao PDR
HNN	–	Hin Nam Nor NPA
IP	–	Independent photos
KML	–	Khammuoan Limestone NPA
LLV	–	Lavin-Laveung PPA
LNTA	–	Lao National Tourism Administration
NEPL	–	Nam Et-Phou Loeuy NPA
NHA	–	Nam Ha NPA
NKD	–	Nam Kading NPA
NKG	–	Nam Kong PPA
NKN	–	Nam Kan NPA
NNT	–	Nakai-Nam Theun NPA
NPA	–	National Protected Area
NPU	–	Nam Phoun (Poui) NPA
NXM	–	Nam Xam NPA
PAFO	–	Provincial Agriculture and Forestry Office
PCV	–	Phou Chomvoy PPA
PDD	–	Phou Dendin NPA
PKK	–	Phou Khao Khouay NPA
PKT PNPA	–	Phou Kathong Proposed NPA
PPA	–	Provincial Protected Area
PPN	–	Phou Phanang NPA
PXH	–	Phou Xanghe NPA
PXT	–	Phou Xiengthong NPA
TCL	–	Tiger Conservation Landscape
TPZ	–	Totally protected zone
XBN	–	Xe Bangnouan NPA
XKP	–	Xe Khamphor
XPN	–	Xe Piane NPA
XSP	–	Xe Sap NPA

GLOSSARY OF TERMS

Totally Protected Zone (TPZ). Core breeding area for tigers and other wildlife where human activity is prohibited

Controlled Use Zone (or Managed Zone). Area where sustainable use of natural resources by local communities for subsistence is allowed

Corridor. Habitat connectivity within and between protected areas that allow movement or dispersal of tigers and prey within/between TCLs

Convention on Trade of Endangered Species (CITES). An international agreement between governments to ensure that international trade in specimens of wild plants and animals does not threathen their survival

Convention on Biological Diversity (CBD). An international treaty to sustain the diversity of life on Earth

MIST (Monitoring Enforcement System). A database tool used to track effectiveness of law enforcement efforts, threats, and trend of illegal activities .

Category 1 Species (2007 Wildlife Law). Species that are considered to be rare, highly threatened to extinction, high economic value, significant to socioeconomic development, environment protection, scientific research. Hunting is totally prohibited.

Category 2 Species (2007 Wildlife Law). Speicies that are significant to socio-economic developemtn, envirornment protection, local livelihood and scietific research. Hunting outside the TPZ for subsistence is occassionally allowed, but not for trade.

Category 3 Species (2007 Wildlife Law). Species that are common in nature and have a high reproductive rate. They are also highly significant to socioeconomic development, environmental protection, and scientific research. Hunting for subsistence is occassionally allowed, but not for trade.

Tiger prey. Any wildifespecies, often ungulates, that arehunted by tigers for food

National Protected Area (NPA). National Conservation Forest set aside for the purpose of conserving the nature, preserving fauna and flora, forest ecosystem and other valuable sites of natural, historical, cultural, tourism, environmental, educational and scientific importance.

Provincial Protected Area (PPA). Provincial Conservation Forest set asidefor the purpose of conserving the nature, preserving fauna and flora, forest ecosystem and other valuable sites of natural, historical, cultural, tourism, environmental, educational and scientific importance.

Priority Source Site. An area embedded within a Tiger Conservation Landscape (TCL) that currently has confirmed or likely reports of tiger in a designated protected area, which also has the potential to serve as a Totally Protected Zone (TPZ) within a designated Protected Area

Tiger Conservation Landscape: area where there is sufficient habitat for at least five tigers and where tigers have been confirmed for the last 10 years

LIST OF CONTRIBUTING AGENCIES

- CITES Scientific Authority, Science and Technology Agency, Prime Minister's Office
- Department of Customs, Ministry of Finance
- Department of Forest Inspection, MAF
- Department of Livestock and Fisheries, MAF
- Department of Planning and Investment, Ministry of Planning and Investment
- Department of Planning, MAF
- Division of Forest Resources Conservation, Department of Forestry, MAF
- Faculty of Forestry, National University
- Faculty of Science, National University
- Forest Inventory, Department of Forestry, MAF
- Houaphan Provincial Agriculture and Forestry Office (PAFO)
- International Union for Conservation of Nature – Lao PDR Country Program (IUCN Lao PDR)
- Lao Biodiversity Association
- Luang Pprabang Provincial Agriculture and Forestry Office (PAFO)
- Ministry of Agriculture and Forestry (MAF)
- Muang ThongTiger Farm
- National Protected Areas - 23 representatives
- Phou Bia Mining Company
- The Wildlife Conservation Society-Lao Program (WCS-Lao PDR)
- The World Bank – Lao PDR
- Viengkham District Agriculture and Forestry Office (DAFO), Luang Pprabang province
- Viengthong District Agriculture and Forestry Office (DAFO), Houaphan province
- World Wide Fund for Nature- Lao PDR Program (WWF-Laos)

MINISTER'S MESSAGE

Lao's People Democratic Republic (hereafter Lao PDR), is rich in natural resources. Most notable is that much of the land is still covered by forest – which we literally describe as "green gold". Given its distinctive location at the heart of Indochina, the country contains a wide variety of habitats that support a diversity of fauna and flora, and some of them are rare and endemic to Lao PDR.
The tiger is one of the ecologically important species found in the forest ecosystem of Lao PDR. In the past, tigers were widely distributed in forests throughout the country, and their presence served as an indicator of healthy forests with abundant wildlife populations. Today, tigers across Lao PDR are endangered and on the brink of extinction due to several factors, but the most serious of these are poaching and habitat loss. The potential loss of tiger populations in Lao PDR is an ominous signal that Lao biodiversity, including the nation's forests and wildlife, is also in decline and in danger of being lost.

Can we imagine what a shame it would be if our forests no longer contain tigers? Isn't this the same as if our rivers no longer contain fish?. At first, we may think the simple answers to these questions are that the forest is dispensable, although we also know that thousands of Lao citizens have depended upon on these forests for centuries. Therefore, we, in this generation, need to act now to not let the stripes - that are so powerful, magnificent, and valuable to the forest ecosystem of Lao PDR - become extinct. In national development strategies, the government of Lao PDR emphasizes that the maintenance of healthy and productive forest ecosystems and the sustainable use of natural resources are key to achieving the nation's goals for sustainable economic growth and poverty eradication, and to raise the country out from its least-developed nation status by 2020. These principles are based on the fact that more than 80% of nation's citizens still live in rural areas and depend on biological resources for daily subsistence.

It is a great honor for the government of Lao PDR to work together with all citizens and organizations, including government agencies, the private sector, NGOs, scientists, and local communities to save an endangered species, and also to support management for sustainable use of natural resources to secure the future of the country through sustainable development. Along with this National Tiger Action Plan (NTAP), other important instruments that are already in place to support the NTAP include the national Wildlife Law, the Forestry Law, and several national strategies, including the Biodiversity Strategy and Action Plan, and the Forest Strategy to 2020. However, these instruments mean nothing if they are not implemented effectively. Thus, support and cooperation from all agencies is essential if we are to be successful. The government of Lao PDR is committed to the goal of securing wild tigers and their habitat for future generations. With the development of this National Tiger Action Plan we have taken the first step, and by working together we will achieve our goal for the benefit of our future generations.

Minister of Agriculture and Forestry

MESSAGE FROM THE DIRECTOR OF THE DEPARTMENT OF FORESTRY

Tiger, a flagship of the Asian forest ecosystem, is facing an extremely high risk of extinction in the wild. The global population has currently dropped below 3,500 individuals and occupies only 7% of their historical range. There is a growing concern among conservation communities as well as governments that tigers will be gone within the next few years. In response, the global communities, including Lao PDR, have worked together hand in hand to identify appropriate measures to address the problems, and establish targets to increase tiger numbers. If a powerful and magnificent animal like tiger becomes extinct in the wild, nobody knows what will be happen to this world. However, what we do know at present is that the world is now facing more frequent and extreme natural disasters due to climate change.

Over the past decades, the government of Lao PDR has taken important steps to conserve forests, wildlife and aquatic animals, which is treated as a national property because they provide a wide range of options for national economic activities and growth as well as local livelihoods. In 1993, the National Protected Area (NPA) system was legally established through the Prime Minister's degree No. 164, and there are 21 designated NPAs with a total area of 3.31 million ha, covering 14% of the country's total land area. Other protected areas include 57 provincial protected areas with an area of 932,000 ha (4% of total land area), and 144 district protected areas with an area of 500,000 ha (2% of total land area). This is considered as one of best protected area systems in Asia. After establishment of the NPA system, a series of regulations regarding wildlife protection and PA management were issued to guide how protected areas should be administered. In 2006, the government issued the first Forestry Law, followed by Wildlife Law in 2008. Moreover, the country is a signatory to several international treaties, most notable is the Convention on Biodiversity in 1996, and the Convention on International Trade of Endangered Species (CITES) in 2004.

The National Tiger Action Plan was developed in line with the national strategies for biodiversity and forestry to 2020, emphasizing protection of wildlife and its habitat, particularly tigers, and maintenance of connectivity amongst forest patches throughout the country. The Department of Forestry is a leading government agency with the mandate to ensure that forest resources and biodiversity are managed sustainably and contribute substantially to national development. I, director of the Forestry Department, call for support from all Lao citizens, to work together to ensure that all objectives and measurements identified in this plan are implemented successfully.

Director of Forestry Department

PREFACE

The Division of Forest Resources Conservation is a leading government agency, directly responsible for cooperation and coordination with concerned agencies to secure the management of national protected areas and conservation of aquatic animals and wildlife throughout the country. The tiger is a critically endangered species and legally designated in the list of Category I protected species in the National Wildlife Law. It is a top priority species in need of urgent conservation because it plays a key role in the natural forest ecosystem that contributes significantly to sustainable social, economic, and environmental benefits.

The National Tiger Action Plan was developed according to national principles outlined in the National Biodiversity Strategy to 2020, National Forestry Strategy to 2020, and National Growth and Poverty Eradication Strategy in order to identify appropriate management interventions that support integrated conservation and development to meet national development goals. The Plan was developed in consultation with various stakeholders including both national and local agencies as well as international NGOs who have worked in Lao PDR for many years. All the data on tigers was compiled from the field and interviews using internationally accepted approaches to use as baseline data for designing management objectives. All management interventions in this plan represent inputs or ideas of Lao people in association with national policies. I believe the National Tiger Action Plan will become an important tool to provide guidelines in conserving wildlife and its habitat, particularly tiger populations, and this plan will be successful if we continue working
together to ensure that all activities are implemented.

Buaphan Phanthavong
Director of Division of Forest Resources Conservation
Department of Forestry

ACKNOWLEDGMENTS

We would like to express our sincere thanks to all participants of the National Tiger Action Plan workshop, held in the Department of Forestry from November 31st to December 1st 2010, for their active participation in a series of discussions and for sharing their experience and comments. Outputs from this workshop were compiled and led to development of the National Tiger Action Plan for Lao PDR.

This Tiger Action Plan was made possible by the generous financial support of the Global Tiger Initiative, World Bank, and other in-kind support from the Department of Forestry, Division of Forest Resource Conservation, and the Wildlife Conservation Society-Lao Program. Permission for holding the Tiger Action Plan workshop was granted by the Ministry of Agriculture and Forestry.

Many thanks to those who took part in the facilitation and compilation of the results of discussions held during the workshop, including staff from WCS-Lao PDR and DFRC. Logistic preparation for the workshop was coordinated by staff of the Division of Forest Resource Conservation.

Data on the current status of tigers across the country was compiled from standardized interviews with several wildlife conservation workers including NPA staff, foresters in District Agriculture and Forestry offices, and international NGO staff who are currently involved in field activities in various NPAs. Many thanks to all involved for sharing their knowledge and experience, and for their valuable time to answer our questions by phone.

EXECUTIVE SUMMARY

Within the last 100 years, tigers have rapidly declined in numbers and distribution across their range. Less than 3,500 animals now live in the wild, and occupy only 7% of their historical range across Asia24. Tigers remain today in small isolated and fragmented patches of forest across 14 range countries. However, those small and isolated populations that survive at present are continuingly declining due to direct killing for their body parts, depletion of prey due to overhunting, persecution by angry farmers, and habitat loss and fragmentation.

In Lao PDR, tigers once occurred in most forested areas across the country, but today tigers have disappeared from most places of the country due to the direct killing of tigers, unsustainable over-harvesting of their prey, and loss of habitat. In the last five years, tigers have only been confirmed by camera trap photos and genetic analysis of scats from one location in the country, the Nam Et-Phou Louey National Protected Area, while the persistence of tigers in other parts of the country is provisional from reports of animal signs but the certainty of tiger presence remains unknown.

Despite this decline, the country still contains extensive habitat in several tiger conservation landscapes that could potentially harbor abundant prey populations, which could support viable tiger populations. Unfortunately, the status of the tiger and their prey populations in most of those landscapes remains uncertain. The paucity of information may be due to the fact that tigers have received little conservation attention in the past due to a lack of national capacity and financial support to monitor and manage tiger populations. However, the existing data compiled from field surveys during 1990s, recent research and monitoring in a few national protected areas and anecdotal reports from others suggest that wild tigers may still occur in many parts of Lao PDR, but at very low numbers.

Tigers are adaptable to a wide range of habitats. They can live wherever there is sufficient prey. So, despite the low abundance of tigers in the country at the present time, there are enormous opportunities to make the recovery and conservation of wild tiger populations possible in the Lao PDR. This recovery is possible because; i) the current human population is relatively low (22 people/km2) compared to neighboring tiger range countries, ii) over 47% of land is forested, of which 14% is established as 21 national protected areas that may serve as core source populations for tigers in the wider landscape, iii) major prey species still exist in most NPAs and landscapes, and iv) there are national policies that promote integration between biodiversity conservation and sustainable development, as well as the dissemination of national laws addressing
wildlife protection.

At least eight Tiger Conservation Landscapes (TCLs) were identified throughout the country, and classified into four different classes. Class 1 TCLs have habitat to support at least 100 tigers, evidence of breeding, minimal-moderate levels of threat, and conservation measures are in place. The Class 1 TCLs cover a total area of 45,976 km2, one is in the north east (25,978km2) and another is in the far-south of Laos (19,997 km2). Class 2 TCLs have sufficient habitat for 50 tigers, moderate levels of threat, and a basis for conservation that needs to be improved. A central TCL covers 36,318 km2, and approximately 2,527 km2 in the farsouthwest of the country. Two other classes of TCLs, Class 3 and Potential, have habitat to support some tigers, but have moderate-high levels of threats, and minimal conservation investment. Together, these TCLs cover approximately 40,460 km2.

The primary objective of this National Tiger Action Plan (TAP) is to establish a focused strategy that lays out specific actions to be taken over the next 10 years (2010-2020) toward an overarching vision of securing healthy functioning forest ecosystems where viable tiger populations thrive forever. The overall goal for this plan is to elevate the existing tiger numbers to the level of viable breeding populations at source site, Nam Et-Phou Louey NPA, ensure connectivity between all TCLs, and obtain baseline data on tiger populations for all TCLs in Lao PDR by 2020. The plan was developed in line with existing national policies and legislative structure relevant to wildlife conservation. This framework includes the National Growth and Poverty Eradication Strategy, the National Forest Strategy, National Biodiversity Strategy and Action Plan, and the National Socio-Economic Development Plan, and National Wildlife Law of Lao PDR

The plan identifies seven objectives necessary toward achieving the goal, these include;

1. Increase public awareness and support for the recovery and conservation of wild tigers and their habitats
2. Identify and demarcate totally protected zones (TPZs) in protected areas and corridors for connectivity between TPZs in tiger conservation landscapes.
3. Increase and make effective the enforcement of national regulations and international conventions to stop killing of tigers and to regulate illegal harvest and trade of tiger prey.
4. Increase national cross-sectoral cooperation for the recovery and conservation of wild tigers and their habitats
5. Increase international cooperation to reduce the illegal trade of tiger and prey to neighboring countries
6. Monitor and reduce human-tiger conflict in tiger conservation landscapes
7. Strengthen Protected Area organization, capacity and sustainable financing to effectively implement management activities to reduce threats to tigers and prey at priority source sites in Class 1 and 2 tiger conservation landscapes

The plan describes in detail the actions to be taken at different administrative levels in order to achieve each objective. At priority source sites, actions will mainly aim at reducing direct and indirect threats at sites that harbor tiger populations. At the landscape level, activities will aim at reducing threats occurring beyond the boundary of priority source site (i.e. protected area), which are spread across the landscape. At the national level, actions will focus on national policy or legislation, institutional capacity building, cross-sectoral cooperation and coordination, as well as technical and financial support. The success of this Tiger Action Plan will be possible with cooperation and involvement of all concerned stakeholders and agencies.

This plan will be implemented using an adaptive management approach, where monitoring is used to measure the impact of the interventions on the status of wild tigers, their prey and the threats they face. This approach allows lessons to be learned, and new knowledge and methods to adapt the design and implementation of interventions based on monitoring results. The success of this plan will be assessed by monitoring a measurable indicator of our conservation target, which is tiger occupancy across landscapes and the tiger population size or density in priority areas. The indicator of success will be assessed using sound science-based approaches. For example, capture-recapture analysis using tiger photos from camera traps or fecal DNA from tiger scat. In addition, tiger prey occupancy will be also used to determine the distribution and proportion of the habitat that is occupied prey species. An increase in the measurable indicator of tiger and prey abundance and distribution indicates the efficacy of conservation actions. To measure the achievement and effectiveness of conservation actions towards the objectives, we will use MIST (Management Information System) to evaluate if the conservation actions being implemented are effective at reducing key threats to wild tigers, their prey and habitats.

PART 1

STATUS OF TIGERS AND THEIR CONSERVATION IN LAO PDR

1. TIGER NATURAL HISTORY AND SIGNIFICANCE

1.1 Why conserve tigers?

Tiger is the largest mammalian predator in Asian tropical ecological systems. In their role as top predator, tigers serve as a flagship of Lao ecosystems. The presence of viable populations of top predators is indicative of the integrity of entire ecosystem; if lost it may generate the disruption of food web that affects the structure of ecological community1,2. This means when tigers are removed, prey populations can explode leading to the decline of plant communities on which many species depend. Therefore, protection of the tiger symbolizes the protection of the nation's forest and biodiversity that is important to human well-being in the forms of "ecological services" provided by a healthy ecosystem.

Biodiversity, in addition to providing for food, fuel, shelter, medicine and livelihoods, provides the critical 'ecosystem services' on which socioeconomic development depends. These services include air and water purification, soil conservation, disease control, and reduced vulnerability to natural disasters such as floods, droughts, landslides and pest epidemics3. Biodiversity loss exacerbates poverty, and likewise, poverty is a major threat to biodiversity. So poverty reduction will only be achieved with the maintenance of the nation's biodiversity.

Unfortunately, tigers are in rapid decline throughout the forests of Laos; to reverse the declining trend of tigers is an obligation of Lao citizens. The Law on Aquatics and Wildlife states clearly that tigers are protected so hunting and trading in tigers/tiger parts is banned. As a signatory to the international Convention on International Trade in Endangered Species (CITES), the government of Lao PDR is committed to work with the international community to prevent the illegal trade of tigers.

1.2 Status of tigers at global, regional and national level

Tigers (Panthera tigris), once widely distributed across Asia, today have rapidly declined in number and distribution (Figure 1). They are listed globally as "critically endangered" throughout their range4. They are restricted to small and isolated remnant forest patches covering only 7% of their historical range and their population status is uncertain across this distributional range (Figure 2). Of the eight tiger subspecies, three of them have been driven to extinction. They include the Caspian (P.t. virgata), the Bali (P.t. balica), and the Javan (P.t. sondaica). The Indochinese tiger (P.t. corbetti), was once widely distributed across Indochina, namely Laos, Vietnam, Cambodia, Thailand, Malaysia and Myanmar. The most well-known factors driving the decline of the current tiger population worldwide include direct poaching of tigers for commercial trade, depletion of prey due to over-hunting by humans, and habitat loss and fragmentation resulting from human land-use practices, and tigerhuman conflict.

1.3 Natural history

1.3.1 Description

Tiger is the world's largest cat and is a specialized predator that preys on ungulates – any animal with hooves such as bovids (wild cattle), deer, pigs and serow. Tigers have black stripes with the background coloration of reddish orange to reddish ochre and white under parts. The pelage of tropical tigers seems to be darker than those that occur in temperate habitat. The largest adult tigers weighing up to 300 kg are recorded in Far East Russia with the smallest adult tigers weighing about 140 kg in peninsular Malaysia and Indonesia. Tigers are greatly adaptable to a wide range of habitat types, even in altered landscape. The only prerequisites for survival of tigers are sufficient prey, plant cover, and water. Tigers live wherever there is an adequate supply of prey, and preferably large prey
species7,8.

1.3.2 Reproductive capability

A tigress comes into heat at intervals of around 3 to 9 weeks, and is receptive for about 3 to 6 days within that period. Gestation is short, only 103 days, and a litter usually has a range of 2 to 5 cubs. In nature, a tigress produces a new litter only after her young have

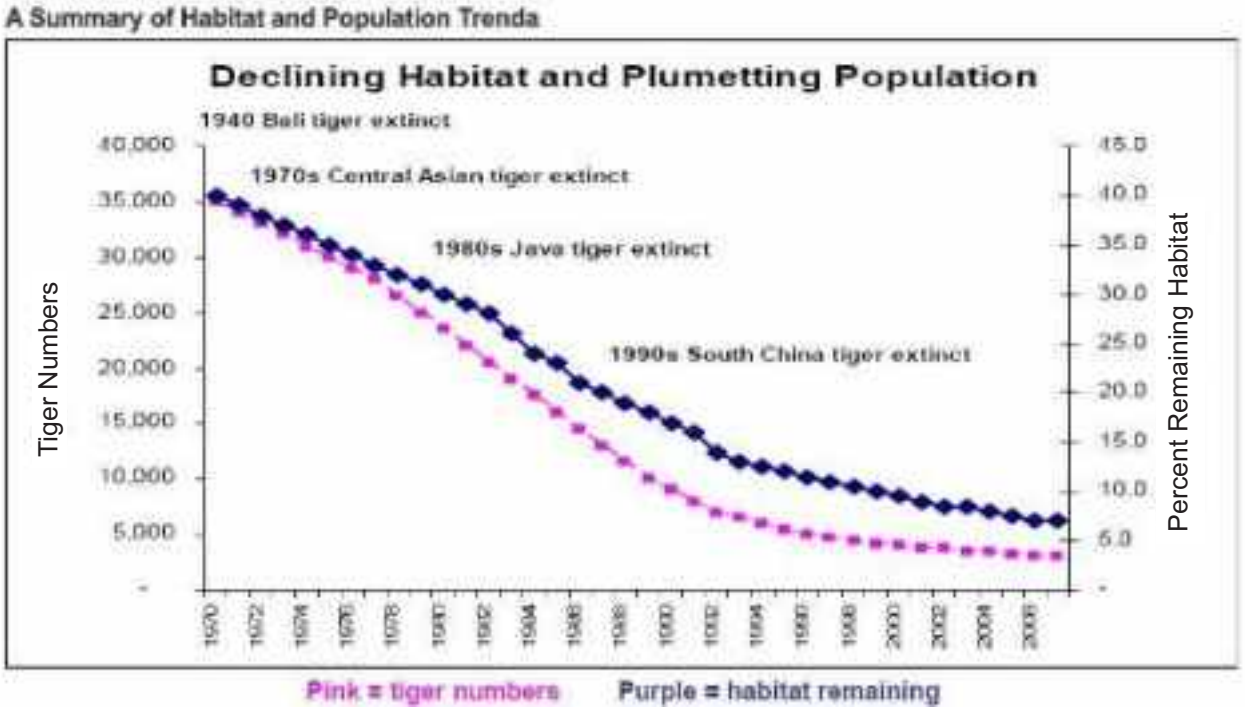

Figure 1. Trend in population status of tigers and habitat throughout its range (Source: Damania et al. 2008, www.wds.worldbank.org)

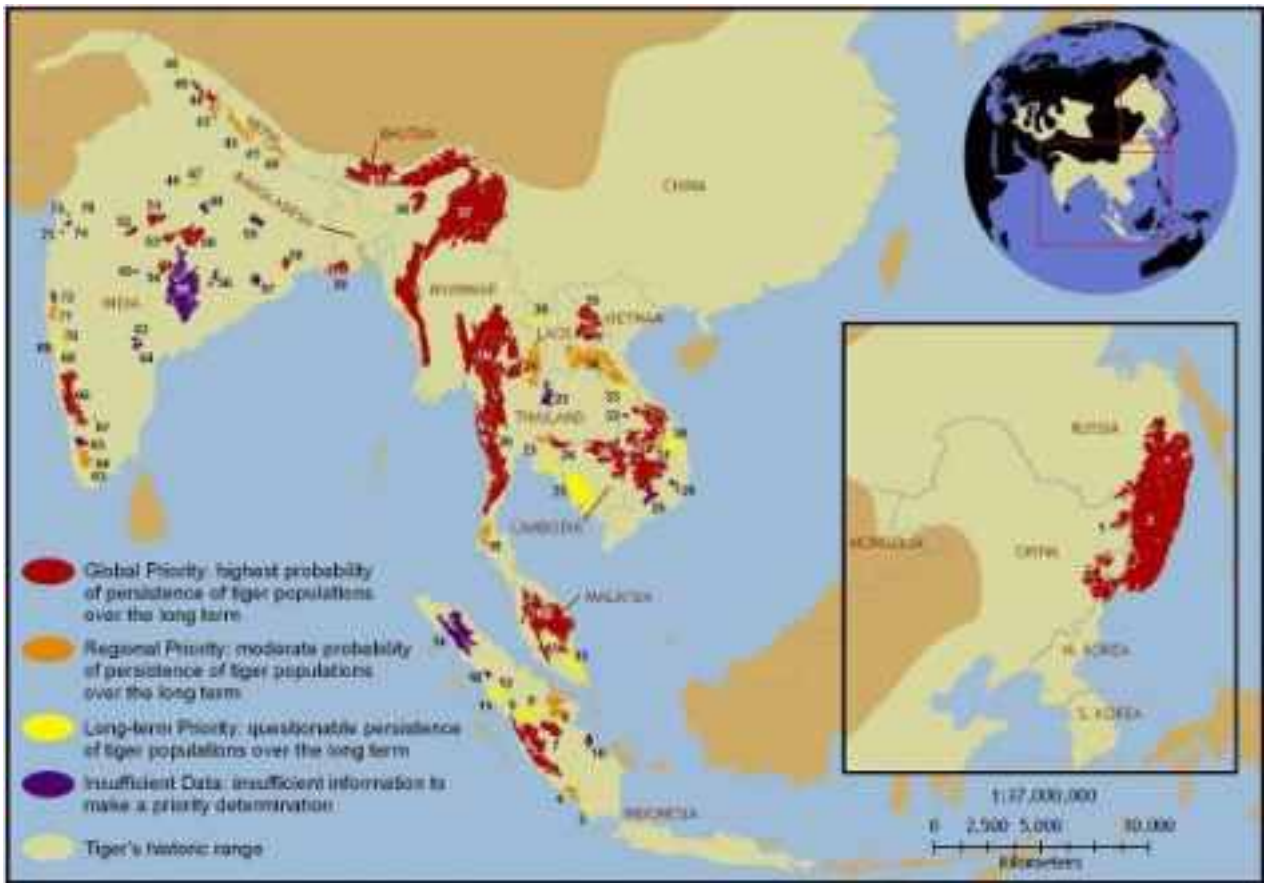

Figure 2. Map showing historical and current geographical distribution of tigers, and priority areas for tiger conservation. (Source: Dinerstein et al. 2006, www.savethetigerfund.org)

all dispersed, usually after 18-20 months. However, if a litter was lost after birth, the interval between litters is only 7-8 months. Females breed relatively early at about 3 years of age, whereas males breed at about 4 years of age. Reproductive lifespan is about 6 years for females and only 3 years for males in nature. Based on their high fecundity, tigers are able to recover rapidly from substantial losses in many places as long as the habitat and prey population remain intact9.

1.3.3 Feeding ecology

Tigers are a top predator in the ecosystem so almost any terrestrial vertebrates are potential prey for this animal. However, in order to survive and reproduce tigers need large prey to meet their energetic requirements10. Large ungulates, such as cervids (deer), make up nearly 75% of the biomass contribution to tiger diets in most parts of tiger range9. So, the depletion of large prey species is a critical threat to the long-term persistence of tigers10. A tigress consumes 5-6 kg of meat per day on average, which translates to 1,760 to 2,112 kg per year. If a mother with cubs, it would need 50% more food9. So to survive, an individual tiger needs to feed on a deer-sized prey approximately every week, consuming about 50 animals per year (Figure 3). Tigers crop about 10% of available prey base, which generally corresponds to the rate at which the prey population grows. Therefore, a total prey population of 500 deer-sized animals is needed to produce the 50 deer that a single tiger must consume annually to survive 12 (Figure 3).

In Laos, large prey (i.e. bovids and cervids) have been heavily hunted; muntjac and wild pig are now probably the key prey13. In the present situation, tigers are likely approaching to a hypothetical 'muntjac-only scenario', where small prey (<25kg) make up the majority of the tiger diet (Sunquist 1999). If this is the case, a tigress needs to kill one 20-kg muntjac every 2-3 days or 183-365 muntjacs/year. If feeding on wild pig only, an average male (120kg) and female (100kg), a tiger would consume annually at least 87 and 104 wild pigs respectively. Thus, the muntjac and wild pig population at a site would need to be several times larger than this to produce sufficient prey for a single individual tiger.

Figure 3. Tiger needs to feed on a deer-sized prey approximately every week, consuming about 50 animals per year. Tigers crop about 10% of available prey base, which generally correspond to the rate at which the prey population grows. Therefore, a prey population of 500 deer-sized animals is needed to support a single tiger (Source: Karanth and Nichols 2002)

1.3.4 Home range and territory

Tigers are solitary outside of the mating season, and when young are fully dependent on their mothers14. In order to meet their requisites or ecological requirements (i.e. food, water, and cover) tigers roam a large area that encompasses a wide range of habitat types or ecosystems. A male's home range is greater than the female, overlapping with several
female territories (Figure 4). However, the size of territories or home range of tigers varies greatly with prey density. For example, a typical home range size for resident breeding females in prime areas in Nepal and India ranges in size from 10 to 15 km2 where they support prey densities of around 25-50 ungulates per km2 14,15, whereas in the Russian Far East that supports prey densities less than 5 ungulates per km2, female tigers have territories that range in size from 200 to 400 km2 16.

Tigers move around within their home ranges for three main reasons; hunting, maintaining social communication with other tigers and avoiding the enemy they fear – i.e. man. Daily movement distance varies considerably with prey abundance. If prey is abundant, they move over short distances as probabilities of encountering prey are high. For example, in Chitawan National Park in Nepal, tigers move only 2-11 km as prey densities are high with 68 ungulates/km2 15,17. If prey is scarce, tigers may travel for several kilometers. This is likely the case for tigers in much of Laos today. In these cases, tigers may travel far beyond the protected area boundaries, which can lead to tiger-human conflict, mainly due to

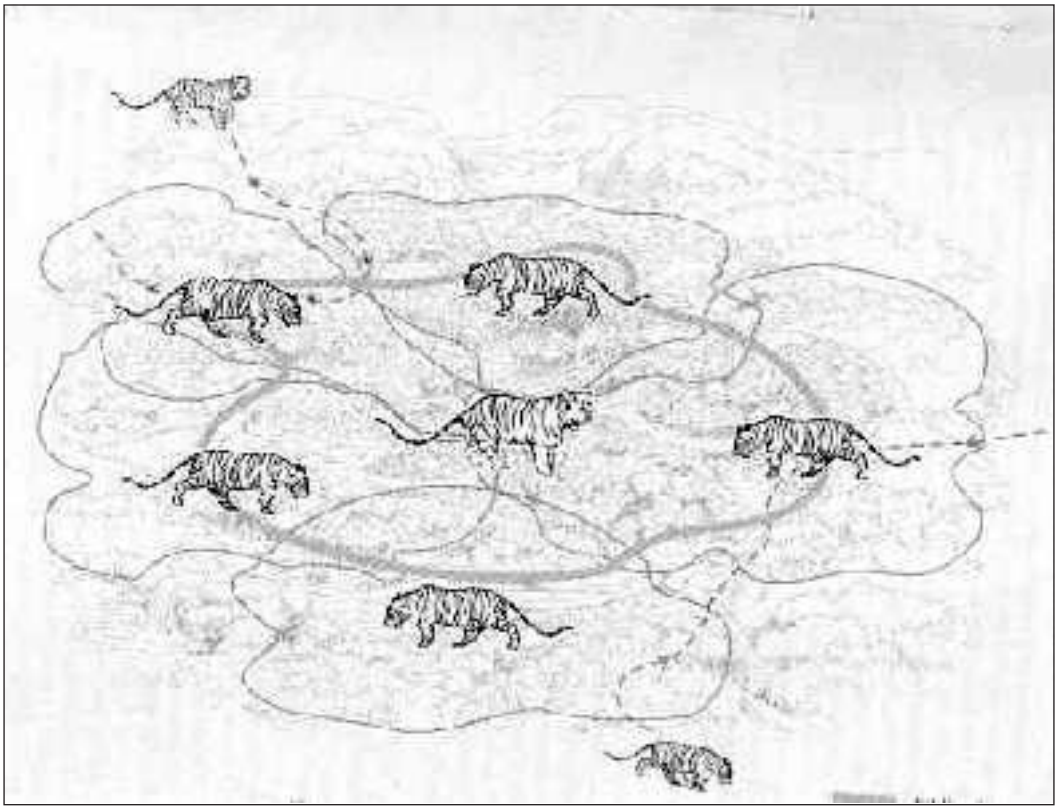

Figure 4. A male's home range is greater than the female, overlapping with several female territories (Source: Karanth and Nichols 2002).

tiger depredation of livestock or direct confrontation with humans18. If problems occur, tigers are often killed by humans in a revenge of loss of their property.

1.3.5 Population density and prey

Prey abundance is a critical determinant of tiger numbers. Tiger population densities are strongly correlated with prey densities. For example, in Kaziranga National Park in India with high prey densities of 68 animals per km2, and associated biomass of 5,200 kg per km2, tiger density is 17 tigers per 100 km2 19. At Sikhote Alin Zapovednik Reserve in Russia where ungulate biomass is lower than 500 kg per km2, tiger density is less than 1 tiger per 100 km2. The situation in Russia is similar to tropical habitats such as Lao PDR where large prey has been heavily hunted out. For example, in Malaysia tiger density ranged from 1.1 to 1.9 tigers/km2 with the estimated prey biomass of 270 to 430 kg/km2 20. In the Nam Et-Phou Louey National Protected Area in Laos, the estimated density of tigers was 0.2 to 0.7 tigers/100 km2 and the crude estimate of prey was about 3.25 ungulates/km2, of which muntjac and wild pig were the most common while detections of sambar and gaur were much lower13.

2. TRENDS IN TIGER DISTRIBUTION AND POPULATIONS IN LAO PDR

2.1 Past records (to 2005)

2.1.1 Sources of data and methods for past records

Historical records of tigers before 2005 were mainly derived from existing reports for the following periods of time:

1988-1993. Salter 199321 analyzed village questionnaire data on wildlife distribution gathered between 1988-1993.

1932-1998. Duckworth and Hedges 199822 assessed the status of tigers in Laos by reviewing five sources of data, which included published papers from 1932 to 1998, wildlife survey reports, reports of other surveys, media articles and personal communication.

1991-1998. Duckworth, Khounboline and Salter 199923.provided a baseline on the status of tigers in Laos by summarizing data compiled from field surveys for large mammals for periods exceeding a

week during 1991-1998 in 32 different areas of the country.

2003-2004. Johnson, Vongkhamheng et al., 200613 used camera traps set in five 100 km2 sampling blocks across NEPL NPA from 2003 to 2004. Each 100 km2 sampling block divided into 25 4-km2 grid cells, in which a pair of cameras was placed to photograph both sides of individual tigers in optimal locations. Cameras were mounted on trees at 45 cm and set to operate for 24 hours per day and left in the forest for over 30 days. The software program "CAPTURE" was used to generate tiger density estimate as tigers could be identified to individual tigers by their distinct stripes. As prey could not be identified to individuals by their markings, index of prey abundance was used, i.e. number of photos per 100 camera trap days (CTD). CTD was calculated from the time the camera was mounted until the date of the final photo for a total effort of 3,588 total CTD.

1995-2005. Dinerstein et al. 20066 delineated tiger conservation landscapes based on tiger records from 1995-2005, current forest cover, and human influence.

2.1.2 Results from past records (see Appendix 4 showing locations of NPAs in Lao PDR)

1988-1993. Salter21 reported tigers present in 87% of interviews (n=328) spread across 18 NPAs of Laos.

1932-1998. Duckworth and Hedges22 mapped 64 tiger records spread over the country, of which only 21 were confirmed records based on sightings or remains of tigers. Based on tiger data and habitat availability

they suggested only five areas that showed particular potential for harboring viable tiger populations. These areas were:

i) Northern Laos including three non-contiguous areas: Nam Et-Phou Louey NPAs, Nam Kan NPA and Nam Phoun NPA
ii) Central Laos in the Nam Theun basin including the contiguous area between Nakai-Nam Theun (including Nakai Plateau), Nam Kading, Khammouan Limestone and Hin Namno NPAs.
iii) Southern Laos including the contiguous area on the slopes of the Bolaven Plateau between Xe Pian, Dong Hua Sao and Don Ampham NPAs, Xe Khampho and Nam Kong PPAs and the Xe Kong basin.

1991-1998. Duckworth et al. (1999) 23 reported tiger as present in 18 of 32 areas surveyed during 1991-1998, however it was thought that their population densities were at low numbers . These areas were:

i) Northern Laos from five of the 11 areas surveyed, which were Nam Et-Phou Louey, Nam Ha, Nam Phoun, and Nam Theun Extension
ii) Central Laos from five of the seven areas surveyed, which were Nakai-Nam Theun including Nakai Plateau and the Nam Theun Corridor, Hin Nam Nor and Phou Xang He, and
iii) Southern Laos from eight of the 14 areas surveyed, which were Xe Bang Nouan, Dakchung Plateau, Phou Xieng Thong, Don Amphan, Nam Kong, Dong Huasao, Xe Piane and Dong Khanthung.

Provisional records were noted for another six areas including Nam Xam, Phou Khao Khoay and Nam Kading NPAs in northern Laos and Xe Sap, Phou Khathong and Bolaven Plateau in southern Laos.

2003-2004. The camera trap surveys in NEPL NPA 13 found that the NPA supported a small viable tiger population with an estimated density of 0.2 to 0.7 tigers per 100 km2 and a population estimate ranging from a minimum of 7 to as many as 23 tigers in the sampled area. An index of prey abundance ranged from 0.08 independent photos (IP) per 100 CTD for gaur, 0.25 IP per 100 CTD for sambar, 0.27 IP per 100 CTD for serow, 0.40 IP per 100 CTD for wild pig, and 2.77 IP per 100 CTD for muntjacs.

1995-2005. Dinerstein et al. (2006) 6 mapped approximately 175 tiger point locations recorded from 1995-2005 in Laos, which included no records of evidence of breeding (see map Appendix 1).

From these records combined with recent land cover and human influence data, the following areas of priority for tiger conservation and surveys in Laos were identified:

Class 1 Landscapes(1)(see maps Appendices 2 and 4):

(TCL#35) Northeastern Laos including areas within and adjoining the Nam Et-Phou Loeuy and Nam Xam NPAs, and extending into northern Vietnam.

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(1) Class 1 landscapes have habitat to support at least 100 tigers, evidence of breeding, minimalmoderate levels of threat, and conservation measures are in place. [24]

(TCL#27) Southern Laos including the areas within and adjoining Dong Huasao, Xe Piene, Dong Amphan, Xe Sap and Dong Phouvieng NPAs and the Xe Khampho, Bolvan Southwest and Phou Khathong PPAs. This area adjoins contiguous habitat in central Vietnam and northeastern Cambodia.

Class 2 Landscapes(2) (see maps Appendices 2 and 4):

(TCL#34) Central Laos in the Nam Theun basin including the areas within and adjoining Nakai-Nam Theun, Nam Kading, and Phou Khao Khouay, Khammuoan Limestone NPAs and Phou Chom Voy PPA and the Nam
Chouan and Nam Ngeum Watershed Management Areas.

(TCL#26) Dong Khanthung PPA with adjoining areas in northern Cambodia and southwestern Thailand.

Class 3 and Potential Landscapes(3) (see maps Appendices 2, 3 and 4)
(TCL#33) Areas within and adjoining Hin Nam Nor NPA

- Also areas west of Phou Xang He NPA including the following PPAs: Phou Sor to the northwest, Xenoy-Xaba to the northeast, and Laving-Laveung to the east.

(TCL#36) Areas within and adjoining the Nam Ha and Nam Kan NPAs Areas within and adjoining Nam Phoun and Phou Phanang NPAs Areas within Phou Den Din NPA Areas within and adjoining Xe Bangnouan and Phou Xiengthong NPAs

2.2 Current records (2005-present)

2.2.1 Sources of data for current records

Current records of tigers in Lao PDR, after 2005, are compiled from two sources:

I) Results of field research projects and,

[2] Class 2 landscapes have sufficient habitat for 50 tigers, moderate levels of threat, and a basis for conservation that needs to be improved. [24]

[3] Class 3 landscapes have habitat to support some tigers, but with moderate-high levels of threat, and minimal conservation investment. In this document, potential landscapes include both "survey priority landscapes" that are large areas of potential habitat under low human impact where tiger status is unknown (or that have not been surveyed since 1995) and "restoration landscapes" that are similarly large areas of potential habitat under low human impact but where survey efforts since 1995 have not revealed evidence of tigers. [24]

ii) Standardized interviews conducted in September 2009 with local wildlife conservation workers including protected area staff, foresters, and/or NGO staff who have worked or have experience in particular areas for at least two years. Pre-prepared data forms were faxed or e-mailed to those concerned people and then followed up by phone calls. The data form included questions about the evidence of:

- tiger signs/sightings with a detailed description of the evidence, location and date,
- tiger human conflict with a description of the human killing or type of livestock killed, description of the evidence for each case, and date,
- threats to tigers including direct killing and date, presence of hunting of prey or habitat loss and description.
- The likelihood that reports represented actual tiger presence were ranked as follows:

Confirmed: tigers were photographed by camera traps or identified by DNA analysis of scats.

Likely: report of tiger killed; track width equal to or greater than 10cm or pad width equal to or greater than 7.5cm.

Possible: report of depredation of adult buffalo or a human killed Uncertain: report of tracks less than 10cm wide or pad less than 7.5cm wide; report of a tiger sighting; report of other signs or depredation of a cow.

2.2.2 Current records: methods and results

Class 1 Landscapes (see map Appendix 4)

(TCL#35) Nam Et-Phou Louey - 25,978 km2

Camera trapping for tigers and prey was conducted from 2004-2006 in 300 km2 of the NPA13 followed by camera trapping for tigers over 800 km2 of the NPA from 2006-2007 (WCS unpublished data). A total of eight individual tigers were detected with camera traps in NEPL NPA from 2003- 2007.

From 2006 to present, DNA extraction from large carnivore scats has been used to estimate a minimum number of tigers in the NPA. Nine individual tigers have been detected from analysis of 124 scats from 2006-2009. One tiger was seen in the NPA by enforcement staff in July 2009. From January-June 2008, prey occupancy surveys were conducted in the NPA core zone49. The 2600 km2 area was divided into 3.25 km2 sub-grids based on biological information on home range of large ungulates. Teams walked approximately 3-6 km within each sub-grid to record presence/absence of ungulate signs every 300 meters. The survey found an estimated prey abundance of 3.25 ungulates per km2 in the core zone, of which muntjac and wild pig were the most common, with much less detection of serow, sambar and gaur.

From January – June 2009, standardized surveys of local experts across 100-300km2 grids and modern occupancy modeling was used to estimate the current occurrence and distribution of tigers and prey in a 30,000 km2 landscape around the NEPL NPA (C. Vongkhamheng, unpublished data). The survey recorded reports of tiger presence within the past year in 70% of the grids across the 30,000 km2 landscape. Most detections occurred inside and adjoining NPAs (NEPL and NXM). Habitat occupancy estimates ranged from 70% for gaur (SE = 0.05), 96% for Sambar deer (SE = 0.02) and up to 100% occupancy for muntjac, wild pig and serow. The probability of occurrence for muntjac, wild pig, and serow were more widely distributed than for gaur and sambar across the landscape.

(TCL#27) Southern Laos - 19,996 km2

Questionnaire surveys for tigers and prey were conducted in 35 villages across Xe Pian NPA using grid-based sampling approach, by dividing the NPA into 14-300km2 grid cells25. Approximately 70% of the 14 grid cells surveyed were reportedly occupied by tigers in the past five years. Of those, 25% of respondents (n=105) reported sightings of tigers, and 53% of respondents reported signs of tigers.

Tracks (13x14 cm) were reported in Dong Huasao on November 2006 and January 2007 (Table 1). Tracks (13x15 cm) were reported from July 2007 in the vicinity of Ban Angor. Tracks and scrapes were found in Phoulan (UTM 691786 1765413) and at Houy Kata (UTM 688826 1766165), Ta Oy district in Xe Sap NPA. Tracks of an adult tiger with cubs were reported in Dong Ampham NPA near Xekhaman hydropower on 7 September 2009 and another report from Huay Chingling in April 2009 (Table 1).

Class 2 Landscapes (see map Appendix 4)

(TCL#34) Central Laos – 36,317 km2

Nam Kading NPA: From 2007-2009, ground dwelling mammals were monitored at a total of 200 camera trap points at a spacing of one camera point per 2 km2 across 400 km2 of the 1,600 km2 NK NPA for a total effort of 6,357 camera trap days. The surveys detected no tigers (WCS / IEWMP; in prep.). Although large cat tracks are reported by NPA staff, it remains uncertain if these are from tiger. Prey including gaur, sambar, serow, wild pig and muntjac were recorded by camera traps but overall abundance is low.

Nakai-Nam Theun NPA: From 2006-2008, ground dwelling mammals were monitored at a total of 300 camera trap points at a spacing of one camera point per 2 km2 across 600 km2 (three blocks of 200 km2 each) in the 3,532 km2 NNT NPA for a total effort of 11,870 camera trap days32, 48. The cameras recorded no tigers and a relatively low level of large prey.

Khammouane Limestone NPA: Tracks (10x11 cm) and cattle depredation by tiger were recorded on 3 August, 2006 by NPA staff (Table 1).

Nam Ngeum watershed management area: Tracks of tiger were reported from southern Xiengkhuang province, at Phoun, Xaisomboun and Thathom districts in 2009 during the NEPL NPA landscape survey (J. Vongkhamheng pers. com.)

(TCL#26) Dong Khanthung – 2,526 km2

No reports have been received from this area since 2005.

Class 3 Landscapes (see map Appendix 4)

(TCL#33) Areas within and adjoining Hin Nam Nor NPA –7,477 km2

Tracks (10x12 cm) and a buffalo carcass suspected of being killed by tiger were found on 25 August 2009 in the vicinity of Ban Nong Buao or near Phou Chuang (17o30′09″ N 105o54′33″ E) (Table 1). The area is located in the corridor between Hin Nam Nor and Nakai Nam Theun NPAs. Also a track (13x15 cm) was reported by NPA staff on 7 September 2009 in the vicinity of Ban Napao.

Areas west and north of Phou Xanghe NPA including Dong Phousor and Xenoi-Xeba, and Lavin-Laveun: Tracks (~11x12 cm) were recorded on May 2005 in the

vicinity of Ban Doune, and a buffalo kill was reported during the dry season of 2007 in Phou Xenghe NPA (Table 1). Other reports of tracks were received from Lavin-Laveun PPA in 2009 near Xepone district

(TCL#36) Areas within and adjoining the Nam Ha and Nam Kan NPAs – 7,315 km2

Nam Ha NPA: Felid tracks were encountered by NPA staff, one (9x10 cm) on 16 August 2009 in the vicinity of Ban Nam Muay, Sing district, and another (10x11 cm) was reported in August 2008 in the vicinity of Ban Hatlieng, Luang Namtha district. Two cows were reportedly killed by tiger in these two villages in June 2007 and October 2008, respectively (Table 1). One large buffalo was reportedly killed by tiger in 2007 near UTM 755787, 2306957 in Luang Namtha district.

Nam Kan NPA: Tracks (10x11 cm) were found on 14 February 2007 by NPA staff in the vicinity of Ban Toop Phouvieng district (Table 1). Other recent reports of large cat tracks are from Chomsy, Nam Laem, Nam Touk, Nam Lin (Table 1).

Potential Landscapes (see map Appendix 4)

(TCL #32) Areas within and adjoining the Xe Bang Nouan and Phou Xiengthong NPAs – 6,948 km2

Tracks (12x13 cm) were recorded on June 2007 in the vicinity of Ban Naxan and Nalan, Vapi district, Saravan province (Table 1). A buffalo and a cow were reportedly killed by tiger on December 2008. Tracks (11x12 cm) were recorded at Phou Xiengthong NPA on June 2007. A report of tiger depredation of a buffalo and cow in the vicinity of Ban Thongphathongxai, Khong district, Saravan province occurred in December 2008.

Areas within and adjoining Nam Phoun and Phou Phanang NPAs – 14,139 km2

Tracks (11x12 cm) were recorded on 27 September 2008 in Navan village, Phieng district (Table 1). Also, a buffalo and cow were reportedly killed by tiger in the same area in the same year. No tigers are reported at present in Phou Phanang NPA.

Areas within Phou Den Din NPA – 4,581 km2

Tracks (10x11 cm) were recorded on 1 June 2008 in the vicinity of Ban Hath Hin (Table 1).

2.3 Trends in tigers across Laos

Although tigers reportedly still occur in several landscapes at present, since 2005 tigers are confirmed from only one protected area (NEPL NPA) with likely evidence of their presence reported from thirteen other protected areas (Table 1). In the remaining areas, the presence of tiger is uncertain or absent. Given this information, tiger abundance appears be declining throughout Laos and they may now be extirpated in some areas based on the following evidence:

Rarity of sightings of tigers in the forest. Out of 35 interviews with people working in landscapes in Laos, there were only 8 reports of sightings of tigers since 2005.

Rarity of camera-trap photos of tigers in key areas surveyed since 2005. In Nakai Nam Theun NPA where sightings of tigers were once regularly reported by field workers during 1990s23, no tigers have been photographed since 2006 despite extensive camera trap surveys (11,870 CTD). Likewise, in Nam Et-Phou Louey NPA, camera trap surveys for tigers over a three-year period from 2005- 2007 photographed only four different individuals over 5,979 CTD of survey effort (WCS unpublished survey data).

Although tigers are protected by law, direct poaching of tigers has reportedly occurred in several protected areas throughout Laos since 2003 (Table 2). The number of tigers reported killed, as shown in Table 2, are only those that local authorities have strong evidence of. The number of actual kills across the country is uncertain. This is a concern given that scientific studies show clearly that a small population of about 30 individual tigers may become extinct within 15 years with only a 2% kill rate a year. Only a larger population of over 70 tigers could potentially sustain a loss of 10% a year or more5. So, based on the known number of tiger killed in each NPA or landscape, and if the trend still continues, it appears that tigers in Laos are presently vulnerable to extirpation.

3. THREATS TO TIGERS IN LAO PDR

3.1 Direct killing of tigers

3.1.1 Poaching of tigers for trade

Although tigers are a legally protected species in Laos, they are poached with a variety of methods including snares, poison, and explosives across Laos. This is because of the high demand for tiger parts in

Table 1. Reports of tigers since 2005 from protected areas across Laos based on photographs (PHO) or DNA analysis of scat samples (DNA) or from interviews (n=35) reporting observations or reports of tracks (TG,TL) or other sign (SN), sightings (RS), evidence of large livestock depredation (BD, CD), of tigers killed (TK) or humans killed (HK).

No	TCL	Name of Protected Area	2005 to present2 (level of confidence)					Sources
			Prior to 2005[1]	Confirmed	Likely	Possible	Uncertain	
I.		**Class 1 Landscapes**						
1.	**35**	Nam Et-Phou Louey NPA	X	PHO,DNA	TK,TG	BD	TL,RS,SN,CD	NPA staff/WCS staff, camera traps, scat DNA
2.	35	Nam Xam NPA	?	-	TK	-	-	NPA staff/village survey
3	27	Dong Phouvieng NPA		-	-	-	-	NPA staff
4	27	Xe Sap NPA	?	-	TK	-	SN,CD	NPA staff, IUCN staff
5	27	Dong Huasao NPA	X	-	TG	BD	CD	NPA staff, village reports
6	27	Dong Ampham NPA	X	-	TG	HK	RS	NPA staff/WWF staff
7	27	Xe Piane NPA	X	-	-	-	TL,RS,SN	NPA staff/WWF report
8	27	Nam Kong PPA	X	-	-	-	SN	IUCN staff
9	27	HHW/Xe Khamphor		-	-	-	SN	IUCN staff
10	27	Dak Cheung plateau	X	-	-	-	-	
11	27	Phou Kathong PNBCA	?	-	-	-	-	
II.		**Class 2 Landscapes**						
12	34	Phou Khao Khouay NPA	?	-	-	-	-	NPA staff
13	34	Nam Kading NPA	?	-	-	-	TL,SN	NPA staff/camera traps
14	34	Nakai-Nam Theun NPA	X	-	TG	BD	RS,SN	NPA staff/camera traps
15	34	Khammouan Limestone \NPA	?	-	-	-	TL,SN	NPA staff
16	34	Phou Chomvoy PPA		-	-	-	-	
17	34	Upper Nam Ngem		-	-	-	SN	WCS staff

No	TCL	Name of Protected Area	2005 to present[2] (level of confidence)					Sources
			Prior to 2005[1]	Confirmed	Likely	Possible	Uncertain	
		Watershed						
18	34	Upper Nam Chouan Watershed		-	-	-	SN	WCS staff
19	34	Special Zone (Xaysomboun)		-	-	-	SN	WCS staff
20	26	Dong Khanthoung	X	-	-	-	-	
III.		**Class 3 Landscapes**						
21	36	Nam Ha NPA	X	-	TK,TG	BD	RS,CD	NPA staff
22	36	Nam Kan NPA	X	-	TK,TG	BD, HK	CD	NPA/DAFO staff
23	33	Hin Nam Nor NPA	X	-	TG	BD	RS	NPA /IUCN staff
24	33	Phou Xanghe NPA	X	-	TG	BD	TL,SN	NPA staff
25	33	Lavin-Laveun PPA		-	-	-	SN	Outhai (pers. com)
IV.		**Potential Landscapes**						
26	32	Xe Bangnouan NPA	X	-	TG,TK	BD	CD	NPA staff
27	32	Phou Xiengthong NPA	X	-	TG	BD	CD	NPA staff
28	-	Nam Phoun (Poui) NPA	X	-	TG,TK	BD	TL,CD	NPA, DAFO staff
29	-	Phou Phanang NPA	?	-	-	-	-	NPA staff
30	-	Phou Dendin NPA	?	-	TK	-	TL,CD	NPA staff

[1]Records prior to 2005 from Duckworth & Hedges (1998): ? - tiger presence based on provisional report, x - tiger presence based on signs, sighting

[2]Degree of confidence of tiger report from 2005 to present:
Confirmed: tigers were photographed by camera traps(PHO) or identified by DNA analysis of scats(DNA)
Likely: report of tiger killed(TK); tracks >10 cm wide or pad >7.5 cm wide(TG)
Possible: report of depredation of adult buffalo(BD) or a human killed (HK)
Uncertain: reports of cat tracks <10cm wide, pad<7.5cm wide(TL); report of sighting(RS); report of signs(SN) or cow depredation(CD)

Table 2. Reports of tiger poaching from NPAs since 2003.

No	NPAs	# tiger killed	Date(s)	Source
1	Phou Den Din	2	Apr-06/July-07	NPA staff
2	Nam Ha	3	Dec-05/Apr-07	NPA staff
3	Nam Et-Phou Louey	17	Jan-03 to Oct-09	NPA staff
4	Nam Xam	1	Mar-08	NPA staff
5	Nam Phui	1	9-May-05	DAFO of Phieng district
6	Xe Bang Nouan	1	Dec-08	DAFO of Khong district
7	Xe Sap	1	Dec-08	DAFO of Ta Oy district
8	Nam Kan	2	Jun-05/Nov-05	NPA staff

international markets for traditional medicines associated with the weak protected area management in Laos. The current estimated price of a tiger ranges from US$ 10,000 up to US$ 70,000 5,28. In NEPL, tiger bones sold for up to US$ 11,528 in 200413. Tiger parts, such as skins, teeth, bones and others, were one of the most-traded wildlife items in recorded in Lao PDR during the 1990s[26].

Since 2003, poaching of tigers for trade is reported in several NPAs (Table 2). For example, more than 15 tigers have been killed since 2003 in Nam Et-Phou Louey, two tigers were reportedly killed near Bor Keo-Luang Nam Tha provincial boundary in June 2005, two were killed in Nam Ha NPA on October 2007, and one tiger killed in Nam Xam in April 2008.

A tiger farm was established in Laos in 2002, with the first 20 breeding individuals originating from Taiwan. Now, the farmer claims there are 254 individual tigers in the farm and they will be ready for export in the near future27. Although the direct impacts of this tiger farm on wild tigers in Laos is uncertain, the potential threat to wild tigers caused by tiger farms is very high. It is well-known worldwide that the legalizing trade in farmed tiger products allows smugglers to exploit the loophole and take opportunities to sell wild tiger products. This problem occurs because there is no way to distinguish between parts of tigers from the farm and those from the wild, which makes law enforcement difficult.

From an economic perspective, the price of a wild tiger ranges from US$10,000 to US$70,000 in international markets28, and approximately US$11,528 on local markets in northern Laos13. The high price is because customers perceive wild products to be more effective than the farmed ones and thus prefer the wild products over the farmed29. In a simple cost analysis of wild versus farmed tigers parts, the cost of raising a tiger to adulthood in captivity is at least US$ 4,000 (range from US$ 4000 to US$ 10,000) and as little as US$15-25 for a bullet to poach a wild tiger. Despite the cost of transportation and an occasional loss due to confiscation by authorities, it is a lucrative trade. This discrepancy provides substantial economic incentive for poachers and smugglers to undercut farmers in any legal markets despite the risks associated with being caught and penalized30. In short, tiger farms don't support wild tiger conservation even though farmers often claim that farms are a solution to wild tiger conservation arguing that the legally-supplied captive-bred tiger parts and products in markets would undercut the illegal supply from tiger poachers. Some argue that tiger farmers have no interest in wild tiger conservation. If wild tigers do go extinct, farm investors stand to gain an economic advantage as they can control the supply of tiger parts for the global market30.

3.1.2 Killing of tigers as the result of human-tiger conflict

Livestock depredation. Killing of tigers in revenge due to livestock loss has been recorded in many rural areas throughout Laos. About 43.8% of village interviews across Laos during 1988 to 1993 (n=317) reported livestock depredation by tigers, but the proportion of reports truly referring to tigers is unclear23. For example, one tiger was shot in Phou Khoun on the Luangphrabang/Vientiane province border in December 1998. Another was shot in Nam Et-Phou Louey on 18 December 1997 with the permission from Viengthong district authorities.

Of particular concern at the present time, given the high price of tiger parts and the associated negative attitude of humans toward tigers, is that when livestock are killed and tigers are suspected, tigers are targeted by the villagers, resulting in opportunistic killing of more tigers rather than taking revenge. For example, in the Nam Et-Phou Louey NPA, a systematic investigation of human-tiger conflict from 2003-2004 found that tiger poaching was closely tied to cattle grazing with farmers opportunistically using livestock to bait tigers more so than retaliation for livestock attacks13. Contrary to previous predictions that livestock loss was a widespread problem, the study found depredation affected only 12% of NPA villages and a small fraction of the total herd. Given the opportunity to report attacks in return for possible compensation, farmers lagged in both reporting and removing livestock to villages. NEPL farmers were willing to accept livestock loss and encouraged grazing in tiger habitat as it provided opportunities for tiger poaching to offset livestock loss, which was driven by the increasing lucrative trade in tiger bones.

Man-eating. Although tigers have had a bad reputation as man-eaters in many parts of Laos, very few cases have been reported across the country in recent years. For instance, there are only two cases reported prior to 200523 and another other two cases reported after 2005 (WCS unpubl. data). Actually, humans are not the primary or preferred food source for tigers. The occurrence of a human attack is usually in self-defense or protecting their infants, and those man-eaters are usually old, sick or injured8. If an incidence occurs, tigers are typically killed in revenge. An example of a recent incident occurred in August 2005 in Meung district, Bokeo province is the following report: "It started when a group of three men went fishing near Hua Nam Kha village. They heard a wild pig screaming and went to investigate, and saw it was a tiger. The tiger ran off when it saw the men. One of the men had a gun, so the other two waited while one man went after it with the intention to shoot it. He didn't come back and it was getting dark. They went back to the village and led a big search party next morning with many people. They found his gun and then him. All that was left was the head and one leg. There were two sets of paw prints, one animal bigger than the other. They carried the bits back to the temple in Meung township."

3.2 Prey depletion

Hunting of ungulates (i.e. gaur, sambar, serow, wild pig and muntjac) for subsistence has long been practiced by rural residents in Laos. However, the picture began to change when the government of Laos introduced the "new economic mechanism (NEM)" during the late 1980s. Since the opening of free markets and the associated increase in the prices of wildlife on both domestic and international markets, hunting of wildlife for subsistence has become more commercially oriented. Various parts of ungulates including horns, antlers, gall bladders, meat and others were commonly traded domestically, and with Thailand, China, and Vietnam31,26. In recent years, wild meats are still sold in markets and restaurants in several townships across the country despite the fact that it contradicts the National Law on Aquatics and Wildlife.

The decline of ungulate populations in Laos is clearly evident from results of research in protected areas. For example, in Nam Et-Phou Louey NPA, a 2008 study found an ungulate abundance index of approximately 3.25 animals/km2 49. Large prey (>100kg) are extremely low at only 0.02 and 0.31 animal/km2 for gaur and sambar, respectively, whereas muntjac and wild pig are more abundant at 1.38 and 1.36 animals/km2, respectively (C. Vongkhamheng, unpublished data). The results suggest that wild pig and muntjac are probably the principle prey available for tigers in Laos at the present time. Similarly, in Nakai Nam Theun and Nam Kading, the large prey abundance is very low and only muntjac and wild pig are found in moderate abundance32.

3.3 Habitat loss and fragmentation

In Lao PDR, habitat loss and fragmentation is a less urgent threat to tigers than the two major threats of tiger poaching and prey depletion. This is based on the fact that Laos still has over 40% of suitable forest cover and a low human population of about 22 people/km2 at present as compared to neighboring countries (263 people/km2 for Vietnam, 128 people/km2 for Thailand, 80 people/km2 for Cambodia).

However, given the current trend of rapidly increasing human population and associated increases in rates of resource use, habitat loss and fragmentation will become a much more serious problem in the near future if there is poor land-use planning and management. This is because almost two thirds of country is geographically mountainous. Flat land suitable for permanent agricultural fields is found only in Mekong valley on the western side of the country and over 75% of the population is living in rural areas. Forest clearance for shifting cultivation by subsistence farmers is widespread in the upland areas.

Moreover, logging (legal and illegal), cash crop plantations along with the rapid increase in mining and hydropower development as well as transportation corridors across the country is contributing to habitat loss and fragmentation. Land use planning is needed to assure that appropriate habitat with sufficient protection is maintained to allow tigers to safely move within and between tiger conservation landscapes. If corridors are not maintained to connect source populations of tiger, the result will be smaller isolated populations that are genetically depauperate and face an even higher likelihood of human-tiger conflict. This will ultimately lead to extirpation of tigers from these fragments and threaten the long-term survival of tigers across Laos.

4. LEGISLATIVE PROTECTION OF TIGERS IN LAO PDR

The Lao PDR's Constitution (1991) states that "all organizations and citizens must protect the environment and the natural resources including: land, underground minerals, forests, fauna, water sources and the atmosphere" (Article 17)45. Legislative protection of tigers has long been taken into account by the government's decrees and regulations addressing tiger conservation (Table 3). More recently, the law on aquatic and terrestrial wildlife states that tigers and their larger prey species (gaur, banteng, sambar, serow) are listed as protected44. On the 3rd of April, 2007 the Prime Minister also signed an urgent agreement No. 25/PM, to increase effectiveness of forest management throughout the country. This agreement states how the nation's economic development is linked to the country's environmental status. Additionally, Lao is a signatory to several international conventions that support tiger conservation. These conventions enable the government to address problems affecting tiger conservation beyond the national jurisdiction, including the Convention on Biological Diversity (1994) and the Convention on International Trade in Endangered Species of Wild Fauna and Flora since 200443.

5. OPPORTUNITIES AND CONSTRAINTS FOR TIGER CONSERVATION IN LAO PDR

5.1 Opportunities for tiger conservation

Given the high resilience of tigers in the environment

Table 3. Principle legal instruments addressing tiger protection in Lao PDR.

Legal instruments	Key provision
National Legal Framework	
Decree of the Council of Ministers No. 185/CCM, in relation to the Prohibition of Wildlife trade, 21 October 1986	Prohibits export of all wildlife
Decree of the Council of Ministers No. 47/CCM, on the State Tax System, 26 June 1989	- Lists types of natural resources, including various species of wildlife, aquatic animals and parts thereof and their associated resource tax rates and special fees; 67 species or species group of wildlife are listed - Subsistence level users of natural resources are exempted from resource taxes - 1996 New Tax Law does not mention natural resource tax
Decree of the Council of Ministers No. 118/CCM, on the Management and Protection of Aquatic Animals, Wildlife and on Hunting, and Fishing, 5 October 1989	- Defines wildlife as state property with mandate to MAF to manage it (including through awareness programs) and local people to use it pursuant to regulation. - Allows import/export of wildlife with special authorization - Prohibits hunting and breeding of protected or endangered species, except where human life is endangered - Prohibit hunting by means of mass destruction (explosives, poisons, etc.)
Decree of the Prime Minister No.	- Established national protected areas and states

Legal instruments	Key provision
164, 29 October 1993.	that hunting and fishing inside them is illegal - Explosives, chemicals, poisons and other substances harmful to wildlife are banned in NPAs - Measures (warn, fine) for anyone who disobeys the decree, confiscates illegal items
Order 54/MAF on the Customary Right and the Use of Forest Resources, 7 March 1996; followed by recommendations 377/MAF on the Customary Use of Forest Resources	- Secures legal rights for local people to use forest resources for subsistence, including hunting and fishing of non-protected species - Customary rights may be recognized by signed agreement or by law, and local people shall be compensated for loss of customary means of livelihood
Decree 1074 of the Ministry of Agriculture and Forestry, 11 September 1996	- Prohibits wildlife trade - Prohibits hunting of protected species including tiger and "such as Asian elephant, Banteng, Saola, Douc Langur, etc." - Prohibit hunting during a breeding season, and by dangerous methods, and/or by the use of weapons in NPAs and towns - Bans wildlife trade, except for research and conservation - Bans exporting wildlife used for food - Responsibility for PAFO to co-ordinate with other agencies to collect and register weapons used for hunting
Forestry Law, October 1996 and updated 24 December 2007.	- Grants state ownership of and authority to manage wildlife - Prohibits possession of wildlife without permission - Mandates state to define two categories of protected wildlife - Prohibits hunting during a breeding season and/or by means of mass destruction - Prohibits hunting of and trade in prohibited species, with certain exceptions - States that all guns and hunting equipment must be registered with certificates - Article 46, Part 5, establishes by law Wildlife Day on 13th July annually - Zoning NPAs to core (totally protected), managed (controlled use), and corridor zones
MAF Regulation No 0360 (2003) on management of NPAs, Aquatic Animals and Wildlife	- Provides guidelines on establishment and zoning of NPAs - Defines restricted activities on aquatic animals and wildlife - States duties of state agencies and funding support
Provincial and District regulation on management of PA, Wildlife, and Aquatic Animals (e.g. NEPL NPA Regulation 2008)	- Zoning of NPA into core, managed, and corridor zones and specify clearly activities in those areas - Prohibit hunting of all wildlife and aquatic animals in the core zone - prohibit trade in wildlife - Guns must be registered with special licenses
Wildlife and Aquatics Law, 24	- Update lists of protected (Category 1) and

Legal instruments	Key provision
December 2007	tmanaged (Category 2 and Category 3) species with tiger and large prey listed as Category 1 species that cannot be harvested anywhere in the country at any time. - State activities, management, and development on wildlife and aquatic animals
Prime Minister' agreement No.25/PM regarding forest management, 3rd April, 2007	- Assigned at least 15 staff in each NPA - Provide basic equipment and financial support for NPA management
International Commitments and Obligations	
United Nations Convention on Biodiversity (signed in 1996)	- Requires State Parties to prepare Biodiversity Strategies and Action Plan. - Laos has agreed; • To develop a national strategy for conservation and sustainable use of the nation's biological diversity • To develop regulatory provisions for protecting threatened species and populations • To integrate conservation and sustainable use of biological resources into national decisionmaking • To conduct an Environment Assessment (EA) of proposed development projects with a view to minimize harmful effects • To take measures for an equitable sharing of the results of research and development in genetic resources
ASEAN Agreement on the Conservation of Nature and Natural Resources (1985)	- Parties have agreed on development planning, the sustainable use of species, conservation of genetic diversity, endangered species, forest resources, soil, water, air and processes of environmental degradation and pollution. - Promotes joint and individual state action for the conservation of the natural resources in the ASEAN region.
Convention on International Trade in the Endangered Species of Fauna and Flora (signed in 2004).	- Provides international umbrella for management and control of trade in endangered fauna and flora. Tiger is listed as CITES Appendix 1 species for which all international trade is prohibited.

(adaptable to a wide range of habitat types, climates, and prey base) plus high fecundity (reproduction), there are several opportunities that allow for rapid recovery of tigers in Lao PDR even though tiger populations are at very low numbers at the present time.

Low human population

Laos has a low human population density (22 persons per km2) as compared with other tiger range states in Indochina (263 people/km2 for Vietnam, 128 people/km2 for Thailand, 80 people/km2 in Cambodia). Tigers require large home ranges to meet their ecological needs so availability of adequate space results in low human-tiger conflict.

High forest cover

The country has over 40% forest cover, which provides large extensive habitat that could support viable populations of tigers and prey.

Well developed protected area system

There are 21 established national protected areas, covering 14% of the country's land area, as well as provincial protected areas that can serve as core habitat for source populations of tigers and prey in tiger conservation landscapes.

Existence of key prey

Ungulates such as gaur, sambar deer, serow, wild pig, and muntjacs persist in most NPAs. Although ungulate population densities throughout the country are relatively low at present, protection of large prey from all hunting and of small prey from hunting for trade, which is illegal, will allow ungulate populations to rebound relatively quickly as habitat and other required resources (i.e. food) are still available.

The role of tigers in economic development and environmental protection

As a top predator, the existence of a viable population of tiger indicates a healthy ecosystem, which is important to human well-being in forms of "ecological services", food, medicine, and shelter provided by a healthy ecosystem. Economically, tourism is one of the fastest growing industries in the country, contributing substantially to the overall growth of the national economy of Laos. Ecotourism development is a government priority50 and there are initiatives underway in some protected areas (e.g., Nam Ha, Xe Pian, Nam Et-Phou Louey and Nam Kading NPAs) that could provide incentives for protection of wild tigers and their habitats.

Good legislation.

Law on aquatics and wildlife is already promulgated, providing important guidelines in management and conservation of wildlife in the country. Tigers and key large prey (gaur, sambar, and serow) are listed as Category 1 -protected species44. In addition, Laos as a signatory to the CITES, agreed to prevent any trade in endangered species, which includes tiger.

Public attractiveness/support.

As they are perceived as powerful and charismatic, tigers are used for selling several commercial products such as Lao beer, water, Tiger beer as well as ecotourism products (e.g. Tiger Trails). Gaining support from these companies to ensure the survival of tigers in the wild may be possible.

5.2 Current constraints for tiger conservation

Beside opportunities, there are several important issues that we need to address to achieve our conservation goal for tigers; they include:

Lack of baseline data on tigers and prey

There is a lack of information on the population status and distribution of tigers and prey in existing TCLs and particularly in most provincial and national protected areas that could serve as source populations for tigers and prey. The paucity of this data makes conservation planning difficult.

Weak law enforcement

The policy, laws and regulations governing tiger and prey are sufficient. However, weak law enforcement and poor management of protected areas results in tiger poaching and illegal hunting of prey for the domestic and international wildlife trade.

A high demand for tiger parts in the international market

The demand for traditional Chinese medicine is driving poaching of tigers for trade. Cross-border cooperation to tackle this problem is urgently needed. A high demand for prey in domestic and international markets encourages illegal poaching of prey by local villagers to support the trade.

Limited human resources and financial support

Although there are 21 established national protected areas across the country and several more provincial protected areas, very few of these are currently being managed and are dependent on financial support from international organizations. The currently estimated level of support for the protected area system (national and provincial protected areas) is only $US0.09/hectare. It is estimated that at least eleven times that amount ($US1.00/hectare) is needed to achieve a minimum level of management in Lao's protected areas. As a result of limited financial support, all protected areas are understaffed and many of the staff lack training in the skills required to effectively manage the protected area and to recover and conserve wild tigers and their habitats.

Lack of cooperation and coordination among government agencies.

Weak law enforcement is mainly the result of a lack of cooperation and coordination among enforcement agencies including foresters, police, military, commercial and custom officers, and justice. In addition, although national sustainable development strategy shows clear links between biodiversity and poverty reduction, unplanned development activities

undermine biodiversity conservation, for example, building roads through NPAs, land concessions for cash crop plantations in NPAs, etc. They take little regard to the value of environmental protection and protected areas in economic development.

Weak understanding of linkages between poverty reduction, economic development goals and the status of the environment.

Although the government of Lao PDR considers the environment as an important component of socio-economic development45 and recognizes that poverty and biodiversity are intimately linked, most funding however is allocated to development of infrastructure and other social sectors with little regard to the future consequences of the impacts on the environment. High priority is given to development activities such as road construction, hydropower, mining and plantation development, without serious consideration of real costs to the environment. It may be that the conceptual link between biodiversity and development is misunderstood by several high level decision makers who play key roles in planning and investment.

6. STATUS OF TIGER RESEARCH AND CONSERVATION ACTIVITIES IN LAO PDR

6.1 Past research and conservation (prior to 2000)

Research and monitoring

There was no specific research or monitoring of tigers in Lao PDR before 2000. Most records of tigers in Laos come from village questionnaires and general wildlife surveys during a period of 1990s (see more details in Section 2.1). For example, Salter (1993) conducted village interviews in all 18 established national protected areas across Laos between 1988 and 1993, provided baseline data on tiger occurrence and major threats to tigers. From 1992 – 1998, preliminary wildlife surveys conducted in most NPAs and some PNPAs provided confirmed data on tiger presence based on sightings, signs and local reports.

Conservation

During 1980s, tigers and other species were largely protected throughout the forest of Laos because the country was closed to international markets and the human population was low. During the 1990s, tigers may have benefited by legal establishment of 21 national protected areas, and by national decrees and laws addressing management of several species including tigers (see section 4). Also, during this time period, management initiatives took place in several NPAs for a few years, with technical and financial support provided by a range of international organizations in up to 19 of the 21 national protected areas46. After these projects ended, those NPAs that received financial support from government continued some conservation activities such as enforcement but a lack of monitoring systems made it difficult to assess conservation progress or success.

6.2 Current research and conservation (2000 to present)

6.2.1 Research and monitoring

Nam Et-Phou Louey NPA (2003-present)

From 2003-2004, the first systematic study on tigers and prey in the country was made by WCS-Lao Program in NEPL NPA, using camera traps. Following the first results, WCS-Lao has worked with the NEPL NPA\ management unit to initiate conservation interventions to ensure a protection for tigers and prey populations in the NPA, and to continue monitoring of tigers and prey. In 2008, an occupancy survey was conducted to assess tiger prey populations including gaur, sambar, serow, wild pig and muntjac in the NPA. Additional studies are focused on tiger diet to determine what prey are key to tiger survival in NEPL NPA and estimate a minimum number of tigers based on DNA extraction from large carnivore scats.

Nakai-Nam Theun NPA (2005-present)

In 2005, the WCS-Lao Program assisted the Watershed Management and Protection Authority (WMPA) to establish a wildlife monitoring program in the NT2 watershed including the NNT NPA32. The objective of the wildlife monitoring program is to provide a baseline for monitoring change in key wildlife populations (including tigers and prey) in the watershed as a result of management. A project from 2005-2007 was implemented to develop capacity within the NT2-WMPA and its monitoring staff and teams so that the protocols, data collection and analyses can be done within the WMPA.

Monitoring is focused on a subset of key species of wildlife in the watershed that are exploited by hunting for domestic consumption,internal trade and unregulated export. The aim of the monitoring program is to detect improvement (positive changes)

in wildlife populations exploited by hunting as a result of WMPA interventions to control wildlife harvest. The protocol for monitoring large terrestrial vertebrates (including tigers and prey) employs camera traps over 800 km2 of the NNT NPA with one-200 km2 sampling block surveyed annually. Since 2007, the WMPA has continued to implement this monitoring program with annual reports on the status of wildlife populations in the NPA[48].

Nam Kading NPA (2007-present)

In 2006, the WCS-Lao Program assisted the NKD NPA to establish a wildlife monitoring program47. The objective of the wildlife monitoring program is to detect change in the abundance of key species of wildlife (including tigers and prey) as a result of management. A project from 2007-2009 was implemented to develop capacity within the NKD NPA to implement the monitoring protocols, data collection and analyses. The protocol for monitoring large terrestrial vertebrates (including tigers and prey) employs camera traps over 400 km2 of the NNT NPA with one-200 km2 sampling block surveyed annually.

Xe Piane NPA and Dong Hua Sao (2007-present)

Since 2007, WWF-Laos has provided financial support to conduct preliminary tiger field surveys in these two NPAs25.

6.2.2 Conservation

Nam Et-Phou Louey NPA (2000-present)

The NEPL NPA has been under active management since 2000 with ongoing international technical and financial support, first from IUCN until 2002, followed by WCS from 2003 to the present. In NEPL NPA, the goal is to increase tigers by 50% from 2005-2015 and the prey to support this increase[33]. Since 2004, WCS-Lao has worked with the NEPL NPA management unit to provide technical and financial support for the NPA Management unit to implement conservation interventions to reach this goal by ensuring the protection of tigers and prey populations in the NPA. The principle management activities include:

Enforcement: the NPA has set up patrol substations in the forest (consisting of 6-7 rangers per substation) to conduct patrols over the 3,000 km2 core zone, and 4 mobile teams of 3-4 officers to control illegal trade of wildlife to markets.

Outreach and land use planning: the NPA conducts public education and outreach in villages inside/outside NPA to build better understanding for local communities about NPA's regulations, the role of wildlife linked to local livelihoods, land use zoning and demarcating the boundaries of NPA's managed and core zones.

Livestock management to reduce tiger-human conflict: the NPA works with farmers to monitor incidents of carnivore depredation of livestock and assist farmers to relocate livestock grazing areas from the core zone to the village area. The NPA also coordinates with livestock development sectors to improve livestock husbandry techniques that maximize productivity without causing human-tiger conflict.

Ecotourism linked to wildlife protection: following a feasibility study of ecotourism in NEPL NPA42, a business plan was developed to analyze the potential to generate economic benefits for NPA management and local communities. The plan is now being implemented to develop ecotourism products that are designed to improve local livelihoods, support NPA management, and provide incentives for the recovery and protection of wild tigers and their habitat.

Nakai-Nam Theun NPA (2005-present)

The Watershed Management and Protection Authority has implemented conservation interventions in the NNT NPA since 2005, primarily funded by a contribution from the Nam Theun 2 power company of US$ 1 million per annum. The goal is to maintain biodiversity in NNT NPA and reservoir. The management activities include:

Enforcement: NPA staff conduct patrols in Nam Theun reservoir, work with village conservation units to conduct forest patrols to reduce poaching of wildlife in the NPA. They work and coordinate with enforcement agencies to respond to reports of illegal activities and set up check points to stop trade in wildlife.

Outreach: the WMPA conducts public education activities for villages inside and outside the NPA to increase public understanding and support.

Land-use planning: the WMPA has conducted land allocation for villages inside the NPA, and set up village conservation unit to guard their designated areas. NPA core zones and managed zone are being established and will be complete by 2011.

Village micro-development: the WMPA provides financial and technical supports to villages inside and adjoining the NPA and reservoir in horticulture and livestock development.

Ecotourism: the NPA has conducted preliminary studies in ecotourism potential in NNT and the reservoir and has completed a strategy for ecotourism development.

Nam Kading NPA (2005-present)

In the NKD NPA, the stated goal is to increase the tiger population by 20% from 2005-201051. Since 2005, WCS-Lao has worked with the NKD NPA management unit to provide technical and financial support for the NPA Management unit to implement undertake landscape level planning to design and implement conservation interventions to ensure protection for landscape species (including tigers and prey) in the NPA. The management activities include:

Enforcement*:* foot-patrols are conducted to reduce poaching of wildlife in the NPA. The NPA works with enforcement agencies to respond to wildlife crimes in townships, along roads, and other key checkpoints.

Outreach and land use planning: the NPA has an extensive conservation education and outreach program that conducts public education in villages inside and adjoining the NPAs, and in schools. This includes land use zoning and demarcating the boundaries of NPA's managed and core zones.

Village non-timber forest management: the NPA provides technical support to villages inside and adjoining the NPA to manage for sustainable offtake of non-timber forest projects.

Research and Training Center: the NPA has established the Tad Vanfong Training Center on the Nam Kading River to support scientific research and ecotourism in the NPA.

Xe Piane NPA (2000-present)

From 1998 to 2002, the FOMACOP project developed an NPA management plan, supported enforcement and outreach activities, village microdevelopment such as banks of rice and buffalo, and ecotourism. After the project ended, the government continued to support enforcement activities including checkpoints, mobile patrolling team to respond to wildlife crimes along the roads and target villages. Since 2007, WWF-Lao PDR has provided financial support to develop ecotourism products and conduct occasional enforcement foot-patrols. An expansion of tiger research and conservation activities is planned for this NPA and others in southern Laos (TCL#27).

PART 2

TIGER ACTION PLAN

1. INTRODUCTION

Tigers once occurred widely in most forested areas across Lao PDR, but today they have disappeared from many places of the country due to the direct killing of tigers, unsustainable over-harvesting of their prey, and loss of habitat. Since 2005, tigers have only been confirmed by camera trap photos and genetic analysis of scat from one location in the country, the Nam Et-Phou Louey NPA, while the persistence of tigers in other parts of the country is provisional from reports of animal signs but the certainty of tiger presence remains unknown (see Table 1). If the current threats carry on and the downward trend of the tiger population continues, tigers will disappear from forest ecosystem of Lao PDR within the next few years and in the interim, shrink to the point of "ecological extinction" – where their numbers are too few to play their role as a top predator in the ecosystem. This would represent not only a significant loss for Lao PDR but for all of Indochina, where Lao PDR represents the greatest hope for tiger recovery, and for the Asia, where less than 3,500 tigers remain in the wild today[54].

This Tiger Action Plan aims to provide basic guidelines for all stakeholders at multiple levels ranging from policy makers to field practitioners to secure the future for the Indochinese tiger in Lao PDR. The Action Plan describes a focused conservation strategy that lays out detailed actions needed for the next 10 years (2010-2020) to overcome the major threats that are driving tiger population decline. The overall goal is to elevate the existing tiger numbers to the level of viable breeding populations in the most promising Tiger Conservation Landscapes (TCLs) and maintain connectivity within/between all TCLs throughout the country (see map in Appendix 4).

The Tiger Action Plan was developed within the Lao government's existing framework for environmental and biodiversity conservation, and national social and economic development. This framework includes the National Growth and Poverty Eradication Strategy35, the National Forest Strategy55, National Biodiversity Strategy and Action Plan56, and the National Socio-Economic Development Plan57. The overall principles in these national strategies provide basic guidelines for identifying the priorities that need to be addressed. The Tiger Action Plan is in line with these national policies in that, (i) it promotes maintenance/increase in forest cover and connectivity of those fragmented forests for better protection of national environment and biodiversity, upon which national economic development depends; (ii) assists the government to address poverty eradication by providing economic incentives for local development through sustainable use of biological resources; and (iii) assists the Lao government to implement obligations made as signatories to international conventions including Biological Diversity (CBD), International Trade in Endangered Species (CITES), and Climate Change (UNFCCC) and as members of international initiatives such as the ASEAN Wildlife Enforcement Network (ASAEN-WEN).

The Tiger Action Plan was drafted by participants in the National Tiger Action Plan Workshop in December 2009 (see list in Appendix 5). After reviewing the Status of Tigers and their Conservation in Lao PDR58 (Part 1 of this document), the participants worked in TCL groups to identify and discuss the following components of the Action Plan (see agenda in Appendix 6):

Vision - a short inspirational statement describing the desired future state of tigers in Lao PDR over the long term (>50 years), including the desired range and abundance of the species, its ecological role and its relationship with humans.

Goal - a short specific statement describing the desired state of tigers in Lao PDR by 2020, including the desired range and abundance of the species.

Direct threats – these are human activities that physically result in undesirable changes in tiger abundance, distribution, movement, and quality and extent of their habitat. Indirect threats –these are the factors that are thought to be leading to the direct threats.

Interventions –these are actions taken to achieve the objective to reduce direct or indirect threats to wild tigers, their prey, and their habitat.

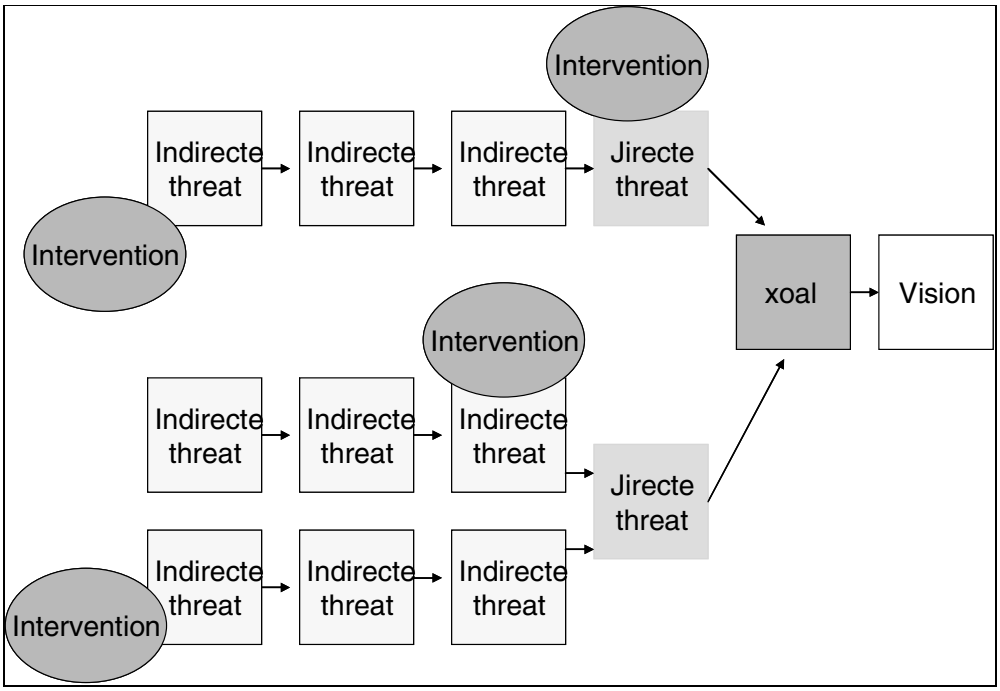

Figure 5 shows the components of a conceptual model illustrating how the causal chains of threats are contributing to the decline of tigers, tiger prey and their habitats. Interventions are management actions selected to reduce threats and reverse the decline.

Objectives - are broad statements describing the desired outcomes of the Action Plan to reduce the indirect and direct threats to reach the goal.

Through the course of the workshop, participants systematically compiled these components to produce a "conceptual model" (Figures 5,6 and 8) to serve as a visual representation of what the participants collectively thought were the key factors – direct and indirect - that were leading to undesirable impacts on wild tigers and their prey in Lao PDR. Based on the model, participants then identified the priority actions that they feel are needed from 2010-2020 to reduce the threats to wild tigers and their prey to be able to achieve the goal and vision of this Action Plan (Figure 7).

2. VISION

A Lao PDR with large functioning forest ecosystems where tigers thrive forever, which provides sustainable social, economic and environmental benefits to the people of Lao PDR

Lao PDR has a rich biodiversity, harbors several species of fauna and flora that are of global and regional conservation significance. There are at least 8,000 species of flowering plants, 100 species of large mammals, and over 700 species of birds, 90 known species of bats, and 500 species of fish. Alongside the rich biodiversity, Lao PDR is also home to dozens of indigenous tribes and cultures, with 47 ethnic minorities and over 230 spoken languages. Over 80% of the population lives in rural areas and relies heavily on the forest resources and wildlife for their subsistence. Biodiversity offers the people of Lao PDR a wide range of options for sustainable economic activities and for human welfare. Hydropower, ecotourism, non-timber forest products, wildlife, wood products contribute significantly to the country's economy. For this reason, the government of Lao PDR emphasizes that maintenance of healthy and productive forest ecosystems, and the sustainable use of natural resources are key to achieving the government's development goals for sustainable economic growth and poverty eradication.

Currently, over 41% of land is forested, of which 13% is declared as national protected areas where the objective is to protect natural areas of flora and fauna, and maintain ecological stability and watershed functions. In this way, the national protected area system can serve as core habitat for the long-term survival of tigers. The existing forest cover across the country is the most important habitat to tigers, encompassing approximately 99,612 km2 and

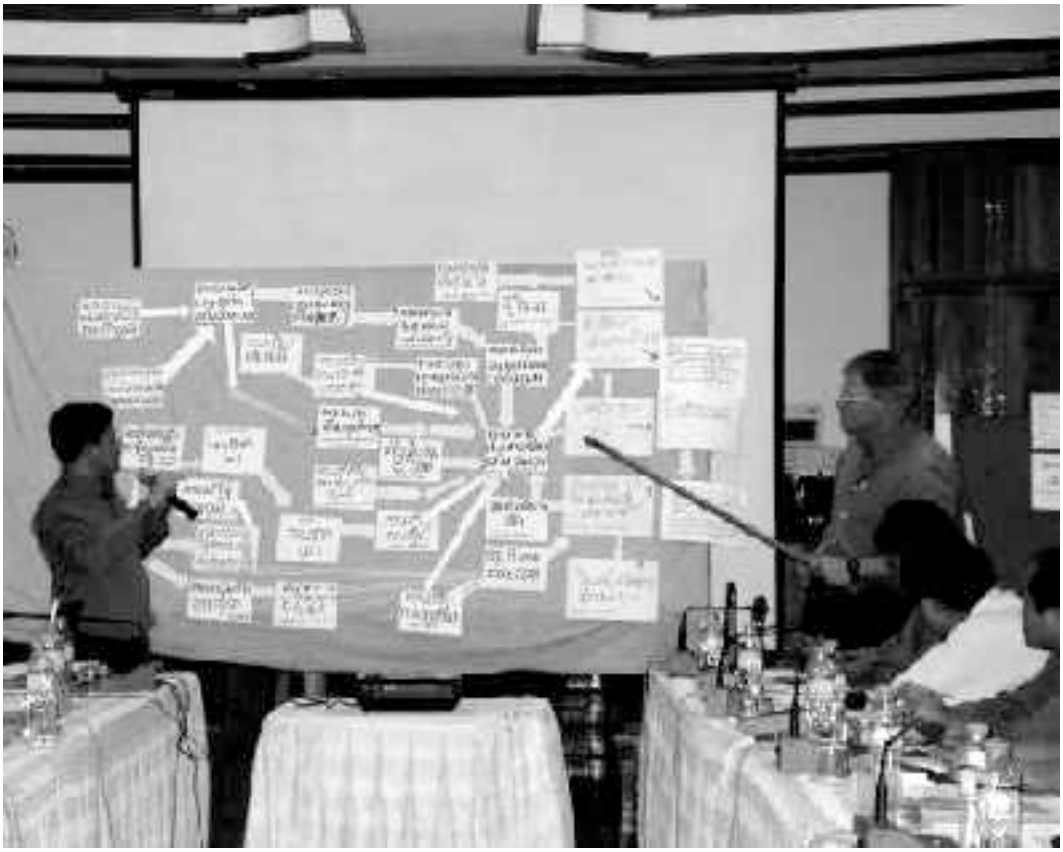

Figure 6. Workshop participants assemble the components of a conceptual model illustrating how the causal chains of threats are contributing to the decline of tigers, tiger prey and their habitats.

Figure 7. Workshop participants working in landscape groups to design the interventions - management actions –to reduce threats and reverse the decline of wild tigers, their prey and habitats in their respective landscape.

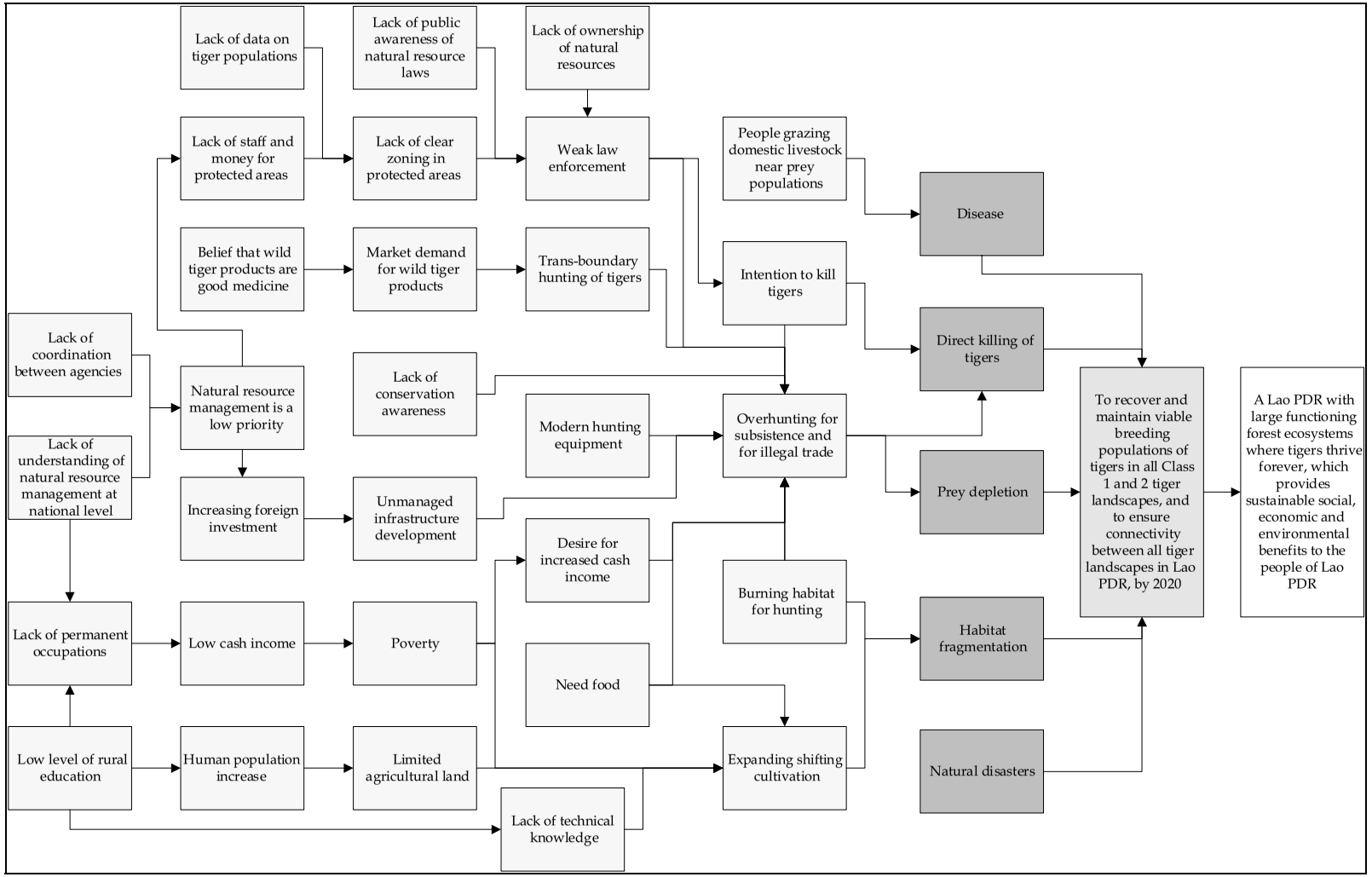

Figure 8. The conceptual model assembled by workshop participants illustrates the causal chains of threats believed to be contributing to the decline of tigers, thier prey and habitats in Lao PDR. From left to right, indirect threats are shown in yellow, leading to direct threats (green), which need to be reduced to reach the goal(blue) and ultimately, the vision (white).

classified into different levels of conservation significance for tigers (see Part 1, Section 2 and Appendix 4). Tigers are a conservation-dependent species. They require an adequate prey base, sufficient land area, and protection from killing. In order for tigers to survive, all their basic needs need to be taken into account. As top predator, tiger plays a role as an icon of the Lao forest ecosystem such that the protection of tigers symbolizes the protection of all national forest and biodiversity, which will provide benefits, in the forms of direct and indirect services provided by healthy ecosystem, to enhance the quality of life and health of the people of Lao PDR.

Policy statement and guiding principles

The overall goal of the Lao PDR development strategy is to ensure the balance in economic development, social/cultural development, and the conservation of natural resources. All of the objectives and actions needed to address the existing threats to tigers in Lao PDR, which are included in this Tiger Action Plan are based on the underlying principles of the National Biodiversity Strategy and Action Plan56, National Forest Strategy55, National Growth and Poverty Eradication Strategy35, national legislation, and international conventions (Part 1, Section 4). The principles of this framework that are adopted for guidance include:

I. Biodiversity is a national heritage and must be used in a sustainable manner today to be conserved for future generations.
ii. The national development process must reflect ecological, economic, social, cultural and spiritual values of the local people.
iii. The sustainable use of biodiversity is a key element of livelihood strategies.
iv. The knowledge, innovations and practices of local people should be respected and their use and maintenance of biodiversity carried out with the support and involvement of their people.
v. Biodiversity is best conserved in-situ[4].
vi. The conservation and sustainable use of biodiversity resources require co-operation at all levels, namely local, national, regional and global and also a sharing of knowledge, costs and benefits.
vii. The formulation and implementation of policies and the establishment of a legal framework are necessary as effective measures against biodiversity depletion.
viii. Education and the raising of public awareness are essential in ensuring the conservation and sustainable use of biodiversity resources. In line with a range of government policies (Table 4), the Tiger Action Plan seeks to address the following urgent issues from 2010-2020:
    1. Protect threatened species and habitat (e.g. wild tigers and their prey)
    2. Strengthen the development and management of national protected areas.
    3. Maintain healthy and productive forests through conservation, protection and sustainable use.
    3. Improve local livelihoods through sustainable use of biological resources.
    4. Improve and develop laws and regulations, securing their effective enforcement.
    5. Enhance education and public awareness on the significance of biodiversity and the importance of it's conservation

Table 4. National policy statements regarding to natural resource management and sustainable development

Policy	Policy statements
NEPES[1]	Economic growth must be based on sound management of natural resources and enhanced social and cultural development
NBSAP[2]	Maintain the diverse biodiversity as one key to poverty alleviation and protect the current asset base of the poor as support to the implementation of the government's priority programs
NSEDP[3]	The rich natural resources of the Lao PDR play a vital role in the country's socio-economic development. It is therefore important that they are protected and exploited in a sustainable manner.
NFS[4]	The objective of National Protected Areas/Biodiversity Conservation areas is to protect natural areas for conservation

[4] "In-situ" is defined as in its original natural habitat (e.g. not in captive-bred facilities).

	of flora and fauna, maintenance of ecological stability and watershed functions, and to preserve historically, aesthetically, culturally or scientifically valuable sites. Objectives should be achieved through local participatory management benefiting NPA residents.
NESAP[5]	To sustainably utilize natural resources and protect and conserve the environment to ensure the sustainable development of the country while reducing poverty and enhancing the quality of life and health of Lao People
WL Law[6]	The tiger is the protected species in Category 1; hunting of tiger, trading, and keeping of tiger parts is prohibited. Violation of this law will be seriously punished.

[1] National Growth and Poverty Eradication Strategy 2004
[2] National Biodiversity Strategy to 2020 and Action Plan to 2010
[3] National Socio-Economic Development Plan
[4] National Forestry Strategy to the Year 2020.
[5] National Ecotourism Strategy and Action Plan 2005-2010
[6] Wildlife Law 07; 24 December 2007.

Table 5. Scale-dependent geographic specific goals and costing

		Temporal (2010-2020)	
Spatial		**2010-2015**	**2016-2020**
	Tigers confirmed (NEPL)	Increase tiger numbers by 50%, and sufficient prey to support this increase, in 3,000 km2 TPZ by 2020. **Cost[1]:** Minimum of US$ 1.8 million for reoccurring operating costs per annum in addition to a one-off minimum investment of US$ 4.7 million for infrastructure and equipment	Manage to increase tiger and prey populations to viable levels in the TPZ and secure movement corridors to ensure a source for reintroductions to other priority source sites **Cost:** Minimum of US$1.8 million for reoccurring operating costs per annum
Priority source sites	Tigers likely in Class 1 and 2 landscapes (Nam Xam, Xe Sap, Dong Ampham, Dong Huasao, Xe Piane, Nakai- Nam Theun)	Confirm the occurrence of tigers at the site; manage to stabilize prey populations **Cost[2]**: Minimum of US$640,000 for baseline field surveys including landscape questionnaire survey and camera trapping at source sites. [1], Minimum of US$3.3 million for reoccurring operating cost per annum in addition to infrastructure investment	At sites where tigers were confirmed present, identify and secure TPZ for tiger breeding habitats and movement corridors; At sites where tigers were absent, manage site to reduce threats, stabilize prey populations and enhance connectivity with sites where tigers are confirmed present **Cost:** Minimum of US$3.3 million per annum for reoccurring operating costs.

3. GOAL

To increase size of breeding population of tigers at source site, Nam Et-Phou Louey, ensure connectivity between all tiger landscapes, and obtain baseline data on tiger populations for all TCLs in Lao PDR, by 2020.

The remaining tigers in Lao PDR appear scattered across various Tiger Conservation Landscapes (see map in Appendix 4 and Table 1), but they are at low numbers. At present, tigers are only confirmed in the Nam Et-Phou Louey NPA whereas their presence in other places remains provisional. Thus, in order to ensure long-term survival and conservation of tigers in Lao PDR, we need to elevate existing tiger numbers to secure a viable breeding population in sites where tigers are confirmed to, while also working to confirm the occurrence of tiger in other potential sites, particularly in all Class 1 and Class 2 TCLs. Where tigers are confirmed in these other potential sites, immediate action must be taken to reduce threats to allow tigers to increase to the level of a viable breeding population. For the purpose of this Plan, a viable population is defined as a minimum of 25 breeding tiger females in each confirmed source site as a viable population capable of sufficient reproduction to maintain the population
over time[11].

Given the existing data on tiger population status, we therefore developed site specific goals that vary in terms of their implementation in space and time (Table 5). The national goal is further broken into two spatial scales including priority source sites and landscapes, and two temporal scales including a period between 2010-2015, and 2016-2020. For the purpose of this Plan, priority source sites are defined as areas embedded within a TCL that currently have confirmed or likely reports of tiger in a designated protected area (Table 1), which also have the potential to serve as a Totally Protected Zone (TPZ) within a designated Protected Area following the guidelines of the National Forestry Law50 for maintaining a viable source population of tigers (e.g., the NEPL NPA has an estimated population of 7-23 tigers within the NPA TPZ[13]).

4. THREATS

At the national Tiger Action Plan workshop, the participants identified five direct threats and numerous underlying factors (indirect threats) that they felt are contributing to the decline of tigers, their prey and their habitat (Figure 8). The direct threats included direct poaching of tigers, depletion of prey, habitat loss and fragmentation, and to a lesser degree, wildlife disease and natural disasters.

Direct killing of tigers is attributed largely to, (i) killing tigers with an intent to make money, and (ii) killing tigers in revenge for livestock loss, which can be associated with farmers using livestock to lure tigers in to poach them. The key factors driving these illegal activities are believed to be the high demand and price for tiger parts on the international market because people believe tiger parts will cure illnesses through traditional medical practices. Low income villagers are encouraged to engage with traders given a desire for cash income that is lacking because rural people often have a low level of education and thus find it difficult to obtain permanent employment. However, overall it was felt that weak law enforcement was at the root of all of the direct threats. Weak enforcement is thought to stem from poor land-use planning and management of protected areas, which is the result of inadequate staff and financial support for management. The paucity of support for protected area management was attributed to an inequality in national government investment in biodiversity conservation and socio-economic development, despite the fact that national strategies clearly state that poverty and biodiversity are intimately linked (see Table 4). This inequality was thought to stem from a lack of clarity at the national planning and investment level about the conceptual linkages between biodiversity conservation and economic development.

Depletion of prey is attributed to over-hunting of large prey species for both subsistence and for trade. The many factors contributing to overhunting were identified as:

i) Weak law enforcement associated with poor land use planning or poor management of protected areas because of a shortage of funding and staff, which is the result of limited integration of biodiversity conservation with national economic development. As a result, participants felt that funding is allocated to development of infrastructure and other social sectors with little support for biodiversity conservation. The weak understanding of the conceptual link between biodiversity conservation and economic development at the national planning and investment level was thought to be rooted in weak coordination and cooperation between the various sectors of relevant government agencies;

ii) A lack of public awareness about biodiversity conservation, particularly among rural

Tiger Conservation Landscapes	Tigers likely in Class 3 or Potential landscapes (Nam Khan, Nam Ha, Hin Nam Nor, Phou Xanghe, Xe Bangnouan, Phou Xiengthong, Nam Phoun, Phou Dendin)	Confirm occurrence of tigers and prey populations **Cost2:** Minimum of US$640,000 for baseline field surveys including landscape questionnaire survey and camera trapping at source sites.	At sites where tigers were confirmed present, identify and secure TPZ for tiger breeding habitats and movement corridors; At sites where tigers were absent, manage site to reduce threats, stabilize prey populations and enhance connectivity with sites where tigers are confirmed present **Cost:** Minimum of US$3.3 million per annum for reoccurring operating costs.
	Class 1 (TCL#35)	Expand breeding populations inside the tiger landscape **Cost3: M**inimum of US$100,000 per annum for operating cost	Enhance zones of connectivity within and between this and other landscapes. **Cost:** Minimum of US$100,000 per annum for operating cost
	Class 1 & 2 (TCL#27,34,26)	Manage to reduce threats to recover source tiger populations **Cost3:** Minimum of US$100,000 per annum for reoccurring operation costs	Enhance zones of connectivity within and between Class 1 and Class 2 landscapes. **Cost:** Minimum of US$100,000 per annum for reoccurring operation costs.
	Class 3 (TCL#33,#36)	Manage to reduce threats to recover source tiger populations **Cost3:** Minimum of US$100,000 per annum for reoccurring operation costs.	Enhance connectivity to Class 1 and 2 landscapes **Cost:** Minimum of US$100,000 per annum for reoccurring operation costs.
	Potential landscapes	Identify any unprotected breeding tiger populations remaining in Laos **Cost3:** Minimum of US$100,000 per annum for reoccurring operation costs.	Enhance their connectivity to existing tiger landscapes **Cost:** Minimum of US$100,000 per annum for reoccurring

Notes:

[1.] Estimate of minimum annual reoccurring operating costs at US$ 300 per square kilometer or US$ 3 per hectare. This includes support for law enforcement, public outreach, ongoing tiger and prey monitoring, land-use planning, boundary demarcation, and protected area office management

[2.] Estimate of baseline monitoring costs based on US$45 per square kilometer to conduct camera trap baseline survey, and US$3 per square kilometre to conduct baseline landscape questionnaire occupancy survey.

[3.] Estimated minimum needed to support reoccurring operating costs for activities at landscape level (including district and provincial level activities such as law enforcement to stop illegal wildlife trade and habitat loss, inter-sectoral coordination, workshops, and training).

communities, is leading to violations of the law and little understanding or support for conservation;

iii) Increased access to forested areas is resulting from poorly planned infrastructure development projects that do not include safeguards to limit the impact of the development on the environment, which in turn contributes to unregulated illegal hunting of wildlife for trade along these unmanaged access routes;

iv) Modern weapons allow rural people to hunt tiger prey species more effectively, which is contributing to a more rapid decline in prey populations than in the past;

v) The growing need for cash income associated with a high demand and price of wild meat encourages rural villagers to hunt more ungulates for trade rather than for subsistence.

vi) The need for food encourages rural people to hunt for wild meat to supplement household food consumption, which alone may be sustainable but when coupled with illegal trade of wild meat is surely unsustainable;

vii) As a result of the high demand and price of prey parts at international markets, driven by beliefs in the value of traditional medicine, there is also cross-border hunting by people from neighboring countries,. The problem occurs in several TCLs along the country's international boundaries, such as in Phou Dendin and Nakai Nam Theun NPAs.

Habitat loss and degradation is attributed largely to shifting cultivation and burning of forest for game hunting. The factors behind these problems are:

i) The demand for food or for income from cash crops results in clearance and burning of land for growing staples (e.g., rice, corn, cassava) and sometimes burning of the forest for hunting ungulates for subsistence consumption or for trade;

ii) The limited availability of agricultural land given the country's mountainous terrain, which is further complicated by increasing human population in rural areas, due to a lack of birth control and education, which results in people encroaching into tiger habitat;

iii) The lack of technical skills by rural farmers, which can result in improper use of chemicals causing negative impacts on the environment as well as low agricultural productivity such that more land is cleared to meet the growing demands for food and cash;

iv) Unmanaged infrastructure projects without environmental safeguards were identified as contributing to habitat loss and fragmentation.

Disease was identified as a cause of decline in tiger prey in cases where infectious diseases are transmitted from domestic animals to wild ungulates where livestock grazing areas in close proximity to wildlife inside protected areas.

Natural disasters were identified as a factor contributing to the loss and fragmentation of tiger habitat, especially in areas of intense shifting cultivation, which in turn was attributed to a lack of technical skills and limited land for agricultural production.

5. OBJECTIVES AND INTERVENTIONS

In order to reduce the threats outlined in the previous section and achieve the goal, "to recover and maintain viable breeding populations of tigers in all Class 1 and 2 Tiger Landscapes, and to ensure connectivity between all tiger landscapes in Lao PDR, by 2020", several objectives and interventions are identified in this Plan. For each objective to be achieved, specific actions must be taken at different administrative levels, ranging from priority sites, to landscapes, and at the national level, to address the indirect and direct threats that are leading to the decline to wild tigers, their prey and habitats (see Table 6). At priority sites, actions will focus on reducing the threats that occur within the protected areas that harbor source tiger populations. Examples of these types of threats include direct poaching of tigers and prey, controlling the hunting of Categories 2 and 3 managed prey species (muntjac and wild pig) and encroachment into tiger habitat inside a protected area TPZ. At the landscape level, key actions focus largely on threats that occur beyond protected areas at the district or provincial level. Examples of these threats include wildlife trade, habitat loss and unmanaged infrastructure development. At the national level, the major actions focus on issues that occur beyond the landscapes at both national and international levels. Examples of these threats are lack of institutional capacity, legislation, financial and technical support, and international cooperation to address the problems facing wild tigers, their prey and habitats.

In this section, we describe the seven major objectives of the Tiger Action Plan. In Table 6, each objective is broken down into specific interventions at priority sites, at landscapes and at the national level. For each intervention, agencies responsible for implementation are identified, as well as indicators

and a means of verification to identify if the intervention has been completed.

Objective 1: Increase public awareness and support for the recovery and conservation of wild tigers and their habitats

If tiger conservation is to be successful or not depends on public support and involvement. So, it is crucial to raise public understanding of how tiger conservation may benefit the citizens of Lao PDR, what is the legislation relevant to tiger conservation, and how the public must engage in tiger conservation. Over the last decades, methods for implementing outreach and education activities have advanced considerably, such as formal education, social marketing campaigns, conflict mitigation, and natural resource planning. At the present time, national capacity to design and deliver public outreach programs specific to the conservation of wild tigers and prey is limited. Only three protected areas (NNT, NK and NEPL) have outreach units that are actively engaged in design and delivery of programs to increase public awareness and support for the conservation of wildlife; only the NEPL outreach unit is focused on land use planning and management issues specifically related to wild tigers and their prey.

Our target groups include a wide range of people, which includes local villagers who live nearby the priority sites or within the TCLs, officials at all levels of government, and the private sectors. To achieve this objective, activities at priority sites will focus on;

(i) building PA staff capacity to design, deliver and evaluate outreach activities,

(ii) support outreach activities in target villages inside/nearby protected areas to disseminate PA regulations, to inform villagers on land-use zoning and demarcation, resolving human-wildlife conflict, the role of local involvement in conservation and resource management.

At landscapes, outreach and education activities will focus on building knowledge and support in villages outside PA to increase their understanding about national laws controlling wildlife crime and the consequences of engaging in wildlife crime, and how increased wildlife populations will benefit people.
At the national level, the outreach activities will aim at building knowledge and support for within/among government sectors about national laws, and tiger significance in sustainable economic development and environment protection. Of particular importance, tiger conservation needs to be integrated into national socio-economic planning and investment.

Objective 2: Identify and demarcate totally protected zones (TPZs) in protected areas and corridors for connectivity between TPZs in tiger conservation landscapes.

In compliance with the national forestry law, land-use zoning will include demarcation of,

(I) TPZs – that are core breeding areas where human activity is prohibited,

(ii) Managed Zones (MZs) – that are areas where sustainable use of natural resources by local communities for subsistence is allowed, and

(iii) corridors – habitat connectivity within and between protected areas that allow movement or dispersal of tigers and prey within/between TCLs.

The law states that all hunting is prohibited in the TPZ whereas harvest of tigers and large prey (e.g. gaur, banteng, sambar and serow) is illegal throughout the country. At the present time, only two protected areas (NEPL and NKD) within two of the priority landscapes have demarcated and are protecting TPZs, while one other (NNT) is in the process of demarcating TPZs. So, we need to extend this activity to other NPAs as well as across TCLs in order to strengthen the effectiveness of our conservation interventions, particularly law enforcement.

To achieve this objective, activities at the priority site and landscape level will first focus on collection of baseline data on status of wild tigers and prey, and their habitat as well as socio-economic information on villages in PAs and TCLs. The baseline results will be used along with national policies and national economic development plans to guide land-use zoning that will accommodate both biodiversity conservation and socio-economic development. At the national level, activities must ensure that land-use planning in TCLs is integrated into national socio-economic development and investment strategies. At core breeding sites, no infrastructure development will be permitted.

Objective 3: Increase and make effective the enforcement of national regulations and international conventions to stop killing of tigers and to regulate illegal harvest and trade of tiger prey.

It is evident that traditional hunting for subsistence has been replaced by commercial hunting, causing severe decline in wildlife populations including tigers. If the current trend continues, they may disappear from the forest ecosystem of Lao PDR within a decade. The major factors behind this

problem are mainly weak law enforcement and poor management of protected areas. Therefore, building capacity within and between enforcement agencies, and providing supports for "on the ground" action is necessary to tackle these illegal activities.

The 2007 Wildlife Law provides good guidelines for the management of wildlife resources, including the control of wildlife crime. The law allows for sustainable harvest of category II (muntjac) and category III (wild pig) species in areas outside TPZs and corridors for family consumption only, but not for trade. Tigers and other large ungulates (e.g. gaur, sambar, banteng, serow), that are Category 1 species, are totally protected from hunting. Hunting of these Category I species for both subsistence and trade is prohibited, and any violation of these regulations will result in a severe penalty, ranging from a fine to jail.

To achieve this objective, implementation will take place at multiple levels. At the priority sites, attempts will focus on building capacity and support for PA staff and local district/provincial enforcement agencies to conduct regular routine and responsive patrols in the tiger core breeding sites to stop poaching of tigers and prey. At the landscape level, attempts will focus on building capacity and support for district/provincial enforcement agencies to stop wildlife trade in markets, restaurants, along roads and at international border checkpoints. At national level, attempts will aim at strengthening the institutional capacity of enforcement agencies, such as Department of Forest Investigation (DOFI), CITES Management and Scientific Authorities and other concerned agencies such as police and custom offices, to enforce the existing laws and strengthen international cooperation to stop cross-border wildlife crime

Objective 4: Increase national cross-sectoral cooperation for the recovery and conservation of wild tigers and their habitats

The National Biodiversity Strategy of Lao PDR emphasizes that conservation and sustainable use of biodiversity resources require co-operation at all levels of government and within Lao society. Therefore, for all management interventions proposed in this Tiger Action Plan to be achieved will require cooperation among all government agencies. Therefore, to achieve this objective, a priority will be to strengthen the capacity of staff to coordinate cross-pectoral actions. A series of meetings/workshops will be held at various levels, namely village, district, province, and national, to increase support and participation in the decisionmaking process.

At the priority sites, activities will focus on strengthening cooperation and coordination among district and provincial government sectors to be aware of and support conservation interventions on the ground (e.g. law enforcement, outreach, land-use planning, etc.), and to ensure that all socio-economic development plans are in compliance with PA regulations. At the landscape level, attempts will focus more on strengthening cooperation between government sectors within/between provinces to ensure connectivity between PAs within a landscape, proper land-use planning and increased local support. At the national level, activities will aim at strengthening cooperation and coordination within and among ministries in order to ensure that conservation of tigers and prey is integrated into national development planning and investment. Of particular concern, no concessions or infrastructure development will be permitted in the core breeding sites for tigers.

Objective 5: Increase international cooperation to reduce the illegal trade of tiger and prey to neighboring countries.

As a signatory to CITES, Lao PDR agrees that any trade in tigers and other endangered species is banned. However, illegal trade in tigers due to the high demand for their body parts for traditional medicine still exists. This is a major cause for the decline of wild tiger populations across tiger range countries, particularly in Lao PDR. Geographically, Lao PDR is located in the heart of Indochina, a landlocked country sharing borders with Thailand and Myanmar to the west, China to the north, Vietnam to the east and Cambodia to the south. Given this setting, strengthening international cooperation with neighbors is critical to control cross-border wildlife trade. Lao PDR has already signed international conventions, including CITES, and is a member of ASEAN-WEN for a number of years and has agreed to control illegal wildlife trade. In order for this objective to be achieved, activities at the priority sites will focus on strengthening cooperation and coordination among local enforcement agencies to stop illegal cross-border wildlife trade along international borders. NPAs also need to work cooperatively with other relevant agencies to develop "Village Development Fund" that may come from sale of NTFPs, park services, ecotourism, and other national/international supports for livelihood improvement. This may demonstrate villagers how tiger conservation is significant to local livelihood and their involvement in conservation. At the national level, attempts will focus on building national capacity for all enforcement sectors to strictly control illegal cross-border wildlife trades at international

checkpoints, and work cooperatively with international enforcement network such as ASEAN-WEN to increase effectiveness of law enforcement.

Objective 6: Monitor and reduce human-tiger conflict in tiger conservation landscapes.

Human-tiger conflict due to tiger depredation of livestock and sometime direct confrontation with humans is a major cause of tiger decline in many tiger range countries. As a top predator, the tiger's requirements may overlap with those of human populations (e.g. diet, land tenure). The conflict generally occurs more commonly inside and around protected areas where cultivation and grazing areas are located inside/nearby the protected area. However, the problem becomes exacerbated if natural prey populations have declined and natural habitats are invaded by human for settlement and agriculture.

In Lao PDR, national protected areas are categorized as multiple-use, IUCN Category VI protected areas, where people are allowed to live within the protected area. Under these circumstances, human-wildlife conflict is possible.
For example, in NEPL NPA, even though tiger numbers are relatively low at present, tiger depredation of livestock is reported by villagers, but the certainty of those reports is not always known. Therefore, it is important to utilize a systematic method to better understand the problem and find ways how to reduce human-tiger conflict. At the priority sites, activities will focus on building capacity for protected area staff to systematically respond to and investigate carnivore-human conflict reports and maintain a carnivore-human conflict database. Also, protected area staff will work with and support farmers to ensure "tiger friendly" livestock management practices, and ensure that those farmers are being trained on technical skills in livestock husbandry. At landscape and national levels, activities will focus on supporting PA regulation, providing technical guidelines to PA staff and farmers, and ensure application of a standardized protocol for all tiger priority sites.

Objective 7: Strengthen PA organization, capacity and sustainable financing to effectively implement management activities to reduce threats to tigers and prey at priority source sites in Class 1 and 2 tiger conservation landscapes.

Following up from Prime Minister' agreement No. 25/PM, dated on 3rd April, 2007, the Provincial NPA Management Unit (PPAMU) was newly established in each province throughout Lao PDR. The mandate of PPAMU is to strengthen PA management in each province in order to protect and conserve forest, wildlife, and watershed resources. In addition, this agreement has emphasized that each NPA must be assigned at least 15 government staff, provided sufficient equipment, vehicles and financial support to implement management interventions.

Up to now, only two protected areas (NEPL and NK) in two Tiger Conservation Landscapes have management plans designed to reduce threats specific to the conservation of wild tigers and prey. A site-specific management plan is urgently needed for each priority site or landscape. The plan should set the goal and objectives clearly, lay out all key threats to tigers, their prey, and their habitats and all key interventions that tackle those problems. Due to inadequate financial support, only a few of the 21 NPAs throughout Lao PDR with technical and financial assistance from international organizations or industry are under proper management at the present time, namely NEPL, NKD, NNT. A sustainable financing mechanism in each priority site or tiger landscape is needed to secure long-term financial support.

To achieve this objective, activities will aim at building staff capacity of PPAMU at priority sites or landscapes to

I) identify and rank threats to wild tigers and prey,
ii) design management activities that will reduce the greatest threats, and
iii) implement site-specific plans for conservation of wild tigers and prey. Technical training provided to NPA or PPAMU staff need to include;
    a) principles of tiger ecology and conservation and of wildlife management,
    b) how to integrate wildlife management with rural livelihoods and development,
    c) group leadership, communication and coordination skills, as well as conflict resolution for mitigating resource disputes and stakeholder disagreements,
    d) tools for financial and administrative management of TCLs, including budgeting, fundraising, and reporting.

In addition, at each site attempts should focus on creating an "NPA Management Fund", which generated revenue from ecotourism, fines, research fees, and gifts to support the management. This may be an option for long-term sustainable financing mechanism for each priority site or landscape. At national level, attempts should ensure that national funding is allocated to NPA management, and to work together with international partners to consider REDD project sites as an option for sustainable long-term financing for NPA management in tiger landscapes.

Table 6. Scale-dependent implementation of interventions.

	Interventions	Leading agency	Collaborate agency	Indicator	Means of verification	Short-term 2010-2015	Mid-term 2016-2020
Objective 1: Increase public awareness and support for the recovery and conservation of wild tigers and their habitats							
Tiger Source Sites	**Intervention 1.1.** Establish and train protected area outreach units to design, deliver and evaluate the effectiveness of outreach activities.	**NPAs**	**PAFO, DAFO**	**Number of NPA outreach staff trained**	**Roster of trained NPA staff**		
	Intervention 1.2. Compile and disseminate national laws, PA regulations and zoning to source site communities and authorities.	**NPAs**	**PAFO, DAFO**	**Awareness program and materials**	**Report on awareness materials and their distribution.**	X	
	Intervention 1.3. Develop and ratify village contracts that ensure compliance with laws and regulations to protect tigers and sustainably manage the use of tiger prey species and habitats.	**NPAs**	**PAFO, DAFO, Law agency**	**Number of villages contracted**	**Published reports listing completed village contracts**	X	
Tiger Landscapes	**Intervention 1.4.** Disseminate national laws and PA regulations that protect tigers and sustainably manage their prey and habitats to communities and authorities across Class 1 and Class 2 TCLs.	**NPAs, DAFO**	**PAFO, Media agencies**	**Awareness programs implemented, and materials**	**Media pick up; Report on awareness materials and their distribution.**	X	X
Nationa	**Intervention 1.5.** Conduct outreach activities to raise awareness of national agencies and authorities of the importance of wild tigers and their conservation.	**DFRC**	**MAF, Media agencies**	**Awareness programs**	**Media pick up, meetings, published reports on awareness materials and their distribution**	X	X

Table 6. Scale-dependent implementation of interventions.

	Interventions	Leading agency	Collaborate agency	Indicator	Means of verification	Short-term 2010-2015	Mid-term 2016-2020
Objective 2: Identify and demarcate totally protected zones (TPZs) in protected areas and corridors for connectivity between TPZs in tiger conservation landscapes.							
Tiger Source Sites	**Intervention 2.1.** Increase knowledge on the status of tigers and prey in NPAs using scientificsound methods	NPAs	DAFO, PAFO	Completion of rigorous science- based field surveys	Published technical reports	X	
	Intervention 2.2. Compile land use and socioeconomic data to inform the demarcation of PA zones.	NPAs	PAFO, DAFO	Completion of rigorous science- based field surveys	Published technical reports	X	
	Intervention 2.3. Identify and demarcate PA boundaries of source sites.	NPAs	PAFO, DAFO	Boundary demarcation signs, maps	Published technical reports with boundary maps	X	
	Intervention 2.4. Following, the 2007 National Forestry Law, within PAs identify and demarcate large areas, at least 1,500 km2 in size, of TPZs, and corridors between TPZs.	NPAs	PAFO, DAFO, LMU	Land use map showing PA TPZ	Published technical reports with PA and TPZ maps	X	
	Intervention 2.5. Conduct village land-use planning and allocation in PA controlled use zones to ensure public compliance with NPA zoning.	NPAs,	PAFO, DAFO, LMU, village	Village meetings, regulations	Official village land use planning agreements and maps	X	
Landscape	**Intervention 2.6.** Identify and demarcate protected corridors of habitat connectivity to facilitate dispersal of tigers between source sites within TCLs and between TCLs.	NPAs	PAFO, DAFO, LMU, village	Established corridors	Published technical reports with corridor maps	X	X
	Intervention 2.7. Conduct village land-use planning and allocation outside of PA boundaries to ensure compliance with PA zoning and corridors within TCLs.	NPAs	PAFO, DAFO, LMU, village	Number of villages with land use maps	Official village land use planning agreements and maps	X	

Table 6. Scale-dependent implementation of interventions.

	Interventions	Leading agency	Collaborate agency	Indicator	Means of verification	Short-term 2010-2015	Mid-term 2016-2020
Objective 2: Identify and demarcate totally protected zones (TPZs) in protected areas and corridors for connectivity between TPZs in tiger conservation landscapes.							
National	**Intervention 2.8**. Approve PA management plans to ensure crosssectoral compliance with PA TPZs and corridors.	**DFRC**	**DOF, MAF**	**Approved management plans**	**Number of PA management plans completed and approved**	**X**	
	Intervention 2.9. Manage land concessions and infrastructure development in TCLs to comply with PA management plans and zoning.	**DOF**	**MAF,DCPI, MI, MEM, MT**	**Infrastrucutre and concession management plans that comply with PA regulations**	**Infrastructure and concession management plans endorsed and regulated.**	**X**	
Objective 3: Increase and make effective the enforcement of national regulations and international conventions to stop killing of tigers and to regulate illegal harvest and trade of tiger prey.							
Tiger Source Sites	**Intervention 3.1**. Establish, train, and coordinate a multisectoral law enforcement team to effectively implement PA regulations, CITES and CBD international conventions at source sites.	**NPAs**	**DAFO,PAFO, Military, police, justice, custom, provincial and district government**	**Number of staff trained and actively serving on this task**	**Reports on enforcement of PA regulations and international conventions.**	**X**	
	Intervention 3.2. Develop and implement PA protection strategies that identify threats to wild tigers and prey at source sites and target enforcement activities to reduce threats.	**NPAs**	**PAFO, DOF, DOFI**	**Level of threats and enforcement**	**Reports on the results of threat and enforcement monitoring**	**X**	
	Intervention 3.3. Establish and support effective foot patrols within PA TPZs and corridors to stop illegal poaching of tigers and prey.	**NPAs,**	**PAFO, DOF, DOFI, DAFO, military, police, custom,**	**Foot patrol effort n and level of illegal poaching**	**Reports on the results of threat and enforcement monitoring**	**X**	**X**

	Interventions	Leading agency	Collaborate agency	Indicator	Means of verification	Short-term 2010-2015	Mid-term 2016-2020
Landscape	**Intervention 3.4.** Build village informant networks to support enforcement to stop illegal poaching of tigers and prey at source sites	**DFRC**	**DAFO, police, military, custom**	**Informant reports that lead towildlife seizures**	**Reports on the results of threat and enforcement monitoring**	X	X
	Intervention 3.5. Install PA law enforcement monitoring systems (e.g. MIST) to systematically monitor, evaluate and adapt law enforcement activities.	**DOF**	**DFRC, WCS**	**Installation of MIST**	**Reports on the results of threat and enforcement monitoring**	X	
	Intervention 3.6. Following the 2007 Wildlife Law, manage for the sustainable harvest of Category 2 and 3 tiger prey in areas outside of PA TPZs and corridors.	**NPAs**	**DAFO, PAFO, Military, Police, Custom, Commerce**	**Sustainability of the harvest of tiger prey**	**Off take monitoring; abundance of tiger prey**	X	X
	Intervention 3.7. Strengthen and coordinate between enforcement agencies at district and provincial levels to stop illegal trafficking of tigers, prey and other wildlife along roads and at restaurants and markets.	**NPAs**	**DAFO, PAFO, Provincial/district gov, Customs, Police, Commerce**	**Level of illegal trafficking and enforcement**	**Reports on the results of threat and enforcement monitoring**	X	X
National	**Intervention 3.8.** Strengthen national capacity and international cooperation at border crossings to adhere to CITES and stop illegal cross-border trade in tiger parts and tiger prey.	**DFRC**	**NPAs, PAFO, DOF, MAF, Custom, Commerce, Police**	**Number of staff trained and actively serving on this task**	**Reports on enforcement at border crossings**	X	X
	Intervention 3.9. Strengthen the capacity and increase effectiveness of the CITES Management and Scientific Authorities to regulate trafficking of tigers and their prey.	**DOFI**	**DOF, MAF**	**Workshops; number of staff trained and actively serving on this task**	**Manuals, reports on staff trained and regulation activities.**	X	X

	Interventions	Leading agency	Collaborate agency	Indicator	Means of verification	Short-term 2010-2015	Mid-term 2016-2020
	Intervention 3.10. Closely monitor and regulate facilities that hold captive tigers and prey to assure compliance with CITES regulations and national wildlife laws.	DOFI	DOF, MAF	Level of monitoring and regulation	Published reports on monitoring, regulation and compliance.	X	X
Objective 4: Increase international cooperation to reduce the illegal trade of tiger and prey to neighboring countries.							
Tiger Source Sites	**Intervention 4.1.** Increase coordination between national government authorities at source sites and nearby border enforcement agencies to monitor and reduce the illegal cross-border trade of tigers and prey.	NPAs	DAFO, PAFO, Custom, Police, Commerce	Level of threats and enforcement	Reports on the results of threat and enforcement monitoring, media pick up	X	X
	Intervention 4.2. Raise the awareness of customs authorities and other relevant border enforcement agencies of the CITES, related national wildlife legislation and regulations, the nature of tiger and prey trade regionally, and how to identify, confiscate and handle illegally traded tigers and prey.	DFRC	PAFO, DOFI, DOF, MAP	Number of staff trained and actively serving on this task	Reports on training and enforcement at border crossings	X	X
Landscape	**Intervention 4.3.** Convene relevant border enforcement agencies to develop strategies for trans-boundary collaboration to control the illegal trade of tigers and prey between Laos and neighboring countries.	DOFI	DOF, Custom, Police, Commerce	Workshops	Published workshop reports and resulting strategies	X	X

	Interventions	Leading agency	Collaborate agency	Indicator	Means of verification	Short-term 2010-2015	Mid-term 2016-2020
	Intervention 4.4. Increase collaboration between national officials responsible for tiger conservation with the ASEAN Wildlife Enforcement Network, TRAFFIC and CITES to strengthen, and monitor change in, the enforcement capacity and effectiveness of customs authorities and other relevant border enforcement agencies to reduce illegal trafficking of tigers and prey.	DOFI	DOF-DFRC, MAO, Custom, Police, Commerce	Workshops, enforcement capacity, wildlife seizures	Reports from enforcement and trade monitoring, media pick up	X	
Objective 5: Increase national cross-sectoral cooperation for the recovery and conservation of wild tigers and their habitats							
Tiger Source Sites	**Intervention 5.1.** Convene regular forums within and between all government sectors at the district and provincial level to raise awareness, compliance with and support for national and PA regulations and zoning to reduce threats to wild tigers, prey and their habitat at source sites.	NPAs	DAFO, PAFO, Military, Police, Custom, Health, Infrastructure, Commerce	Meetings; awareness and compliance with regulations and zoning	Meeting minutes, reports on levels of awareness, compliance and support.	X	X
	Intervention 5.2. Increase coordination between PAs and provincial tourism offices to assure that ecotourism activities at tiger source sites generate financial support for PA management and communities resulting in incentives for the conservation of wild tigers and their habitats.	NPAs	DAFO, PAFO, Provincial/district gov., Tourism	Financial support from tourism for conservation of tigers	Reports on distribution of tourism revenue in PAs	X	X

	Interventions	Leading agency	Collaborate agency	Indicator	Means of verification	Short-term 2010-2015	Mid-term 2016-2020
Landscape	**Intervention 5.3**. Work in partnership with concerned agencies and other development sectors to develop "Village Development Fund" in target villages.	NPAs	DAFO, PAFO, Forest Development Fund, Tourism	# of set-up funds and cash in each village	Participation in conservation, reports, media pick up	X	X
	Intervention 5.4. Assign a multidisciplinary team to systematically assess large-scale land concessions and infrastructure development projects to minimize the impact on wild tigers and their habitats at source sites in the landscape.	PAFO	PAFO,DOF, Provincial/ national LMU/ Planning & Investment	Land use maps and regulations to minimize impact	Published regulations and maps	X	X
Nationa	**Intervention 5.5.** Create and convene a forum for regular dialog within and among all government ministries to integrate awareness and conservation of wild tigers and their habitats into national planning and investment.	DOF- DFRC	MAF, Other sectors	National meetings, national planning and investment plans that consider wild tigers and habitat	Published planss, media pick up	X	X
	Intervention 5.6. Increase national, provincial and district capacity to coordinate crosssectoral management for conservation and recovery of wild tigers and their habitats.	DOF- DFRC	MAP, Other sectors	Workshops. Cross-sectoral management plans	Workshop reports, cross-sectoral plans, media pick up	X	
	Intervention 5.7. Increase government and private sector support in the ecotourism industry for the conservation and recovery of wild tigers and their habitats.	DOF- DFRC	Tourism-government and private sectors, Media agencies	Level of support from tourism for conservation of wild tigers	Reports on tourism support for tiger conservation	X	X

	Interventions	Leading agency	Collaborate agency	Indicator	Means of verification	Short-term 2010-2015	Mid-term 2016-2020
Objective 4: Increase international cooperation to reduce the illegal trade of tiger and prey to neighboring countries.							
Tiger Priority Sites	**Intervention 6.1.** Train and equip all PA field staff to systematically respond to and investigate carnivore-human conflict reports and to maintain a carnivore-human conflict database.	NPAs	DAFO, PAFO	Workshops number of staff trained and actively engaged on this task, database	Report on results of human-carnivore conflict monitoring and response	X	X
	Intervention 6.2. Regulate livestock management in PA controlled use zones to ensure livestock are attended by day and corralled at night.	NPAs	DAFO, PAFO	Livestock raising techniques	Maps of grazing areas	X	X
	Intervention 6.3. Train and support farmers to implement "tiger-friendly" livestock management practices at tiger source sites.	NPAs	DAFO, PAFO	Training workshops; management practices	Reports, manuals	X	X
	Intervention 6.4. Support livelihood alternatives for farmers to reduce hunting pressure on wild ungulates	NPAs	DAFO, PAFO, Forest Deve- lopment Fund, INGOs, Development sectors				
Landscape & national	**Intervention 6.5.** Develop and promote agricultural techniques in tiger conservation landscapes that increase productivity while reducing human-tiger conflict and loss of tiger habitat.	NPAs	DAFO, PAFO	Training workshops; level of conflict and habitat loss	Reports on workshops and results of conflict and habitat monitoring	X	X

	Interventions	Leading agency	Collaborate agency	Indicator	Means of verification	Short-term 2010-2015	Mid-term 2016-2020
Objective 7: Strengthen PA organization, capacity and sustainable financing to effectively implement management activities to reduce threats to tigers and prey at priority source sites in Class 1 and 2 tiger conservation landscapes.							
Tiger Priority sites and Landscapes	**Intervention 7.1.** Strengthen the capacity and organization of provincial PA management units at source sites to i) identify and rank threats to wild tigers and prey, ii) design management activities that will reduce the greatest threats, and iii) implement site-specific plans for conservation of wild tigers and prey.	NPAs	PAFO, DOF	Strategic planning workshops, site-specific plans	Site-specific plans	X	X
	Intervention 7.2. Train provincial PA offices and PA management units at priority sites in: principles of tiger ecology and conservation and of wildlife management, how to integrate wildlife management with rural livelihoods and development, group leadership, communication and coordination skills, conflict resolution for resource disputes and stakeholder disagreements, tools for financial and administrative management of TCLs, budgeting, fundraising, and reporting	NPAs	PAFO, DOF	Staff trained, level of capacity	Published reports on staff trained and capacity	X	X
	Intervention 7.3. Establish PA Management Fund from fines, ecotourism and research fees, and gifts to support site management.	NPAs	DAFO, PAFO, Provincial/dist ricts authori-ties, Energy & Mining, Forest Development fund	PA Management Fund	Published reports on establishment and management of fund	X	X

	Interventions	Leading agency	Collaborate agency	Indicator	Means of verification	Short-term 2010-2015	Mid-term 2016-2020
National	**Intervention 7.4.** Secure financial support for source sites to implement Prime Minister's agreement No. 25/PM, dated 3rd Apr 2007, including recruitment of staff, building of facilities, and equipment procurement for PA management.	MAF	DOF, Forest Development fund	Government funding for PA management	PA annual reports	X	X
	Intervention 7.5. Increase government and private sector support from large-scale infrastructure projects for the conservation and recovery of wild tigers and their habitats at source sites.	DOF	MAF, INGOs, Forest Development Fund	Financial support, development plans	Published reports	X	X
	Intervention 7.6. Investigate the feasibility of long-term support for priority site management from international initiatives such as REDD (Reducing Emissions from Deforestation and Forest Degradation).	DOF	MAP, INGOs,	Research programs to investigate long-term support	Published feasibility studies	X	X

6. IMPLEMENTATION OF THE ACTION PLAN

6.1. Adaptive Management

A successful Tiger Action Plan should broadly speaking apply the following adaptive management steps (Figure 9):

Define the Context: The Plan defines where we want to work and what we want to conserve, also identifying the most important threats and where they occur within the landscape of interest. Developing a conceptual model for the Plan is a useful tool for determining what actions to take to address the threats to reach the goal.

Design Approach and Measures of Success: In the Plan, we strategically identify our interventions so we are confident that they will help abate the most critical threats, while putting in place a process for measuring the effectiveness of our conservation actions by monitoring indicators through various means of verification (Table 6), and using this information to guide our decisions.

Implement Actions and Measure Effectiveness: Following the Plan, we develop and implement interventions taking account the available resources and capacity. We collect and analyze the data to assess how well the interventions are being implemented, to what degree the threats are being successfully mitigated and whether wild tigers, their prey and habitats are doing as well as we hoped.

Review Progress and Revise Approach: Based on the monitoring results, we adapt the interventions and refine the monitoring design to achieve the goal and vision of the Plan.

6.2. Accountability

All participants working to stabilize and recover tiger populations in Lao PDR as described in the goal and objectives of this Plan will be held accountable for their actions by their peers and superiors. Lines of reporting should reflect the existing structure of different teams responsible for implementing interventions. At priority sites, teams of staff working on various activities, ranging from management, enforcement, to outreach and tiger and prey

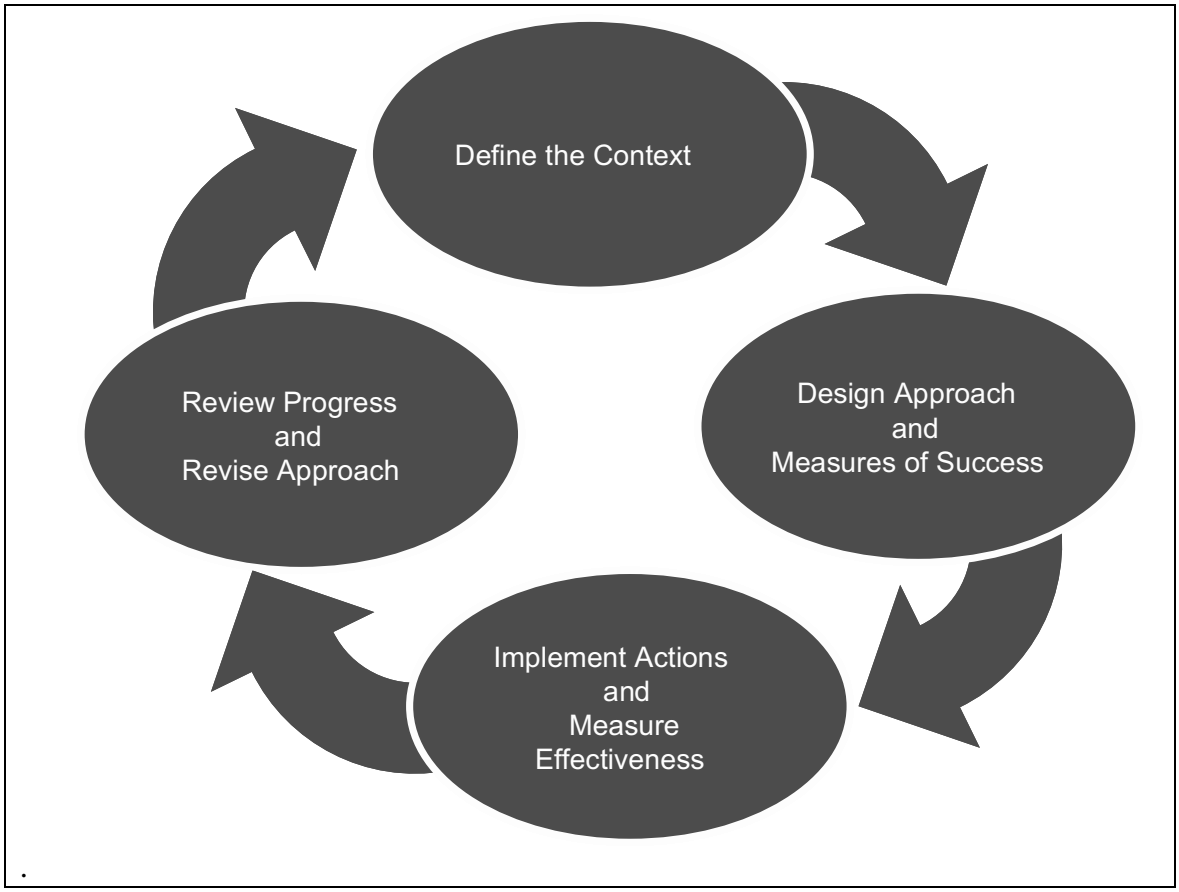

Figure 9: The adaptive management cycle 59

monitoring are needed. Progress reports shared between the entire team is critical. This allows each team leader to report on their progress and difficulties in attaining their objectives to the entire management team. Having team members report to and be accountable in this manner can help create a truly high performance team.

At the landscape level, administrative authorities such as DAFOs, PAFOs and PPMUs are directly responsible for cooperation and coordination with concerned agencies at both central and local levels to implement the activities on the ground. They are accountable to one another by the binding pledge to work together towards the unified vision and goals of this Plan, and monitor movement towards accomplishment of those goals.

At national level, this Plan is developed in parallel to various national policies, which contribute to achieving national development goal and commitment to international community through multilateral environmental agreements. Central government agencies like MAF, DOF, and DFRC are directly responsible for cooperation and coordination with central concerned agencies, and other international bodies. They need to ensure that government funding is appropriately allocated to PA management and work together with implementing agencies to ensure they link their budget, annual performance measures to the goal and objectives of this Plan. For example, this would include linking annual performance measures of progress towards reducing the threat of poaching on wild tigers.

6.3. Monitoring Mechanism

Monitoring will track progress over time towards achieving the goals and objectives laid out in this Plan. Monitoring is a crucial component of good conservation management. It allows us to assess whether or not threats are decreasing, and if tiger and prey populations and their habitat are increasing or remaining stable. Through monitoring we can test our assumptions as to whether our interventions actually lead to what we want to achieve, or are if they wasted effort. Monitoring tracks changes over time and this distinguishes it from a survey, which estimates conditions at a single point in time. Instead, monitoring uses survey results at many instances in time.

Looking at the components of our conceptual model (Figure 5), ideally we should monitor all of the following to get the most information about the effectiveness of our actions: the interventions, the threats and the conservation targets-which are wild tigers, prey and their habitat. We should monitor our interventions to make sure that they are being implemented as we planned. For example, are trained forest guards patrolling in the Totally Protected Zone of the NPA? Since our interventions are chosen to reduce the levels of threats to tigers, prey and their habitat, we should also monitor our success in reducing threats to assess whether or not our interventions were worthwhile. For example, is there a reduction in the number of metal snares in the area being patrolled? Lastly, we look at the status of tigers, prey and their habitat that form our conservation targets to see whether they improve when our interventions are implemented successfully, and threats are reduced. For example, are tiger numbers increasing as a result of the reduction of snares?

The improved state of wild tigers is the ultimate indicator of success of this plan and knowing what that state of tigers is gives us the greatest level of confidence that we might be doing the right thing, yet this is usually the most difficult monitoring to do, costs the most, and may have longer lag-times (see Figure 9). If we monitor the intervention results and threat reductions as proxies for our progress there are definite tradeoffs. The time frame to seeing results and the costs of monitoring decline as we move from directly monitoring changes in tigers, prey and their habitats, to monitoring reduction in threats, to monitoring whether or not our interventions were implemented as planned. However, using these proxies that change within a shorter time frame also lowers our level of confidence in whether the information informs us meaningfully about our actual conservation success to recover and maintain viable tiger populations at our source sites and landscapes.

Monitoring the conservation target: wild tigers and their prey Wild tigers are the primary beneficiary of this plan so the success of any conservation action will be reflected in their population status (e.g. distribution and abundance) and dynamics. The indicator of success is measured in tiger occupancy across landscapes and population sizes or densities in priority areas. At landscape level, the occupancy survey will determine the distribution of and the proportion of existing habitats occupied by not only wild tigers but also all key prey mammals that can be detected by signs. In priority areas, such as NEPL NPA, where tiger presence has been confirmed, absolute population abundance will be determined using intensive-camera trapping surveys. With improved protection of tigers, their prey, and their habitats, in those priority sites, we expect to see increase in tiger abundance in those priority sites and occupancy of the landscape by 2020. A monitoring system in place nationwide, will follow this basic

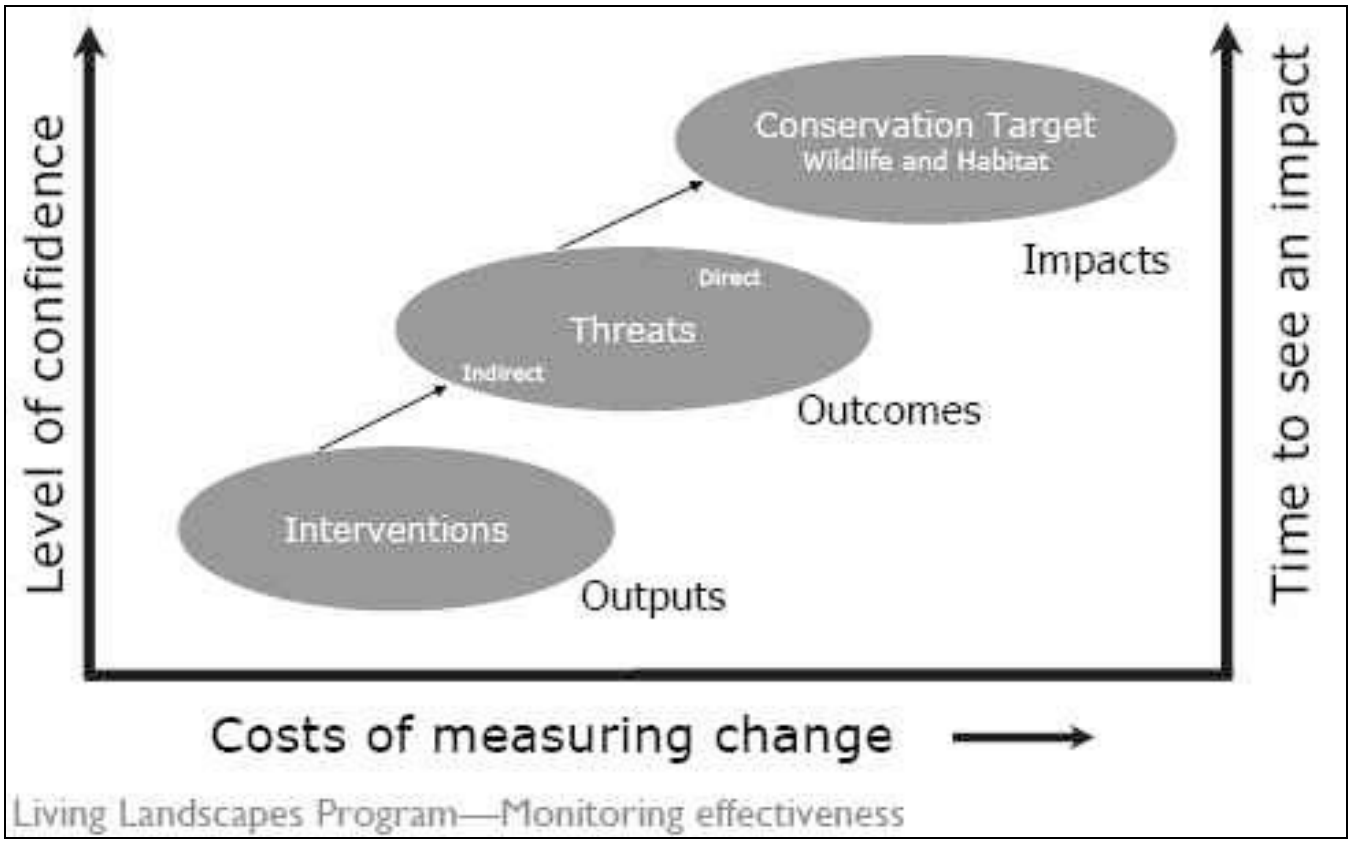

Figure 9: The relationship between confidence, cost and time to results for the different conceptual model components that could be monitored over time. Monitoring interventions, threats or conservation targets is frequently referred to measuring our outputs, outcomes and impacts, respectively. (Source: Wilkie et al., 2006).

sampling framework using standardized internationally accepted scientific methods to measure change in the status of wild tigers and their prey over time.

6.4. Monitoring wild tigers and prey at priority sites

i) Intensive camera trapping survey to obtain a tiger population estimate

The most reliable way of assessing tiger population recovery at a priority site is to directly measure tiger densities (number of tigers/100 km2) in the area of interest. This can be accomplished through capture-recapture analysis using camera trapping or fecal DNA from tiger scats. To do such a survey, it is critical to engage in sound survey designs and analyses by collaborating with experienced scientists who can advise the process to assure that funding is well spent to get the information desired. Some useful guidelines for designing tiger surveys are laid out by Karanth and Nichols (2002, 2010). They emphasize that it is critical that the area surveyed is large enough to capture as many individual tigers as possible and that sufficient effort is employed to increase the probability of detecting tigers if they are present. In Laos, where tiger densities are extremely low, the effort required to detect tigers is considerable (a minimum of 500 camera trap days per 100 square kilometers surveyed) and, ultimately, expensive. Monitoring should be conducted at regular intervals to measure how tiger abundance is changing over time as a result of your interventions.

ii) Occupancy surveys to obtain a prey population estimate Ideally it is desirable to be able to estimate prey densities using line transect distance sampling methods. However, because of the rarity of sightings of animals in the forests of Laos due probably to low number of animals, wariness of human presence, and the rugged mountainous terrain found in many areas the direct count of animals using distance sampling is impractical. This method requires numerous sightings of prey species, which is not yet feasible at most locations in the Laos. Instead a repeated sign-based presence/absence survey that is conceptually similar to a capture-recapture scheme developed by McKenzie (2002) is likely

possible to assess the population dynamics of ungulates. The method is based on a model and likelihood-based approach in estimating rates of sites being occupied by species of interest when detection probabilities are less than one. At the present time, the occupancy survey is the most reliable way to monitor change in large ungulate populations at source sites in Laos based on encounter rates of prey signs (tracks and dung) derived from field surveys conducted in an occupancy modeling and estimation framework64. Given the estimated ratio of tigers to prey (1 tiger for every 500 large ungulates) the abundance of ungulates can also be used to indirectly estimate the potential carrying capacity for tigers of a site65.

Monitoring threats and interventions

In this Plan, Table 6 outlines key objectives and interventions for achieving the goal of recovering wild tigers, their prey and habitats in Laos. For each intervention, indicators and a means of verification are suggested for determining if your intervention was successfully completed to achieve the objective. Depending on the threats and interventions present at each site, this Plan identifies appropriate monitoring activities to assist managers to evaluate if the interventions being implemented are effective at reducing key threats to tigers, prey and their habitat at the site.

In addition to the indicators shown in Table 6, this Plan also recommends that law enforcement monitoring be conducted at priority sites to provide regular information about the status of threats to tigers, prey and their habitat at sites (e.g., hunting, logging, shifting cultivation, wildlife trade) and the capacity of management to effectively respond to these threats In Laos, MIST (Management Information System) is an information management tool that is designed for ranger-based law enforcement monitoring, which is being used successfully at several NPAs including Nam Et-Phou Louey, Nam Kading and Nakai-Nam Theun. For example, changes in illegal activity are reflected in shifts in the spatial distribution of encounters with poachers and illegal camps, snaring or trapping incidents, illegal logging or forest clearance. Accurate and timely reporting via MIST helps to inform and alert PA managers of these changes, allowing them to alter their enforcement strategy through changes in the allocation of resources to the new hotspots. Walston et al. (2010) provide further detailed guidelines on establishing a law enforcement monitoring system for tiger source sites.

Stakeholder Engagement

A National Tiger Action Plan committee will be established to secure sustainable funding, oversee the implementation of interventions, and monitor progress towards achieving goals in priority source sites and Tiger Conservation Landscapes. The committee will work to ensure the continued involvement of all stakeholders at the site, landscape and national level in the recovery program for tigers.

At priority sites: Here the National Protected Area management units (NPAMU) will take a lead in cooperation and coordination with other local government agencies, e.g. police, customs, military, DAFO, tourism, and international conservation agencies and donors to implement management interventions on the ground. Alongside these management activities, the NPAMU is responsible for measuring the progress of project activities using internationally accepted scientific methods.

At landscape level: DAFO, PAFO, and the Provincial Protected Area management units (PPMU) are responsible for cooperation and coordination between government agencies at provincial and central levels, providing supervision to NPAMU on technical perspective to ensure the on-ground interventions are on the right track, and work together with other agencies to suppress illegal trade of tigers and their prey, and to ensure connectivity within/between landscapes.

At national level: MAF, DOF, and DFRC are directly responsible for cooperation and coordination with central government agencies and other international organizations to ensure that the Plan is;

i) integrated into national development plan and investment,
ii) is in compliance with other international agreements,
iii) is supported by donors, and
iv) taken into the on-the-ground implementation.

Public Reporting

In order to gain support for the recovery of wild tigers, their prey and habitats in Lao PDR, The NTAP committee will regularly update stakeholders and the general public of the results and outcomes of interventions made under the NTAP, via radio announcements, newsletters and newspapers. An NTAP website will be designed, maintained, and regularly updated to facilitate dissemination of information about the implementation of the Plan

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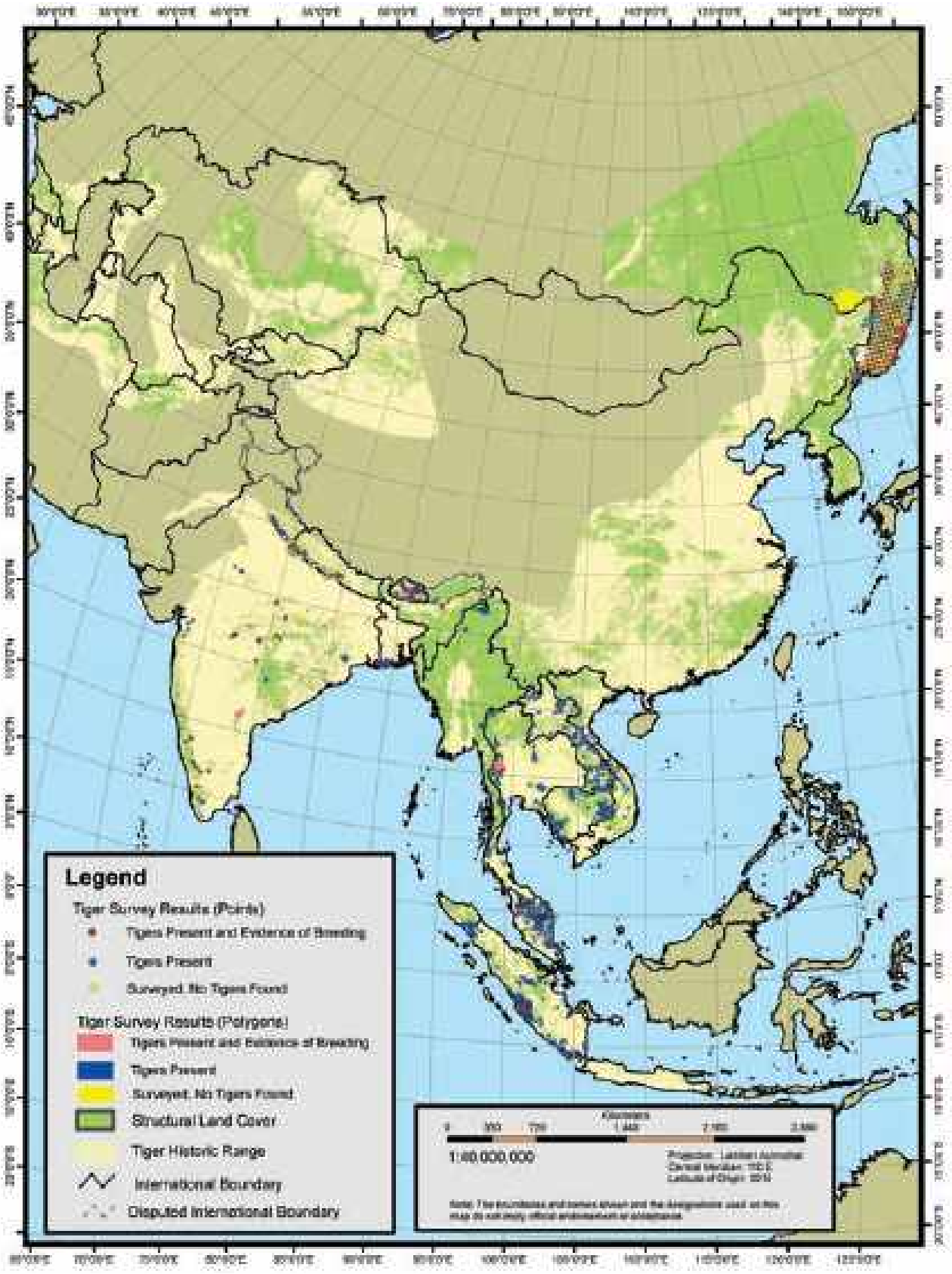
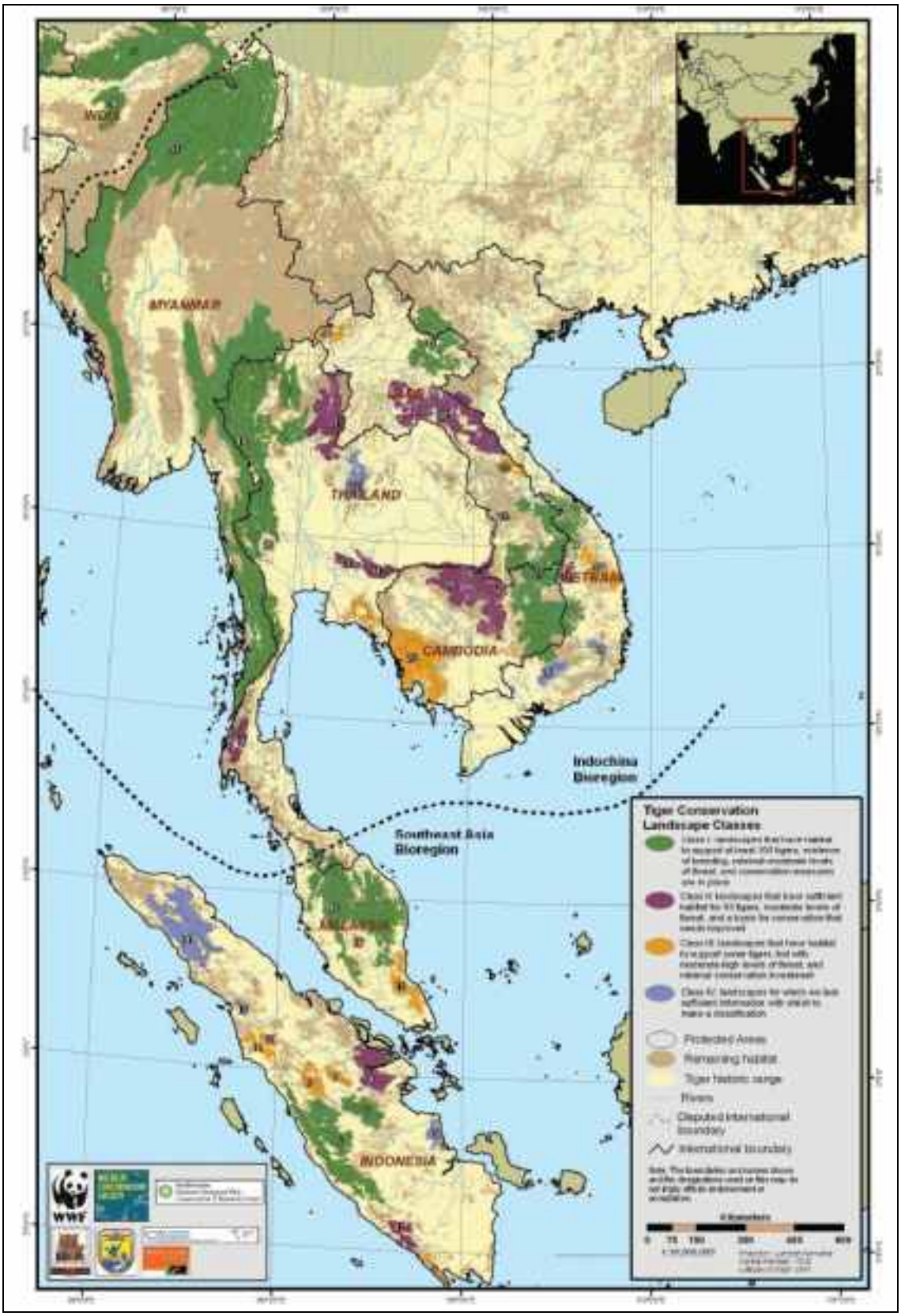
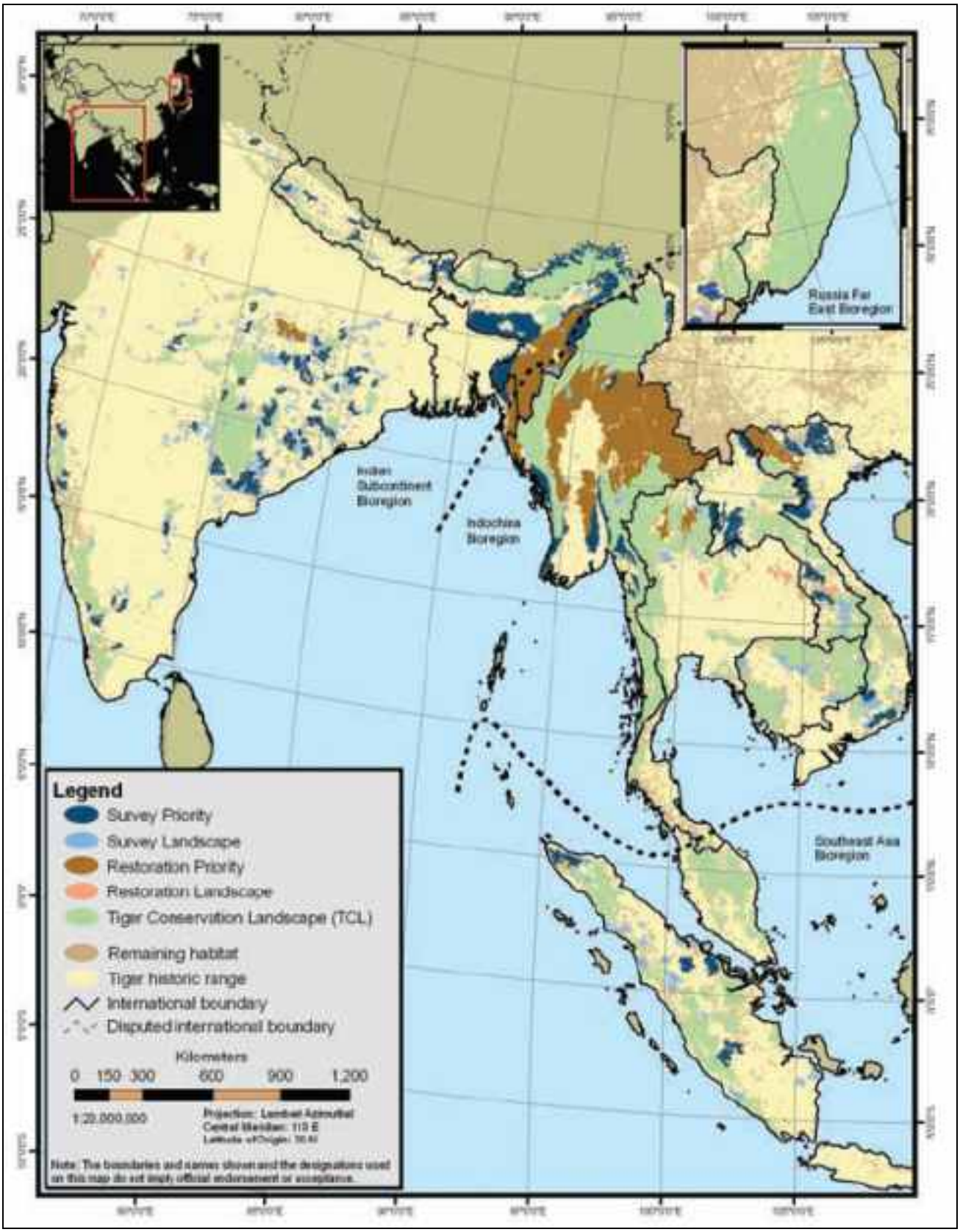


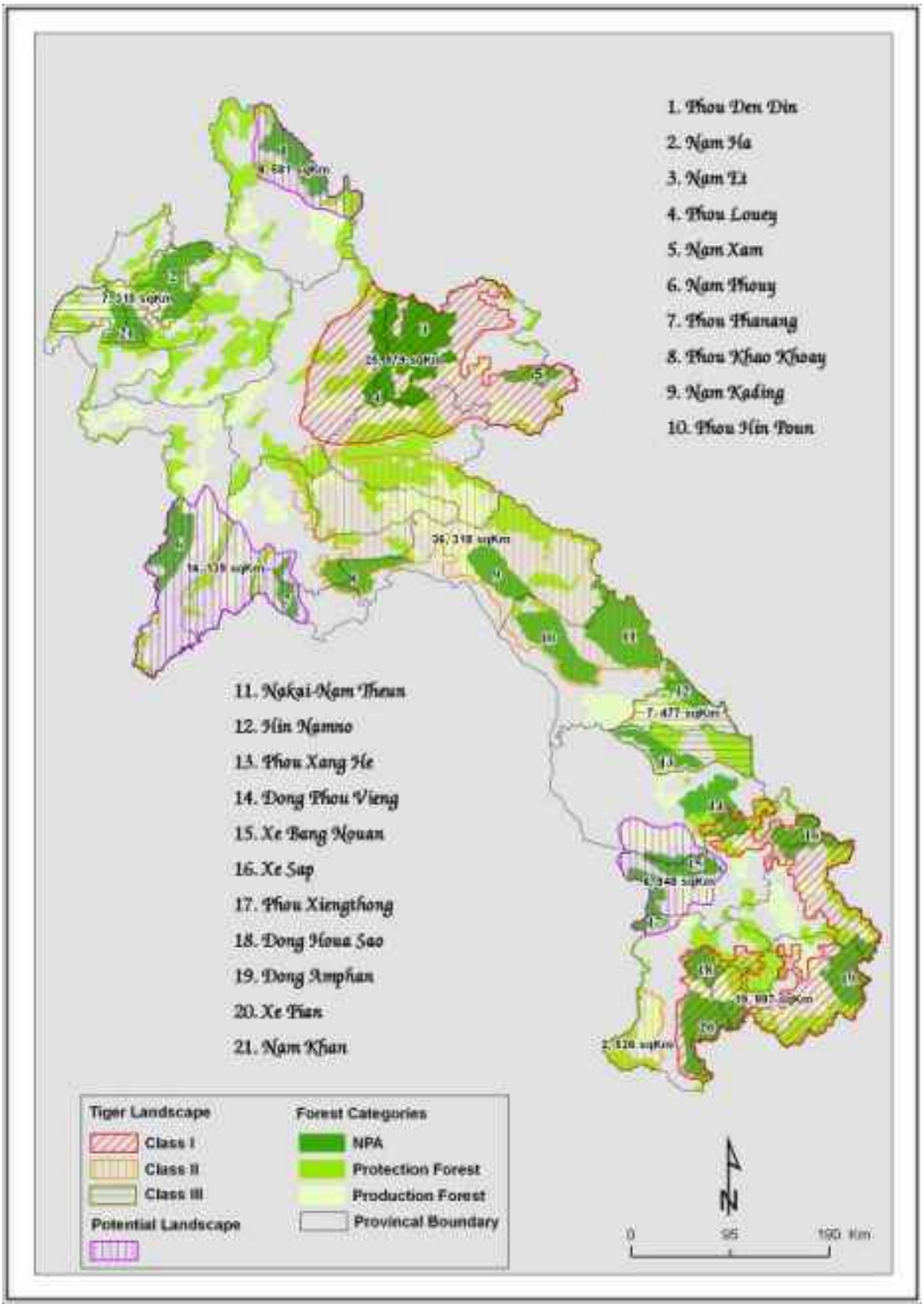
Appendix 1. Tiger survey reports (1995-2005)
(Source: Sanderson *et al.* 2006)



Appendix 2. Tiger Conservation Landscape Prioritization based on tiger records from 1995-2005.
(Source: Sanderson *et al.* 2006).



Appendix 3. Survey and restoration priorities based on tiger records from 1995-2005. (Source: Sanderson et al. 2006)



Appendix 4. National protected areas and tiger conservation landscapes in Lao PDR.

Appendix 5. Lao PDR Tiger Conservation Workshop 2009 Participants

Appendix 6. Agenda of Tiger Conservation Workshop 2009

Time		Items	Responsible agency
8:00-8:30	30	Registration	DFRC
Day 1			
8:30-8:45	15	Opening Speech	DFRC (Khamphan)
8:45-9:00	15	Introduce participants	DFRC (Bouaphan)
9:00-9:30	30	Introduce steps in preparing Tiger National Action Plan; workshop objectives	DFRC (Bouphanh)
9:30-10:15	45	Status of tigers in Lao PDR (Background Notes sections 1-3)	WCS (Chanthavy)
10:15-10:30	15	Break	
10:30-11:15	45	Status of tiger conservation in Lao PDR (Background Notes sections 4-7)	WCS (Chanthavy)
11:15-11:35	20	Tiger Action Plan: Nam Et-Phou Louey National Protected Area	WCS (Venevongphet)
11:35-12:00	25	Smart Infrastructure	World Bank(Sombat)
12:00-13:00	60	Lunch break	
13:00-13:30	30	National Tiger Action Plan: Methods and Terms	WCS
13:30-14:15	45	Vision and goal for tigers in Lao PDR	WCS; participants
14:15-14:30	15	Direct threats	WCS; participants
14:30-14:45	15	Break	
14:45-16:15	90	Indirect threats (landscape working groups)	WCS; 8 working groups
16:15-16:30	15	Closing afternoon session	DFRC (Bouaphanh)
18:00		Reception & Dinner	All participants
Day 2			
8:00-8:30	30	Registration	DFRC
8:30-8:45	15	Review of Day 1	DFRC (Bouphanh)
8:45-10:00	75	Interventions-select actions to reduce threats	WCS; 8 working groups
10:00-10:15	15	Break	
10:15-12:00	45	Interventions-select actions to reduce threats	WCS; 8 working groups
12:00-13:00	60	Lunch break	
13:00-14:00	60	Interventions-select actions to reduce threats	WCS; 8 working groups
14:00-14:30	30	Groups report results (10 minutes each)	3 working groups
14:30-14:45	15	Break	
14:45-15:35	50	Groups report results(10 minutes each)	5 working groups
15:35-16:15	30	Review of Day 2 and next steps	
16:15-16:30	15	Workshop closing	DOF (Khamphanh)

Appendix 7. Lao PDR Tiger Conservation Workshop 2009 Participants

No	Name and surname	Organization Agency	Telephone
1	Mr Subanh	Phoukhaokouay NPA – army	3320065
2	Mr Sut Thiphong Vongsaiya	Scientific Authority (CITES), Science and Technology Agency, Prime Minister' Office	9895550
3	Mr Bounthan Pilachan	Division of Forest Resources Conservation (DFRC), Department of Forestry (DOF)	2401099
4	Mr. Olavanh Dengdaravong	DFRC, DOF	6229784
5	Mr Sivone Sonemany	Viengkham DAFO, Luangprabang Province	5296461
6	Mr Somephan Thumavong	Forest Inventory, DOF, Ministry of Agriculture and Forestry (MAF)	9802802
7	Mr Boubpha Vongkhamchan	DOF, MAF- Administration	5612824
8	Mr Viengsavanh Phomasane	Khammuan Limestone National Protected Area	5850441
9	Mr Homkham Xaykosinphinit	Hin Nam Nor National Protected Area	5815387
10	Mr Thongpat Ladsavong	Department of Customs, Ministry of Finance	5517062
11	Mr Khamtan Amkhavong	Dong Houa Sao National Protected Area	2207162
12	Mr Savai Sithinalongsy	Phou Xang He National Protected Area	5743801
13	Mr Sitha Phongsuphane	DFRC, DOF	
14	Mr Chandy Chanthavong	Nam Poui National Protected Area	2988678
15	Mr Sang Somethina	Nam Xam National Protected Area	5093190
16	Mr Bounsou Sophavanh	DFRC, DOF	5494255
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18	Mr Khanthalay	Xe Sup National Protected Area	5448413
19	Mr Souliya Sengdala	Phou Dendine National Protected Area	5932185
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21	Mr Thong Et Phaivan	Nakai Nam Theun National Protected Area	2324419
22	Ms Somesanouk Akhavong	Faculty of Forestry, National University	2245039
23	Mr Somsanith Chanthanasin	Department of Livestock and Fisheries, Ministry of Agriculture and Forestry	5687438
24	Mr Lummone	Xa Bang Nuan National Protected Area	5044200
25	Mr Sakhone	Tiger Farm representative	2330216
26	Mr Bounpone Phoudthavong	Ministry of Agriculture and Forestry - Chair	021216921
27	Mr Bounpheng Phengchanh	Luang Prabang PAFO	5770175
28	Mr Dalin Xaysaksi	Production Forest Division, DOF, MAF	5444983
29	Mr Souksan Phonpadith	Nam Ha National Protected Area	2390210
30	Mr Onta Bouaviset	Xepian National Protected Area	5439908
31	Mr Bounthop Praxaysombath	Faculty of Science, National University	2212699
32	Mr Bounsuan Phonphichit	Planning & Investment, DOF, MAF	229790
33	Mr Khamkhoun Khounbolin	WWF representative	4388239
34	Mr Ounkeo	Dong Phou Vieng National Protected Area	2325506

35	Mr Xaysongkham Sukhathammavong	Department of Planning and Investment. Ministry of Planning and Investment	7722239
36	Mr Vasanoon	Houaphan PAFO	5664710
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41	Mr Amone	Phou Bia Minning	2213829
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43	Mr Phaivanh Phiapalath	IUCN representative	
44	Mr keovongdeun Phanthanousy	Nam Kading National Protected Area	2337548
45	Mr Somesanouk	Department of Forestry, Ministry of Agriculture and Forestry - Forest Development Fund	5444499
46	Mr Sangvan Buavong	DFRC, DOF, MAF	5478797
47	Mr Renea Stenhouse	World Bank Representative	2221351
48	Mr Phaiveng Vongkhamheng	WWF representative	6588428
49	Mr Thavisouk Saithongdam	WWF representative	5017735
50	Mr Houmphan Rattanavong	Lao Biodiversity Association	5537187
51	Mr. Troy Hansel	WCS-Lao PDR	21-215400
52	Mr. Chanthavy Vongkhamheng	WCS-Lao PDR	21-215400
53	Mr. Vene Vongphet	WCS-Lao PDR	21-215400
54	Dr. Arlyne Johnson	WCS-Lao PDR	21-215400

NATIONAL TIGER ACTION PLAN FOR MALAYSIA 2008 - 2020

PERHILITAN

Department of Wildlife and National Parks
Peninsular Malaysia

National Tiger Action Plan for Malaysia 2008-2020

Department of Wildlife and National Parks Peninsular Malaysia
Ministry of Natural Resources and Environment
Government of Malaysia

In collaboration with

MYCAT
Malaysian Nature Society
TRAFFIC Southeast Asia
Wildlife Conservation Society
WWF-Malaysia

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Cover photograph: Tracks of a Malayan tiger in the Tembeling Forest Reserve, south of Taman Negara, Pahang, Malaysia, in 2005.

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LIST OF ACRONYMS

ACAP	Asian Conservation Awareness Programme
ASEAN-WEN	Association of Southeast Asian Nations - Wildlife Enforcement Network
BMP	Better Management Practice
CFS	Central Forest Spine
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
DANCED	Danish Cooperation for Environment and Development
DCA	Drug Control Authority
DID	Department of Irrigation and Drainage
DoA	Department of Agriculture
DoE	Department of Environment
DTCP	Department of Town and Country Planning
DVS	Department of Veterinary Services
DWNP	Department of Wildlife and National Parks Peninsular Malaysia
EIA	Environmental Impact Assessment
EPU	Economic Planning Unit
ESA	Environmentally Sensitive Areas
FDPM	Department of Forestry Peninsular Malaysia
FELDA	Federal Land Development Authority
FRIM	Forest Research Institute of Malaysia
FSC	Forest Stewardship Council
HTC	Human-Tiger Conflict
IPTA	Public Institutions of Higher Learning
JKPTG	Department of Lands and Mines
JKR	Public Works Department
JNPC	Johor National Parks Corporation
JPA	Department of Public Services
JUPEM	Department of Survey and Mapping Malaysia
KPKT	Ministry of Housing and Local Government
MACRES	Malaysian Centre for Remote Sensing
MNS	Malaysian Nature Society
MTIB	Malaysian Timber Industry Board
MTCC	Malaysian Timber Certification Council
MYCAT	Malaysian Conservation Alliance for Tigers
MYCAT	SO MYCAT Secretariat's Office
NFP	National Forestry Policy
NGO	Non-Government Organisation
NPBD	National Policy on Biological Diversity
NPE	National Policy on the Environment
NPP	National Physical Plan
NRE	Ministry of Natural Resources and Environment
T4T	Teachers for Tigers
PRF	Permanent Reserved Forest
PPKB	Biodiversity Education Programme
PSPC	Perak State Park Corporation
PWA	Protection Wild Life Act 1972
RAPPAM	Rapid Assessment and Prioritisation of Protected Areas Management
RELA	People's Volunteer Reserve
TCL	Tiger Conservation Landscapes
TCM	Traditional Chinese Medicines
TSEA	TRAFFIC Southeast Asia

UNESCO	United Nations Educational, Scientific and Cultural Organization
UPEN	State Economic Planning Unit
USM	Universiti Sains Malaysia
WCS	Wildlife Conservation Society
WG	Working Group

LIST OF IMPLEMENTING AGENCIES

Anti Smuggling Unit
Association of Southeast Asian Nations – Wildlife Enforcement Network
Department of Agriculture
Department of Environment
Department of Forestry Peninsular Malaysia
Department of Immigration
Department of Irrigation and Drainage
Department of Lands and Mines
Department of Public Services
Department of Public Works
Department of Town and Country Planning
Department of Veterinary Services
Department of Wildlife and National Parks Peninsular Malaysia
Economic Planning Unit
Forest Research Institute of Malaysia
Johor National Parks Corporation
Land Agencies
Land Offices
Local Authorities
Malaysia Timber Certification Council
Malaysian Conservation Alliance for Tigers
Malaysian Nature Society
Malaysian Timber Industry Board
Marine Police
Media
Ministry of Natural Resources and Environment
MYCAT Secretariat's Office
Perak State Park Corporation
Public Institutions of Higher Learning
Royal Malaysian Armed Forces
Royal Malaysian Customs
Royal Malaysian Police
Sabah Wildlife Department
Sarawak Forestry Department
State Economic Planning Unit
State Governments
TRAFFIC Southeast Asia
Universiti Sains Malaysia
Wildlife Conservation Society Malaysia Programme
WWF-Malaysia

MINISTER'S MESSAGE

Apart from being one of the 12 mega-diversity nations, Malaysia is one of the few strongholds for the tiger. A symbol of great strength, beauty and independence, the tiger was chosen as our national animal with the hope that it would protect the nation, illustrated by the two tigers flanking Malaysia's Coat-of-Arms in a protective stance.

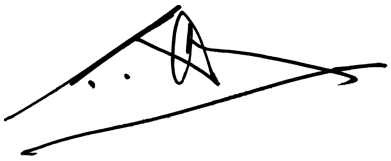
Today, however, the tiger is in grave danger. Its endangered status is an indicator of ecosystems in crisis. Let us not be proud of a tiger economy without real tigers in the forest.

Vision 2020 promises Malaysia will attain fully developed status by 2020 but, as defined in the foundations of this vision, "It must be a nation that is fully developed along all the dimensions: economically, politically, socially, spiritually, psychologically and culturally". Development always comes at a price, and we are challenged with balancing progress and conservation. If, however, we persist with improper and ill-planned development guided by short-term profit, the healthy ecosystems that we humans are entrusted to manage sustainably for other species and our future generations will be lost forever, marking our failure to capture the essence of Vision 2020.

It is the government's duty to formulate and implement policies for sustainable management of forests and biodiversity conservation with state governments, scientists, the business community and the public. Some of the main tools that we have are the National Policy on Biological Diversity, the Protection of Wild Life, the National Forestr and the Environmental Quality Acts. Of particular significance is the National Physical Plan, which guides us to preserve the integrity of areas designated for conservation of natural resources.

Policies and laws mean nothing if not implemented or complied with. Boldly, we must work together – government, NGOs, the public and the private sector – to shoulder this responsibility cohesively. The government is committed to securing wild tigers and their habitats for future generations, and we trust that support from all these parties will help realise this vision for Malaysia.

Congratulations to all involved in developing this Action Plan. You have taken the first step; now it is crucial that you labour together to see this Plan duly implemented.



Datuk Douglas Uggah Embas Minister
Ministry of Natural Resources and Environment

FROM THE DESK OF THE SECRETARY GENERAL

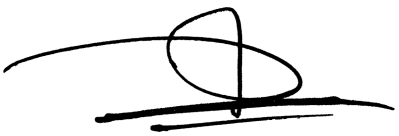
Indeed, what becomes of Malaysia, if we lose our national animal? We must feel pride when we think of the tiger, not a sense of loss.

The Ministry of Natural Resources and Environment, in line with its mandate, aims to ensure that Malaysia's natural resources and biodiversity assets are managed sustainably while contributing to national social and economic development objectives. It is not an easy balance to achieve, but the Ministry is firm in its commitment. To effectively counter increasingly sophisticated challenges, Malaysia continues to seek innovative methods and approaches.

For taking steps in the right direction of collaborative action to saving the Malayan tiger, I commend the Department of Wildlife and National Parks Peninsular Malaysia (DWNP) in the unique partnership with NGOs through the Malaysian Conservation Alliance for Tigers (MYCAT), the alliance comprising DWNP and the Malaysian Nature Society, TRAFFIC Southeast Asia, Wildlife Conservation Society and WWF-Malaysia.

This Tiger Action Plan is the true embodiment of the spirit of cooperation not just between the government and non-government sector, but also between agencies within the Malaysian government. Speaking of conservation area, while 6% of Peninsular Malaysia's total land cover falls under DWNP's jurisdiction as protected areas, a further 36% are permanent reserved forests managed by the Forestry Department. A crucial factor for successful implementation of the Plan is for these two departments, under this same Ministry, to work in unison for biodiversity conservation.

All the pieces are in place, now it is left to you to ensure you continue synergising your efforts in line with this Action Plan, and I wish you the very best of luck in successfully implementing the actions contained within.



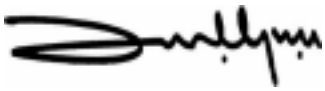
Datuk Suboh bin Mohd Yassin
Secretary General, Ministry of Natural Resources and Environment

PREFACE

As the leading government agency in wildlife conservation in Malaysia, and in fulfilment with the National Policy on Biological Diversity, one of the critical roles of the Department of Wildlife and National Parks is to promote the integration of and collaboration with conservation partners in reaching the national vision of conservation excellence. It therefore gives me great pleasure to introduce the National Tiger Action Plan for Malaysia, truly a first-of-its-kind Plan developed in collaboration with Malaysia's NGOs.

The tiger is one of DWNP's priority species for conservation because it is an indicator species of ecosystem health, the keystone species at the apex of the food chain, and the umbrella species under which numerous other biodiversity can be protected. The Action Plan was developed in accordance to the existing government policies and framework. It is a practical instrument linking conservation ideals to giving wild tigers a future; a real future that will stretch beyond the next century. I believe that Malaysia can give tigers a chance to survive and that the success story of tigers will showcase Malaysian Government's commitment to biodiversity conservation.

The Action Plan is a 'living' document, which we will continue to review, update and amend to ensure its objectives are met in the context of a world that is constantly growing and changing. I look forward to implementing it with all the stakeholders involved.



Dato' Abd. Rasid Samsudin
Director General
Department of Wildlife and National Parks Peninsular Malaysia

ACKNOWLEDGMENTS

We would like to thank the participants of the Malayan Tiger Conservation Workshop, held in Lanchang, Pahang on 7 to 9 November 2006, for their active participation in the series of discussions that shaped and led to the *National Tiger Action Plan for Malaysia* (hereafter referred to as 'the Plan').

The workshop and drafting of the Plan was made possible by generous financial support from 21st Century Tiger, a programme of the Zoological Society of London, in addition to in-kind contributions from the Malaysian Conservation Alliance for Tigers (MYCAT) partners; i.e. the Department of Wildlife and National Parks Peninsular Malaysia (DWNP), the Malaysian Nature Society (MNS), TRAFFIC Southeast Asia (TSEA), the Wildlife Conservation Society – Malaysia Programme (WCS) and WWF-Malaysia. The MYCAT Secretariat's Office (MYCAT SO) received institutional support from DWNP and financial support from the US Fish and Wildlife Service and Save the Tiger Fund. WWF-Malaysia also provided financial assistance to support the action plan drafting team leader.

The workshop organising committee, headed by DWNP's Siti Hawa Yatim and comprised DWNP's Abdul Kadir Abu Hashim, Mohd Khairi Ahmad, Rahmah Illias, Clement Wong and MYCAT Coordinator, Loretta Ann Soosayraj, ensured the smooth running of the workshop. Logistical support from personnel of all MYCAT partners also made substantial contributions to the success of the workshop.

Based on presentations and discussions during the workshop, a draft plan was compiled by the action plan drafting team: Kae Kawanishi (MYCAT SO), Loretta Ann Soosayraj (MYCAT SO), Melvin Gumal (WCS), Gareth Goldthorpe (WWF-Malaysia), Chris R. Shepherd (TSEA), Kanitha Krishnasamy (MNS), and Abdul Kadir Abu Hashim (DWNP). Additional assistance was provided by Brian Lee (WWF-Malaysia), Salman Saaban (DWNP), Abu Zahrim Ismail (DWNP), James Compton (TSEA), Song Horng Neo Liang (TSEA), Suzalinur Manja Bidin (MYCAT SO), Rick Gregory (MNS Selangor) and Caroline Yap in completing the draft. Comments received from Misliah Mohamed Basir (DWNP), Sivananthan Elagupillay (DWNP), Zaharil Dzulkafly (DWNP), Dionysius Sharma (WWF-Malaysia), Surin Suksuwan (WWF-Malaysia), Ahmad Zafir Abd Wahab (WWF-Malaysia), Mark Rayan Darmaraj (WWF-Malaysia), Carl Traeholt (Malayan Tapir Conservation Programme), John Seidensticker (Save the Tiger Fund) and Mahendra Shrestha (Save the Tiger Fund) helped improve the earlier draft of the Plan.

Besides numerous telephone and online discussions, the drafting team met 17 times between November 2006 and July 2007 to improve the draft plan, which underwent 11 revisions before submission to the DWNP Tiger Action Plan Advisory Board, headed by the DWNP Director General, Abd. Rasid Samsudin, and comprised Misliah Mohamed Basir, Zainudin Ab. Shukor, Siti Hawa Yatim, Sivananthan Elagupillay, Zaaba Zainol Abidin, and Khairiah Mohd. Shariff in August 2007.

This Plan is the culmination of the joint efforts of all interested parties involved in tiger conservation in Malaysia. Many thanks to everyone who made contributions towards developing a single Tiger Action Plan that will lead to a future in which tigers thrive in Malaysia.

We look forward to working together with an even greater sense of cooperation and commitment towards protecting the Malayan tiger in Malaysia.

EXECUTIVE SUMMARY

Globally, the tiger *Panthera tigris* has lost 93% of its habitat and three subspecies in the last 100 years. Today, less than 3,000 wild tigers survive in 14 countries. The initial decline in tiger numbers was primarily due to large-scale loss of habitat but in more recent times such losses have been exacerbated as the smaller and isolated populations that survive are hunted for their body parts, persecuted by angry farmers and villagers, and starved as their prey is over-harvested. Threats to the survival of wild tigers are mounting and a world without wild tigers may become a reality in our lifetime unless drastic measures are taken. In stark contrast to today's situation, the 1950s saw as many as 3,000 tigers in Malaysia alone. During the subsequent two decades, however, as the countries agricultural base increased, tigers were seen as pests. Institutionally persecuted, with a bounty placed on them, tiger numbers rapidly dropped to only a few hundred. During the 1970s, attitudes changed and the fortune of the tiger in Malaysia took a turn for the better as it was listed as a totally protected species under the Protection of Wild Life Act 1972. However, this protected status has only slowed the decline down, not reversed it, and today only about 500 wild tigers are thought to survive in Malaysia. It has become increasingly clear that more precise conservation interventions are needed to recover and sustain tigers in Malaysia. By implementing a suite of concerted actions, backed by political commitment and public support, we as a nation and as part of the global conservation community can ensure that one of the most majestic and charismatic animals with which we share the planet will not vanish. To see the tiger disappear in this or any other century could only be a testament to our indifference, ignorance, greed and lack of compassion and foresight.

Malaysia is blessed with a rich and diverse store of biological resources, a stable socio-economic base and with national policies in place that promote sustainable development and biodiversity conservation. Although only 6% of the total land area of Peninsular Malaysia is protected by a network of Protected Areas (PAs) and most PAs are less than 1,000km2, the system is augmented by the presence of Permanent Reserved Forests (PRFs) which act to buffer the PAs from the negative impacts often associated with human activities. This forestry management system covers an additional 36% of the land area of Peninsular Malaysia and is managed sustainably under the National Forestry Act 1984. The current thinking amongst conservationists in the country emphasises the essential roles that the PAs and PRFs, connected together with ecological corridors, play in supporting healthy, manageable, populations of tigers and their essential prey. Ensuring these connections will provide this endangered species and its prey with the condition they need to recover and thrive into the 22nd century. However, one of the big challenges for wildlife conservation in Malaysia is that, whilst policies are made at the Federal level, the implementation of actions pertaining to land-use and natural resource management are carried out at the level of the State.

Within Malaysia, tigers are found only on the peninsula and mainly in three landscapes. The Main Range Landscape (20,000km2) is in the west of the mainland and, runs from the Malaysia-Thai border to Negeri Sembilan. It is connected to the second landscape, the Greater Taman Negara (15,000km2) to the east, which includes Taman Negara National Park, the country's largest protected area. Finally, the Southern Forest Landscape (10,000km2) can be found south of the Pahang River but it is isolated from both the former landscapes. These forest landscapes form the basis for spatial planning in tiger conservation in Malaysia and each has a priority core area: Belum-Temengor Complex, Taman Negara, and Endau-Rompin Complex, respectively. In order to augment their potential for tiger conservation to facilitate the continued dispersal of tigers *within* the landscapes, priority ecological corridors have been identified, whereby habitat restoration and management can maintain connectivity: Belum-Temengor, Taman Negara-Lebir-Tembat, and Endau-Rompin-Mersing, respectively. One critical linkage that still exists and must be actively maintained and enhanced to ensure connectivity *across* the landscapes is a narrow strip of forest connecting the Main Range and Taman Negara near the western border of the park in Pahang. Existing and proposed linear infrastructures, such as roads, railways, and a major oil pipeline threaten the connectivity of habitats within and between all these areas but mitigation measures are available to counter the risk of fragmentation when incorporated into the early planning of infrastructural developments that may block corridors.

Because the challenges to the tiger's survival are complex, involving multiple stakeholders, the Department of Wildlife and National Parks Peninsular Malaysia (DWNP) formulated this National Tiger Action Plan for Malaysia in a participatory manner through a workshop and discussions with NGOs and other government agencies using a collaborative platform called the Malaysian Conservation Alliance for Tigers (MYCAT).

The aim of the Plan is to establish a holistic but focused and achievable conservation strategy that lays out specific actions to be taken over the next eight years (Phase I: 2008-15) towards an overarching vision of securing viable tiger populations in Malaysia for the next century and beyond. The Plan was developed around existing government policies and legislative structures relevant to wildlife conservation. Through this plan, the Malaysian government has the opportunity to present healthy tiger populations as an exemplar of its on-going efforts to develop economically in a sustainable manner rather than the Malayan tiger becoming another symbol of the systematic loss of tropical forest and an ecosystem in crisis. The nature of a country's development is demonstrated by the policies it implements. Of particular importance to wild tiger populations in Malaysia are the National Policy on Biological Diversity, National Forestry Policy, National Policy on the Environment and the National Physical Plan.

The National Physical Plan (NPP) is the blueprint for spatial planning in Peninsular Malaysia and, therefore, provides the backbone for the Plan's aspiration to secure a large expanse of interconnected tiger habitat, defined as the Central Forest Spine (CFS) in the NPP. Envisioned for realisation by 2020, the CFS is a network of forest complexes connected by green linkages that, together, form a contiguous forest spine for Peninsular Malaysia. Permanent Reserved Forests within the CFS provide critical habitat and connectivity to core tiger populations in the priority areas and buffer them from anthropogenic and natural demographic fluctuations. PRFs still contribute to the nation's economic drive, where ecologically sound land-use practices such as eco-tourism and sustainable forestry are permitted. This is vital for the nation and the tiger because the large forest ecosystems that the tiger needs to thrive are also a primary source of the resources upon which human livelihoods depend. The presence of healthy tiger populations across the CFS will signify the balanced progression of the country's ecology, society, culture and economy and, ultimately, an enhancement of the quality of life of Malaysians, which is the essence of the Vision 2020. The goal for 2020 identified in this National Tiger Action Plan for Malaysia is:

Tiger populations actively managed at carrying capacities across the three landscapes within the Central Forest Spine and connected with functioning corridors.

This Plan identifies four objectives towards achieving this goal:

1. Secure the Central Forest Spine with strictly protected priority areas in landscapes connected with corridors.
2. Provide effective and long-term protection of tigers and their prey.
3. Promote and practice ecologically sound land-use, compatible with tiger conservation outside the priority areas.
4. Apply science in monitoring the efficacy of conservation actions and improving the knowledge of tiger ecology.

This Plan further outlines priority outcomes for each of the objectives and then translates these conservation objectives and desirable outcomes into concrete actions, responsible agencies, measurable indicators and realistic time-frames. These details lay out the first phase of the Plan to be carried out between 2008 and 2015; dates that deliberately coincide with the 9th and 10th Malaysian Plan. In this Plan the importance of accountability and transparency in conservation actions is implicit, with an in-built evaluation and learning mechanism for a continued process of implementation. The overall indicator of success, or the Plan's measurable target, is:

About 1,000 wild tigers surviving on wild prey in the Central Forest Spine by the year 2020. The success of this conservation strategy must be reflected in the known status of the distribution and density of the tiger populations in Malaysia. In order to use these indicators, we must first establish a baseline upon which we can monitor our efforts to stabilise, increase and manage tiger numbers. By doing this, we hold ourselves accountable to the wild tigers for which this Plan is devised; the importance of

conservation science, the fourth objective of the plan, becomes imperative. Applying scientific methods to measure the efficacy of conservation actions allows for the efficient planning of, allocation of resources to, and the implementation of specific activities. This increases the accountability and transparency in the conservation actions taken.

As the custodian of the Plan, DWNP has the responsibility of implementing many of the identified actions. Of the 80 planned actions, DWNP, in collaboration with NGOs and other government agencies, takes the lead in implementing 59. Other government agencies that lead actions pertaining, for example, to the Central Forest Spine, sustainable forestry and park management include the Economic Planning Unit, Ministry of Natural Resources and Environment, Department of Town and Country Planning, Forestry Department, Perak State Park Corporation, and Johor National Parks Corporation. Eight actions are led and implemented by various NGOs, namely the Malaysian Nature Society, TRAFFIC Southeast Asia, Wildlife Conservation Society and WWF-Malaysia. Implementation of the full Plan is therefore a responsibility shared by many stakeholders. As it is a government document with cross-departmental implementation, the Ministry of Natural Resources and Environment will provide the inter-agency coordination to link its implementation with that of other relevant national policies.

By using an adaptive management approach to implement the Plan, the agencies involved can ensure a process that is both proactive and reactive, allowing lessons to be learned and new knowledge and methods to be incorporated as the work evolves. As such, it is a living document. This Plan is a collection of working models, strengthened through stakeholder dialogues, tested in practice, and constantly reviewed and revised. In order for real and mutual accountability and learning to take place, the core of the stakeholder engagement strategy must involve a two-way mechanism (dialogues). Here, responsible agencies and individuals will be actively encouraged to exchange views, clarify expectations, address differences, enhance understanding and encourage creative and practical solutions.

The MYCAT Secretariat's Office will act as Secretariat to the Division of Conservation and Environmental Management of the Ministry of Natural Resources and Environment to monitor the progress of the implementation of the Plan. The Secretariat will compile and submit bi-annual reports to the Ministry, which will then chair a central stakeholder meeting where necessary decisions and adjustments to the Plan will be made. Towards the end of Phase I (2008-2015), the implementation of the Plan will be evaluated by an independent conservation audit team. The results from the evaluation will form the basis for a stakeholder workshop to set the work plan for Phase II (2016-2020).

Malayan tiger © Chris R. Shepherd

INTRODUCTION

Malaysia is a tropical country rich in biological diversity and natural resources. Many of Southeast Asia's threatened large mammals, such as the Sumatran rhinoceros *Dicerorhinus sumatrensis*, Asian elephant *Elephas maximus*, tiger *Panthera tigris*, gaur *Bos gaurus*, Malayan tapir *Tapirus indicus* and Malayan sun bear *Helarctos malayanus*, are still found here. The status of some of these species has reached a critical state while that of others remains largely unknown. Thus more effective conservation and research efforts are required to ensure the survival of these species (Locke, 1954; Medway, 1965; Hislop, 1968; Oliver, 1978; Khan *et al*., 1983; Aiken and Leigh, 1985; Zaaba *et al*., 1991; Misliah and Sahir, 1997; Foose and van Strien, 1997; IUCN 2006).

Wildlife conservation in Peninsular Malaysia dates back to 1896, when the first wildlife legislation was passed to regulate the exploitation of wild birds in the Straits Settlements. Subsequently, large mammals were protected in Pahang and in 1903 the Chior Wildlife Reserve, the first protected area in Malaysia was established in Perak. Since then, 41 protected areas have been added to the national list. The Wildlife Commission of Malaya, established by the colonial government in 1930 reviewed the prevailing status of wildlife protection throughout Peninsular Malaysia (then Malaya). Their work resulted in the creation of several State Game Departments in 1936 and provided a framework for the consolidation of the state game offices and the establishment of the Protection of Wild Animals and Birds Ordinance 1955 in Peninsular Malaysia. After independence, this ordinance was repealed and the Protection of Wild Life Act 1972 (PWA) was enacted by the Malaysian Parliament. This enabled the federalisation of all State wildlifedepartments and the empowerment of the Director-General for the Department of Wildlife and National Parks (DWNP) over the State wildlife departments. Currently, the PWA is under review and is likely to be replaced by more comprehensive wildlife conservation legislation in the near future. To complement conservation efforts by the government, several conservation organisations were founded. The country's oldest and premier nature conservation organisation, the Malaysian Nature Society (MNS), was formed in 1940 and currently has 3,000 members throughout Malaysia. Three decades later, in 1972, the global conservation organisation, WWF, established a country office in Malaysia (WWF-Malaysia). Following this, the New York-based Wildlife Conservation Society (WCS) established its Malaysia Programme in 1984 and more recently, in 1991, TRAFFIC, the wildlife trade monitoring network, established its Southeast Asian office, based in Malaysia (TSEA). The tiger is the symbol of two contrasting realities: the vanishing Asian wilderness and the thriving Asian economy. Thirty years have passed since the tiger was listed as a totally protected species under the PWA and Malaysia is one of the 14 nations where tigers still survive in the wild. In addition to being totally protected within Malaysia, tigers are listed on Appendix I of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), which prohibits international trade of live tigers, their parts and derivatives for commercial purposes. Yet tiger poaching continues. Throughout its global range, the species has lost 93% of its original habitat (Dinerstein *et al*., 2006) and three subspecies are now extinct; all in just the past century. Threats to the survival of wild tigers are mounting and a world without wild tigers may become a reality in our lifetime unless drastic measures, backed by strong political commitment and public support, are taken. Challenges to tiger conservation are multi-faceted. Finding solutions, therefore, requires an integrated conservation approach. As the leading government agency in wildlife conservation in Malaysia, one of the critical roles of DWNP is to promote the integration of and collaboration with conservation partners in reaching the national vision of conservation excellence.

Using this collaborative platform, DWNP organised and hosted a 3-day workshop in November 2006, at its Institute for Biodiversity in Lanchang, Pahang, to bring together key stakeholders and decision-makers to discuss the actions needed to save the Malayan tiger from impending extinction. The main goal of the workshop was to develop the *National Tiger Action Plan for Malaysia* (hereafter referred to as 'the Plan'). The Plan reflects national needs and local capacity in line with existing national policies relevant to tiger conservation.

Prior to the workshop, the MYCAT Working Group, comprising representatives from all partner organisations, met on four occasions to plan and prepare for the workshop. In September 2006, the Biodiversity Conservation Division of DWNP distributed threat assessment questionnaires to State DWNP, NGOs and other relevant individuals who have information on wild tigers to assess their threats.

The MYCAT Secretariat's Office analysed the data from 32 respondents and presented the results at the 4th MYCAT Working Group meeting in October 2006,

and again, during the workshop in November 2006. Prioritisation was impossible as the perception-based assessment, which could not be substantiated with reliable data, resulted in similar rankings for most of the threats. Therefore, the Plan addresses major threats equally without prioritisation.

The Plan was developed in a participatory process at many levels. Based on the discussions and results from the workshop and additional information from literature, it was jointly drafted by the MYCAT partners. Through 15 meetings, numerous phone calls and online discussions, the drafting team reviewed and revised 10 earlier drafts that led to developing the Plan's implementation mechanisms, as identified within this document (*Sec. 2.7*). The draft Plan was then submitted to the DWNP Tiger Action Plan Advisory Board. After their thorough review, a revised Plan was circulated to the workshop participants, as well as selected experts in the international tiger conservation community for peer review. After additional improvements were made, it was finally endorsed by the Ministry of Natural Resources and Environment. In effect, this Plan has crystallised the collaborative efforts, knowledge and commitment of those who have made the survival of the tiger their concern. The Plan outlines Malaysia's preparation for saving wild tigers in Malaysia and, as such, does not include management issues relating to captive tigers. In 2004, Malaysia's tigers were recognised as a new subspecies, *Panthera tigris jacksoni*, as they are distinct in mtDNA sequences from those of northern Indochina, *P. t. corbetti* (Luo *et al.,* 2004). While acknowledging the exciting new discovery, the Malaysian government recommends that this subspecies be named *P. t. malayensis* to reflect its geographic distribution. More recently, however, a morphological study has questioned the validity of this classification (Mazak and Groves, 2006). Regardless of the taxonomic classification, in this Plan, wild tigers resident to Peninsular Malaysia are referred to as Malayan tigers. Because of the dynamic and some of the unknown nature of the factors that affect tiger populations and their habitats, it was considered impractical to design a single, comprehensive master plan. Similarly, such an approach would be precluded by the context where socio-political stability, emerging policies, macroand micro-economics, human population growth, and climate change are all key issues. Instead, by using an integrated and holistic approach, a focused action plan that seeks to address major issues for the next eight years towards a unified long-term vision was developed

The Plan is divided into two sections. Part 1 comprises background information on the natural history and the overview of the conservation status of the Malayan tiger based on available knowledge; whereas Part 2 comprises the goals, priorities, targets and planned actions. The main contents of the Plan are found in Part 2, which lays out key actions. Specific actions are to be implemented over the next eight years (2008 to 2015) with the mid-term goal of actively managing tiger populations at carrying capacities across tiger landscapes connected with functioning corridors by 2020, in line with Malaysia's own development plans and existing government policies relevant to nature conservation. At the end of the eight-year implementation period, the Plan is to be evaluated by an independent auditor, its priorities and targets adjusted according to the eight-year outcomes, keeping in tandem with Malaysia's development plans (The 9th Malaysian Plan is for 2006-2010 and the 10th Malaysian Plan is for 2011-2015). The subsequent actions needed to reach the overall goal will then be planned. The implementation section in Part 2 describes mechanisms designed to monitor and measure the Plan's effectiveness and the accountability of parties and relevant stakeholders. Appendices provide supplementary information on the Malayan Tiger Conservation Workshop, held in November 2006. An effort was made to use minimal technical jargon without compromising on the scientific integrity of the Plan. In addition to the first-hand information gleaned from the workshop, other sources of information such as unpublished reports/data and personal communications were used but whenever possible, citations for these were also included.

Part 1

Status of Tiger Conservation in Malaysia

1.1 Natural History

1.1.1 Description, biology and behaviour

The tiger is the world's largest cat and a specialised predator that preys on large ungulate (hoofed animal) species. It is the only striped cat with the ground coloration of reddish orange to reddish ochre and white underparts. The pelage of tropical tigers tends to be darker than its temperate cousins, with shorter and less dense fur (Mazak, 1981; Sunquist and Sunquist, 2002). The largest tigers are found in the Russian Far East and India, where an adult male can weigh up to 250 to 300kg. The smallest, however, are in Peninsular Malaysia and Sumatra, Indonesia, where a large male and female weigh only about 140kg and 110kg, respectively (Table 1). Likewise, the total length of a large Siberian or Bengal tiger can reach up to 3m, while a large Sumatran tiger is about 50cm shorter. Zoo Melaka's records of the captive Malayan tigers show that the total length of the largest wild caught adult male is 1.94m and the largest female, 1.81m (Table 1).

Table 1: Records of captive Malayan Tigers in Zoo Melaka.

No	Sex	Date of admission	Age (yrs)	Type of Acquisition	Origin	Weight (kg)	HBL (cm)	SH (cm)	CG (cm)	TL (cm)
1	F	16 June 98	-9	WC	Terengganu	100	162	93	94	79
2	F	4 March 99	~18	CB	Zoo Melaka	85	ND	ND	ND	ND
3	M	22 March 99	~19	WC	Kelantan	110	ND	ND	ND	ND
4	M	16 June 1999	~26	WC	Kelantan	110	ND	ND	ND	ND
5	F	18 Sept 2000	~19	WC	Pahang	ND	ND	ND	ND	ND
6	F	7 March 2002	5	CB	Zoo Melaka	90 1	51	85	97	89
7	M	20 Aug 2002	~15	WC	Kelantan	120	157	ND	102	96
8	F	16 June1999	~9	WC	Terengganu	90	ND	ND	ND	ND
9	M	12 Dec 2002	5	CB	Zoo Melaka	120	175	88	102	85
10	F	12 Dec 2002	5	CB	Zoo Melaka	110	164	88	120	89
11	M	3 Nov 2003	4	CB	Zoo Melaka	130	ND	ND	ND	ND
12	M	3 Nov 2003	4	CB	Zoo Melaka	130	ND	ND	ND	ND
13	F	3 Nov 2003	4	CB	Zoo Melaka	100	130	ND	120	88
14	F	3 Nov 2003	4	CB	Zoo Melaka	100	ND	ND	ND	ND
15	M	9 Feb 2003	4	CB	Zoo Melaka	100	164	89	105	81
16	M	20 July 2003	4	CB	Zoo Melaka	120	ND	ND	ND	ND
17	F	26 Feb 2004	~9	WC	Pahang	105	181	89	110	87
18	F	28 March 2003	~20	WC	Kelantan	90	ND	ND	ND	ND
19	F	23 Aug 2004	3 CB	Zoo	Melaka	100	150	78	103	78
20	F	23 Aug 2004	3 CB	Zoo	Melaka	100	162	82	108	87
21	M	24 June 2005	~9	WC	Pahang	135	194	115	124	97
22	F	11 Aug 2005	~2	WC	Johor	110	ND	ND	ND	ND
23	M	13 June 2007	~4	WC	Kelantan	100	164	84	92	89

WC: Wild Caught, CB: Captive Bred
Body weight is estimate only as a suitable weighing scale was unavailable.
HBL: Head-Body Length, SH: Shoulder Height, CG: Chest Girth, TL: Tail Length
ND: Data unavailable.
Data source: Zoo Melaka, *in litt.*

A tigress comes into heat at intervals of around three to nine weeks, and is receptive for about three to six days within that period. Gestation averages to around 105 days and a litter usually consists of two or three kittens, with a range of one to four (Mazak, 1981). A tigress produces a new litter only after her young are all dispersed, usually within 18-28 months (Smith, 1993). Sexual maturity is usually achieved in the third year, for females, and towards the end of the fourth year in males; whilst, in Nepal, the average reproductive lifespan was recorded as 6.1 years for females but only 2.8 years for males (Smith and McDougal, 1991). The oldest recorded wild tiger lived for at least 15.5 years, also in Nepal (McDougal, 1991), whilst the oldest captive tiger died at the ripe-old age of 26 (Jones, 1977).

Tigers can swim and hunt well in the water, as verified by Burton (1933) when he recorded a tiger swimming the 8km stretch from the Malay Peninsula to Penang Island and Locke (1954) where a tiger was recorded swimming across the Straits of Johor to Singapore. In the Sundarbans, tigers swam a 29km wideriver (Garga, 1948). Tigers rarely climb trees but they can if provoked.The tiger is a highly adaptable species, exhibiting tolerance to a wide range of forest types, climaticregimes, altered landscapes and prey bases. Being a generalist, the only requisites for survival seem to beplant cover, water and sufficient prey (Schaller, 1967). The historical distribution of tigers exemplifies thevariety of habitat types to which they have adapted, ranging from the pine-oak forests of the Russian FarEast and the rocky mountain slopes of Manchuria, to the tall grasslands of Nepal, the mangrove swamps ofthe Sundarbans and, of course, the rainforests of Malaysia and Indonesia. Generally, tigers prefer lowlandareas where large ungulates are more abundant, but they have been reported at altitudes of up to 4,360min Sikkim, India (Mazak, 1981).

Tigers are essentially solitary outside of the mating season and when young are fully dependent on their mother; but they are not entirely non-social as some groupings, especially of related individuals, have beenreported (Schaller, 1967; Thapar, 1989).

Earlier efforts to monitor tiger populations in Peninsular Malaysia focused on Human-Tiger conflict (Stevens, 1968) and aspects of livestock depredation (Blanchard, 1977; Elagupillay, 1984); research on basic tiger ecology is still in its infancy and much of what is known is based on studies carried out elsewhere, mostly in India and Nepal.

Wild pig juvenile © G. Fredriksson

1.1.2 Feeding ecology

The tiger is the top predator in its ecosystem. Almost any terrestrial vertebrate is potential prey for this ultimate predator, as it has been known to attack elephant and rhinoceros calves as well as other carnivores, such as leopards *Panthera pardus* and dholes *Cuon alpinus*. But across its range generally, the main natural prey base consists of various species of deer, wild pig *Sus scrofa* and wild cattle (Seidensticker, 1986). In addition to hunting down live prey, tigers also feed on carrion (Schaller, 1967; Sunquist, 1981). On the other hand, aside from Man, no other species is individually capable of killing a tiger. There are, however, isolated reports of incidences in which a herd of water buffalo, a pack of dholes or an elephant have killed a tiger.

Vertebrate predators in prey-rich habitats are selectively "energy maximiser(s)" (Griffiths, 1975). Tigers in Chitwan, for example, showed a preference for sambar *Cervus unicolor* (Sunquist, 1981; Seidensticker and McDougal, 1993); in Kanha tigers selectively killed adult male sambar (Schaller, 1967); and in Nagarahole, they selectively killed adult sambar and gaur (Karanth and Sunquist, 1995). A prey item the size of a gaur would sustain an adult tiger for one week. The nocturnal to crepuscular activity patterns of tigers in these areas reflect the activity patterns of the principal prey. That tigers in Taman Negara with minimal human disturbance were largely diurnal with three peaks at dawn, mid-day and dusk suggests that they were hunting diurnal and crepuscular species such as wild pig and barking deer *Muntiacus muntjak,* and possibly sun bear (Kawanishi and Sunquist, 2004). In more disturbed habitats of mixed secondary forests and plantations (e.g. Felda Jerangau Barat and Jerangau Forest Reserve in Terengganu and Gunung Basor Forest Reserve in Kelantan) in high Human-Tiger Conflict areas, tigers still show a crepuscular activity pattern, but were more nocturnal than tigers in Taman Negara (Ahmad Zafir *et al.*, 2006; Darmaraj, 2007).

Concealment and stalking are the main hunting strategies of tigers (Schaller, 1967; Sunquist *et al.,* 1999; Karanth, 2001)

and prey is located primarily by sight (Schaller, 1967). In the rainforest, where visibility is greatly reduced, the proportion of prey species taken by tigers may simply reflect the rate of encounter, hence relative abundance of prey species. It was found that large prey (i.e., sambar and gaur) was extremely scarce in Taman Negara at 0-0.22 animals/km2 with occupancy rates as low as 46% for sambar and 4% for gaur (Kawanishi and Sunquist 2004). In rainforests where prey density is typically low, and its distribution unaffected by ample availability of water and cover, large predators may be more opportunistic than selective feeders (Kawanishi, 2002).

A tiger can eat between 18-40kg of meat in one sitting (Locke, 1954; Schaller, 1967) and will return to its kill for up to a week, until little remains (Sunquist, 1981). The maximum amount of meat a tiger can consume in 24 hours has been estimated to be equal to about 20% of its own body weight (Sunquist, 1981), which, for a 120kg Malayan tiger is 24kg, about the size of a wild pig.

Dietary studies specific to the Malayan tiger are lacking but it is generally expected that the principal prey are the two, relatively abundant, large (>20 kg) ungulates – wild pigs and barking deer – as well as the less common sambar deer. In addition, tigers in Taman Negara are known to prey on sun bears (Kawanishi and Sunquist, 2004). It is unknown, however, whether or not gaur and tapirs are principal prey for the Malayan tiger. Although the former is rare in Malaysia, the latter appears as the third most common large ungulate, after wild pig and barking deer (Kawanishi *et al*., 2002; Kawanishi and Sunquist 2004; DWNP unpublished data; Ahmad Zafir *et al*., 2006; Darmaraj, 2007; Lynam *et al*., 2007). Bearded pigs *Sus barbatus* are larger than wild pigs and could be more ideal prey for tigers, but their distribution is now reduced, currently restricted to the southern portion of the peninsula, probably as a result of having their migratory routes disrupted by land clearance for oil palm plantations and other large-scale developments (Kawanishi *et al*., 2006).

More studies are needed to determine the status of other potential prey species such as the bearded pig and serow (*Capricornis sumatrensis)* to establish their importance in terms of the tiger's dietary needs. Between the two principal prey species, due to its relatively greater abundance and availability, the wild pig

is probably the most important prey species for Malayan tigers. If feeding only on wild pigs, an average male (120kg) and female (100kg) tiger would consume annually at least 104 and 87 wild pigs respectively, that is nearly, 100,000 wild pigs killed annually by 1,000 tigers. As a result of this perceived importance of the wild pig in the tiger's diet, the wild pig was listed as a protected species under the PWA in 1972. Since then, the hunting of wild pig has been regulated through a system of hunting licences.

The tiger's diet also often includes livestock in every range-country where domestic animals are reared adjacent to tiger habitats without proper management. In Peninsular Malaysia, DWNP data suggest that the two common livestock species taken by tigers are cattle and goats. In extremely rural areas, buffaloes are reared instead of cattle because of the ease of maintenance and their superior defence behaviour against predators. In these areas, tigers take buffaloes occasionally but, due to isolation, the incidences are rarely reported to the authorities (Kawanishi, unpublished data).

1.1.3 Tiger land tenure system and social organisation

The tiger land tenure system, which refers to the spatial and temporal occupancy of a habitat by individual animals, is dynamic and, typically, a male's range encompasses those of several breeding females. The size of an individual's territory and home range varies depending on several factors, including habitat type, prey biomass, tiger density and demographics (Schaller, 1967; Sunquist, 1981; Miquelle *et al*., 1999). Typical range sizes for resident females have been recorded as being as small as 17km2 in South Asia (Sunquist, 1981; Karanth and Sunquist, 2000) and as large as 400km2 in the Russian Far East (Matjuschkin *et al*., 1980; Miquelle *et al*., 1999). The variation in daily distances walked, however, is less obvious with records of up to 32km in India (Schaller, 1967) compared to 15-20km in Russia (Matyushkin *et al*., 1980) and only 10km in Nepal (Sunquist, 1981).
Maintenance of an exclusive home range or territory is an important component of tiger social structure (Sunquist, 1981; Smith *et al*., 1987; Miquelle *et al*., 1999). How dense tropical rainforests, as opposed to, say, more open temperate grasslands, affect territoriality is unknown. A home range study requires the application of telemetry technologies and these have not been tried on Malayan tigers. However, based on observations, the home range size of the Malayan tiger has been stated to be 380km2 (Locke, 1954), whilst minimum range sizes, suggested by camera-trapping data in secondary forests and adjacent plantations, were 345km2 for one male and 186, 198 and 229km2 for three females in Jerangau Barat, Terengganu (Ahmad Zafir *et al*., 2006). Smaller minimum ranges were recorded in Jeli, Kelantan with 60 and 289km2 for two males and 98km2 for one female (Darmaraj, 2007).

1.1.4 Tiger density

Tiger density has an inverse relationship with home

range size and correlates positively with prey biomass (Seidensticker, 1996; Miquelle *et al.,* 1999). Using the data from 11 ecologically diverse sites in India, Karanth *et al.* (2004) demonstrated a simple mechanistic model that predicts tiger density as a function of prey density. Using this model, the highest tiger density site, Kaziranga, with its highly dense prey base (68 animals/km2) and associated biomass (5,200kg/km2) can support around 16.8 tigers in 100km2. This is roughly ten times as many as the mean estimated density of tigers in Taman Negara (Kawanishi and Sunquist, 2004) where the crude estimate of prey biomass ranges from 270 to 430 kg/km2. Two recent camera-trapping studies in the mark-recapture framework estimated adult tiger densities, *D(Standard Error)*, in Malaysia, as ranging from 1.10 (0.52) to 1.98 (0.54) tigers/100km2 in the protected primary rainforests of Taman Negara (Kawanishi and Sunquist, 2004) and 2.59 (0.71) tigers/100km2 in the disturbed mosaic habitat of secondary forest, plantation, orchards and human settlements in Gunung Basor Forest Reserve, Kelantan (Darmaraj, 2007).

The evergreen rainforests, especially mature primary rainforests like Taman Negara, offer little primary productivity at ground level and thus mammalian biomass is dominated by arboreal herbivores (Eisenberg, 1980). Consequently, tropical rainforests are not particularly rich habitat for tigers in terms of diversity and abundance of large ungulate communities. Tigers in rainforests at the southern extreme of its distribution range (Malaysia and Indonesia) occur at among the lowest densities recorded in the entire global range (Kawanishi and Sunquist, 2004). An even lower tiger density (<1 tiger/100km2) has been recorded in Sikhote-Alin, Russian Far East, at the northern extreme of its distribution range, where prey is equally scarce (Miquelle et *al*., 1999). More detailed references to the natural history of tigers can be found in Mazak (1981), Nowell and Jackson (1996), and Sunquist and Sunquist (2002).

1.2 National and Global Significance

For thousands of years, humans have respected and admired great cats of the genus *Panthera* such as lions, jaguars, leopards and tigers, for their beauty and strength (Seidensticker and Lumpkin, 2004). In Malaysia, the tiger is a symbol of strength and royal power. Two tigers flank Malaysia's National Coat-of-Arms in a protective stance (Fig. 1) and the Johor state emblem. It is Malaysia's national animal, and the national sports teams call themselves "The Malaysian Tigers" and parade in yellow uniforms with black stripes.

Fig. 1 : Malaysia's National Coat-of-Arms with two tigers flanking the shield.

The symbolic power of tigers manifests itself in a number of commercial products as corporate branding strategies. The global oil giant, ExxonMobil, is probably the most well-known example and is one of a few corporations that actually pay a "royalty" for the use of the tiger's image. Among all corporations using the image of the tiger for branding, ExxonMobil makes the largest financial contribution towards tiger conservation worldwide with US$13.6 million (RM48 million) between 1995 and 2006 (Save the Tiger Fund, 2007). Malaysia's largest financial institution, Malayan Banking Bhd., also uses the tiger for its logo.

With its position at the apex of the terrestrial food chain, top predators maintain the balance of an ecosystem (Terborgh, 1988; Terborgh, 1990; Terborgh *et al.,* 1999; Miller *et al*., 2001). This is the tiger's main ecological significance. Top predators not only have a numerical and behavioural impact on their immediate prey species, but sometimes even regulate their populations, which in turn have effects on plants or smaller animals that these prey feed on. In other words, the loss of top predators may release cascade impacts and changes across the food web.
The tiger is also considered a landscape species since they roam a large area that encompasses different ecosystem or habitat types. And large carnivores generally are the first to disappear in the face of habitat destruction and human intrusion. The presence of a viable top predator population indicates the ecological integrity of a given ecosystem. Hence successful tiger conservation may not only ensure tigers, prey species and their habitat but also the

processes that maintain the ecosystem. Once lost, the latter cannot be recreated *ex-situ*. The tiger's functional role in an ecosystem is thus important to humans who benefit from the ecological service provided by healthy forests. Protection of large tiger habitats therefore means protection of forests, its biodiversity, water catchment areas, and soil, however difficult it may be to put a price tag on such long-term ecological services. Tigers are therefore important for Malaysians and the rest of the world culturally, ecologically, and economically. Aside from these reasons, humans have a moral obligation to safeguard a sufficient amount of wilderness areas where other creatures, such as the tiger that are so vulnerable to large-scale disturbance, can pursue their natural course of evolution, relatively, free of negative human impacts. We now risk losing one of Asia's most beautiful and majestic animals – so admired, feared and respectedthroughout the history of the human race – because of our careless, short-sighted actions and misplacement of priorities and values. Such actions are incongruous with moral and intelligent creatures such as ourselves, and we must today strive to be more morally responsible towards our fellow Earth inhabitants. Just like all other wildlife species, the tiger has an intrinsic value on this planet, as each occupies a specific niche. Saving the big cat thus requires our willingness to forgo some of our immediate self interests.

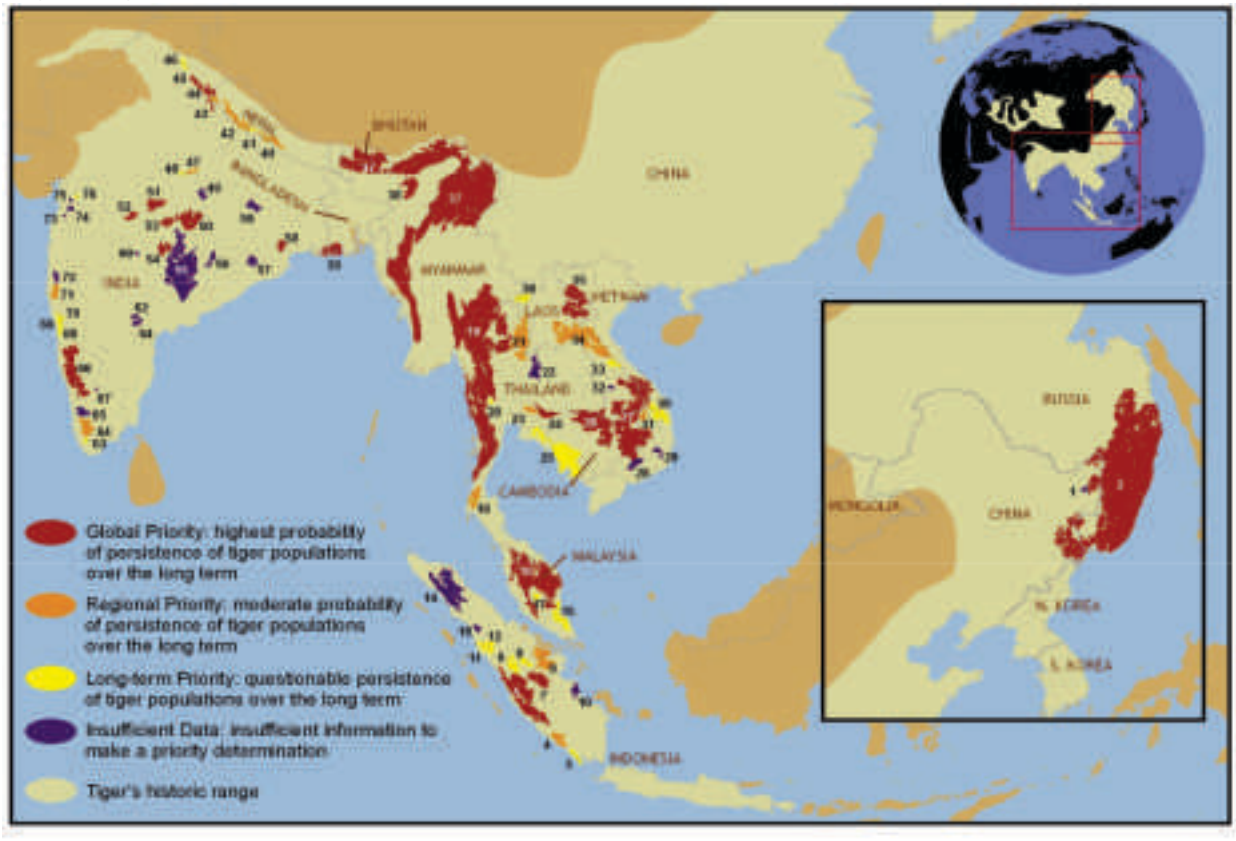
1.3 Tiger Distribution and Population

The historical distribution of tigers extended from eastern Turkey up to the northern tip of the Russian Far East and southward, through India, Indochina and the Malay Peninsula, all the way to the Indonesian islands of Sumatra, Java, and Bali. Tigers have been exterminated from 93% of their original range in the past century and estimates of the area occupied by tigers have dropped by as much as 40% in the past decade alone (Dinerstein *et al*., 2006). The current distribution is represented in scattered fragments across this original range and a recent attempt to convey this into a kind of prioritisation process has identified 76 Tiger Conservation Landscapes (TCLs) where, there is sufficient habitat for at least five tigers, and the tiger presence was confirmed (Fig. 2). These TCLs were then prioritised into four classes based on their ecological and social potential for tiger conservation (Dinerstein *et al*., 2006).

Source: www.savethetigerfund.org

With the extinction of the Javan and Bali tigers, true

Fig. 2 : Tiger Conservation Landscapes and Priorities. Source Dinerstein *et al.*, 2006.



"rainforest tigers" of evergreen rainforests are now found only in the Malay Peninsula and the island of Sumatra. These areas are collectively called the Southeast Asia Bioregion (Dinerstein *et al.,* 1997 and 2006). This bioregion has 15 TCLs, three of which are considered to be global priorities. The only global priority TCL found in Malaysia encompasses the Main Range (i.e., the main western spine of the mountain range) and the Greater Taman Negara Landscape (i.e., Taman Negara National Park and the surrounding Permanent Reserved Forests). This TCL extends across the national border into southern Thailand, but the coverage in Thailand is minimal (Dinerstein *et al*., 2006).

Corresponding to the loss of tiger habitat, the number of tigers has also dramatically declined in the past century and the tiger cannot afford to have another century like the last. There were once believed to be about 100,000 tigers in the original extent of the habitat, which by the 1990s dwindled to about 6,000, including India's 3,000 (Seidensticker *et al*., 1999). After rampant poaching in some Tiger Reserves and mismanagement of resources (Thapar, 1999; Gupta, 2005), preliminary results of the India-wide population studies conducted in 2005 and 2006 have put the total number of tigers at between 1,300 and 1,500, more than 50% reduction from the 2001-2002 census result (Balla, 2007). Elsewhere in Cambodia, Vietnam and Myanmar, extensive forest tracts still remain but tigers have been hunted close to

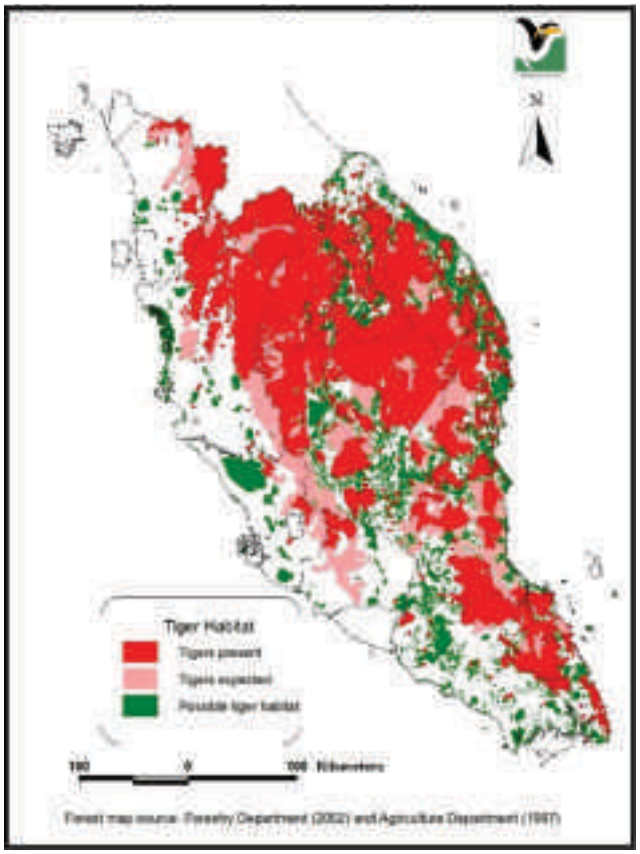
extinction in all of these countries. In the Indochina bioregion, Thailand may represent the last hope for the tigers as it is estimated to have about 190 tigers remaining (Gratwicke *et al*., 2006). All indications suggest that there may be fewer than 3,000 wild tigers left worldwide.

Peninsular Malaysia's forests are managed according to three different categories. The majority (80%) of forest cover (not the total land area) is Permanent Reserved Forests (PRFs) that are managed by state Forestry Departments. They are further classified into Protection Forests (for specific purposes including soil protection, water catchment, research and recreation) and Production Forests (for timber extraction).

About 13% of the forest cover (not of total land cover) is classified as Protected Areas (PAs) such as national parks and wildlife reserves, managed by DWNP or, in the case of state parks, by state governments (e.g., Johor National Parks Corporation for Endau-Rompin and Perak State Park Corporation for Royal Belum). The remaining 7% are state land forests that are managed by state governments (FDPM, 2006).

An analysis of data, collected by DWNP between 1991 and 2003, shows that 51% or 66,211km2 of Peninsular Malaysia was considered suitable as tiger habitats, including all forest types from peat swamps to mountain forests and even some non-forest lands (Fig. 3). Because forests represent 45% of Peninsular Malaysia's land-cover (FDPM, 2006), this means that 6% of suitable tiger habitats fall outside forests to include abandoned agricultural fields, early-succession scrublands, and pockets of swampy woodlands in plantations. The highest elevation where tigers have been recorded was 1,730m, on Gunung Bintang Hijau in Perak (DWNP, unpublished data). No tiger signs were recorded at the peak of Gunung Tahan at 2,187m (the highest mountain in Peninsular Malaysia) or in Cameron Highlands (Topani, 1990).

Source:http://www.wildlife.gov.my/webpagev4_en/printed_material/kmaklumat/harimau.pdf
Fig. 3 : Three types of tiger habitat in Peninsular Malaysia based on analysis of data collected by the Department of Wildlife and National Parks between 1991 and 2003.



Source:http://www.wildlife.gov.my/webpagev4_en/printed_material/kmaklumat/harimau.pdf

Not surprisingly, smaller states such as Perlis and Malacca and the highly developed Federal Territories of Kuala Lumpur and Putrajaya appear to have lost their tigers in recent times, though tigers have been captured or sighted in forest reserves adjacent to Kuala Lumpur as recent as 2001 (DWNP, unpublished data). There are only a few tigers remaining in Selangor and Negri Sembilan as an escalation in development projects continues to fragment forests (*Sec 1.5.1.2*).

An inevitable result of all these development projects, coupled with the loss of lowland forests to largescale agriculture over the last 50 years, is that nearly 90% of the remaining tiger habitat is found in only four states - Pahang, Perak, Kelantan and Terengganu. Each of these has relatively low human densities and large forest cover among the 12 states and federal territories of Peninsular Malaysia.

Tiger habitats fall into the following three categories depending on evidence of tigers, forest status, and forest connectivity. The qualitative assessment of a conservation value is meant to aid the decision-making process for intelligent resource allocation towards conservation of wild tigers.

1.3.1 Tiger Landscapes

From the location of confirmed and expected tiger habitats, three main broad spatial units referred to as "Tiger Landscapes" were identified for planning and management purposes.

Main Range (ca. 20,000km2) to the west of Peninsular Malaysia. This landscape includes hill and montane forests that stretch longitudinally over 5 or 6 states, from Perak, at the Thai border, to Kelantan, Pahang, Selangor, Negri Sembilan, and possibly Kedah. It includes the Bintang Hijau forest complex in Perak, but may or may not include Ulu Muda in Kedah, which appears isolated by the Federal Road bisecting a 2-km stretch of a forest corridor at the Perak-Kedah border. The newly established Royal Belum State Park, at 1,175km2 and the adjacent Temengor Forest Reserve at the northern end, is likely the main stronghold for the Main Range tiger population. But only general information on tigers is available from Belum and Temengor. Apart from a study in Gunung Basor Forest Reserve in Kelantan, where tiger density was estimated at 2.59 tiger/100 km2 (Darmaraj, 2007), not much is known from the rest of the Main Range.

Confirmed Tiger Habitats (37,674km2 or 29% of total land area) with good conservation value These habitats are either PAs or PRFs with evidence of tigers recorded between 1991 and 2003 by DWNP. All PAs (n=4) greater than 400km2 in size in IUCN categories I-IV (IUCN 1994; DWNP/DANCED, 1996) were in this category. That 85% of the confirmed tiger habitats are in PRFs illustrates the significance of collaboration with the FDPM for on-the-ground protection of tigers and their habitats. The conservation value of these habitats is considered good because of the protected status of the forests combined with evidence of the presence of tigers.

Expected Tiger Habitats (11,655km2 or 9% of total land area) with fair conservation value These are forest blocks that are physically connected to confirmed tiger habitats but have yet to be adequately surveyed. Tigers are expected to occur in these habitats because of the physical connectivity. The conservation value of these areas can be raised once tiger presence is confirmed.

Possible Tiger Habitats (16,882km2 or 13% of total land area) with marginal conservation value These areas include forests in tiger states that are isolated from confirmed tiger habitats. It also includes areas with natural vegetation not defined as "forests" by the FDPM (e.g., scrublands and abandoned agricultural fields), but where tigers have been recorded (shown with red dots in Fig. 3). Because the future of these lands is uncertain, their conservation value is marginal, except for areas considered as potential corridors connecting confirmed/expected tiger habitats.

Data Gap: There needs to be a benchmark study on the status of tigers in Belum and Temengor and studies to determine their distribution throughout the Main Range. WWF-Malaysia has begun a study to determine thestatus of tigers in Temengor in 2007.

Greater Taman Negara (ca. 15,000km2) to the east of Peninsular Malaysia. This landscape encompasses Taman Negara National Park and contiguous PRFs north and south of the park that stretch over Kelantan, Terengganu, and Pahang. This area harbours the largest remaining lowland forests (<300 m asl) in Peninsular Malaysia. A benchmark study (Kawanishi and Sunquist, 2004) suggests that the Taman Negara tiger population, estimated at 52-84 adults, is viable if the threats from poaching are maintained at a negligible level to none. The population viability will be greatly enhanced by strong tiger-prey communities in the 11,000km2 of PRFs surrounding the park. The genetic viability of the Greater Taman Negara tiger population will be enhanced by occasional gene flow from the two other landscapes. This landscape is at risk of isolation from the Main Range due to a railway and road running parallel to the western border of the park.

Data Gap: Population monitoring needs to be continued in Taman Negara and the distribution status inthe rest of the landscape needs to be determined.

Southern Forest (ca. 10,000km2) to the south of Peninsular Malaysia. This landscape has already been isolated from the other two tiger landscapes and includes four groups of increasingly fragmented forest complexes located south of the Pahang River: the Chini/Ibam complex, south-east Pahang peat swamp forests, Endau Rompin, and Endau Kota Tinggi. It encompasses southern Pahang and Johor. Among the three main tiger landscapes, this is the smallest and most fragmented. Endau Rompin (402km2 in Pahang and 489km2 in Johor) is situated in the centre of the landscape and should serve as the source population, but little is known of tiger ecology in this area.

Data Gap: There needs to be a benchmark study on the status of tigers in Endau Rompin and surrounding areas. WCS has begun a study to determine the status of tigers and tigers' prey in the Johor portion of the landscape in 2007.

In the global assessment, the Main Range and Greater Taman Negara landscapes correspond with No. 16 Class I Tiger Conservation Landscape of a global priority, meaning that it has habitat to support at least 100 tigers, evidence of breeding, minimal-moderate levels of threat, and effective conservation measures in place and offers the highest probability of the persistence of tiger populations over the long term (Fig. 2; Dinerstein et al., 2006). These two tiger landscapes make up the 5th largest TCL among the 20 global priority TCLs out of a total of 76 TCLs. The Southern Forest Landscape and Krau Wildlife Reserve are Class III TCLs that are considered long-term priority landscapes that require sustained efforts to restore them to Class I status. In the near- to mid-term, they are still important areas for developing a national tiger conservation strategy.

During wildlife surveys, tigers are rarely seen in the forest as they are widely dispersed at low densities and actively avoid humans. Camera-trapping studies, utilising a mark-recapture framework, (Karanth, 1995) is a powerful tool to estimate tiger densities but too expensive to be applied for large areas beyond a few selected priority sites. Hence, to gain a reliable estimate of the national tiger population is, then, an extremely difficult undertaking.

In the 1950s, it was roughly estimated that there were approximately 3,000 tigers in Malaysia (Locke, 1954). By 1977 the number declined to about 300 and in a decade it recovered to 600-650 animals (Khan, 1987) probably because the tiger was upgraded to the totally protected species in 1976. In 1990, based on surveys and verified reports of human tiger conflicts, the tiger population was conservatively estimated at 500 (Topani, 1990).

A more recent attempt for a crude population estimate was made based on typical prey biomass in tropical rainforests (Hoogerwerf, 1970; Seidensticker and Suyono, 1980; Seidensticker, 1986; Kawanishi and Sunquist, 2004), energetic needs of tigers (Sunquist, 1981), estimated tiger densities from studies carried out in tropical Asia (Griffiths, 1994; O'Brien et al., 2003; Kawanishi and Sunquist, 2004; Linkie et al., 2006; Darmaraj, 2007) and available tiger habitats in Peninsular Malaysia (Kawanishi et al., 2003). The available information indicates that it is reasonable to assume the mean tiger density estimates in tropical forests falling somewhere between 1 and 3 tigers/100km2 as earlier suggested by Santiapillai and Ramono (1987). Then the confirmed and expected tiger habitats of 49,300km2 could support between 493 and 1,480 adult tigers (Kawanishi et al., 2003). The wide range is typical of non-scientific guesstimates.

There are no demographic data on a wild Malayan tiger population. If we assume that 25% of a typical tiger population consists of cubs as suggested by Karanth and Stith (1999), the total potential tiger population is estimated at 657 to 1,973 tigers in Malaysia. Note, however, that this figure does not

include the tigersrecorded in the possible tiger habitats and assumes that the expected tiger habitats actually do support tigers. Some data were collected more than 15 years ago and thus the distribution status indicated by these old data may no longer be valid. See Kawanishi et al. (2003) for other limitations of the analysis.

Taking the lower bound of 493 adult tigers, if the assumptions are correct, Malaysia could be supporting the largest tiger population in Southeast Asia. Studies on the nationwide tiger occupancies and densities estimates from more sites including mountain forests will allow us to test the prediction.

1.4 Opportunities

Before discussing the threats to tigers, national policies and legislation already in place to protect tigers, their prey and habitats are presented in this section. Malaysia's stable socio-economy and conservation partnership for tigers are also presented as unique opportunities that need to be further harnessed to strengthen the tiger conservation efforts.

1.4.1 Pro-conservation national policies

Under the Malaysian Constitution, land-use is a State matter and the Federal government has no power over this except for Articles 83-86 and 88 which deal with the reservation and disposition of land held for Federal purposes. However, the Federal government may legislate to the extent of ensuring common policies over land matters and a common system of land administration, though such legislation again has to be ratified by the respective states. The Federal government may also extend its executive authority in the form of advice and technical assistance to the states. In this respect, the federal level councils, such as the National Physical Planning Council, National Forestry Council, and National Biodiversity Council, are empowered to coordinate the planning, management and development of respective natural resources. The following three policies and one plan are considered relevant to tiger conservation.

1.4.1.1 National Policy on Biological Diversity

Malaysia became a signatory of the Convention on Biological Diversity in 1994. As a result, the National Policy on Biological Diversity (NPBD) was drawn up by the Ministry of Science, Technology and Environment in 1998. This Policy serves as a guide towards conservation and sustainable management of Malaysia's rich natural resources and is implemented by the Ministry of Natural Resources and Environment. There are 15 strategies towards achieving the objectives of the policy, and almost all are reflected in this Plan:

i. Improve the scientific knowledge base
ii. Enhance sustainable utilisation of the components of biological diversity
iii. Develop a centre of excellence in research in tropical biological diversity
iv. Strengthen the institutional framework for biological diversity management
v. Strengthen and integrate conservation programmes
vi. Integrate biological diversity considerations into sectoral planning strategies
vii. Enhance skill, capabilities and competence
viii. Encourage private sector participation
ix. Review legislation to reflect biological diversity needs
x. Minimise impacts of human activities on biological diversity
xi. Develop policies, regulations, laws and capacity building on biosafety
xii. Enhance institutional and public awareness
xiii. Promote international cooperation and collaboration
xiv. Exchange of information
xv. Establish funding mechanisms

The policy also acknowledges that current legislative support and conservation efforts are inadequate for holistic biodiversity conservation and further highlights the need for measures to alleviate the impact of human activities resulting in displacement of wildlife.

1.4.1.2 National Physical Plan

The National Physical Plan (NPP) is Malaysia's first national blueprint for spatial planning and was published by the Department of Town and Country Planning in 2005. The NPP Council is chaired by the Prime Minister of Malaysia and this statutory document is being used to guide the National Five YearDevelopment Plans leading towards the achievement of Vision 2020. Furthermore, the Plan also guidesState Planning Committees and local planning authorities when formulating their respective Structure and Local Plans. Most relevant to the Tiger Action Plan is that the NPP sets a spatial framework for sustainable development and

delineates important conservation areas for biodiversity and environmental protection purposes in a landscape ecology perspective. Under the NPP, 36 policies provide a framework for sustainable development, including safeguarding the environment and biodiversity. Two of these 36 policies are of specific importance to the aim of this Tiger Action Plan, namely Policy 18: Environmentally Sensitive Areas (ESAs) and Policy 19: Central Forest Spine (CFS). Realisation of the two policies is crucial for securing the long-term future of landscape species, such as the tiger, as they provide the main tools by which large-scale land-use issues can be brought in-line with conservation efforts. This is expected to be achieved primarily through the identification and protection of ESAs and establishing green linkages through the Central Forest Spine (CFS) and strict control and sustainable development of highlands and coastal zones. The three priority tiger landscapes identified in this Plan (Sec 1.3) fall within the CFS, complimenting current national policies and thereby reaffirming this Plan.

1.4.1.3 National Forestry Policy

Because individual states have complete jurisdiction over forestry matters, in order to ensure a common approach to forestry issues, the National Forestry Council was set up under the National Land Council in 1971. The National Forestry Council is the highest decision-making body on forest issues, representing a forum where head of states and federal governments discuss and decide on forest-related issues. The Council endorsed the National Forestry Policy in 1978. This Policy's objectives are to conserve and manage the nation's forest based on the principles of sustainable management and to protect the environment as well as to conserve biological diversity, genetic resources and to enhance research and education.

1.4.1.4 National Policy on the Environment

In keeping abreast with the country's rapid economic development and to meet with the nation's aspiration for an improved quality of life, the National Policy on the Environment 2002 integrates the three elements of sustainable development:

1) economic development,
2) social and cultural development, and
3) environmental conservation. The Policy aims to achieve:
    1) a clean, safe, healthy and productive environment for present and future generations;
    2) the conservation of the country's unique and diverse cultural and natural heritage with effective participation by all sectors of society; and
    3) a sustainable lifestyle and pattern of consumption and production.

1.4.2 Obligations under international conventions

Internationally, Malaysia became a signatory to the Convention Concerning the World Cultural and Natural Heritage (World Heritage Convention) in 1988 although no sites in Peninsular Malaysia have yet been nominated for inscription on the World Heritage list. Likewise, no sites have been designated under the UNESCO Man and the Biosphere Programme. Malaysia became party to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) in 1977. All tiger subspecies are listed in Appendix I of the CITES, which prohibits international trade of live tigers, their parts and derivatives for commercial purposes. DWNP is the local Management Authority for the CITES-regulated terrestrial faunal species. The commercial international trade in all tigers and their body parts and derivatives was banned in 1987 under CITES. In 1994, CITES Parties agreed that additional measures for the protection of tigers were necessary, including the specific acknowledgment of threats posed by unsustainable trade in tiger parts for use in traditional medicine. CITES Parties then adopted a resolution (Resolution Conf. 12.5) to urge States around the world to do everything possible to help conserve the tiger in 2002.

In Peninsular Malaysia, there are multiple CITES Management Authorities, which are responsible for the implementation of CITES. DWNP, however, has been historically the first point of contact for the CITES Secretariat and is the principal Management Authority. The Ministry of Natural Resources and the Environment (NRE), is the sole Scientific Authority for the country while the National Committee on CITES is a permanent committee that oversees the implementation of CITES in Malaysia. This structure may be changed in the near future, to strengthen the implementation of CITES in Malaysia. The Protection of Wild Life Act 1972 covers the protection of most CITES-regulated species in Peninsular Malaysia.

1.4.3 Existing administrative and legislative structure and enforcement agencies

Nationally, statutes relating to biological resources are in force at both state and federal levels, rendering a

complexity in approach. Many of these legislations are currently under review for amendment. Therefore changes are likely and improvements are expected in the near future. There are a number of legislations related to the conservation of tiger habitat or protection of tigers, the most relevant of which are as follows.

1.4.3.1 Protection of Wild Life Act

The Protection of Wild Life Act 1972 (amended in 1976 and 1988) is the main legislation concerning wildlife in Peninsular Malaysia, which is enforced by DWNP. The tiger is a totally protected species under the Act and a conviction for shooting, killing or taking tigers (and parts thereof) carries the penalty of a fine not exceeding RM15,000 (USD4,000) or no more than five years imprisonment. The tiger, Sumatran rhinoceros and clouded leopard Neofelis nebulosa are afforded with the highest protection under the Act. Tigers' primary prey species, wild boar, sambar deer, and barking deer are protected game species for which hunting is restricted by licensing. In PAs, however, all forms of fauna and flora are totally protected. Steel wire snares are banned and offenders possessing more than 25 snares incur a mandatory jail sentence of up to ten years. For less than 25 snares, an offender is liable to a maximum fine of RM5, 000 (USD1,300) and/or imprisonment up to five years. The Act is currently being amended and the new legislation is expected to allow for higher fines and longer jail sentences for poaching tigers. The use of registered firearms, for the purpose of hunting of game species, is regulated through licensing by DWNP, and Malaysia's strict Firearms Act 1971, which carries a mandatory death sentence, effectively reduces the hunting pressure using firearms.

1.4.3.2 Sale of Drugs Act and the Control of Drugs and Cosmetics Regulations

One of the main threats to tigers comes from the trade in tiger parts for use in traditional medicines. Important legislation relevant to Traditional Chinese Medicines (TCM) are the Sale of Drugs Act 1952 and the Control of Drugs and Cosmetics Regulations 1984 that regulate the sale and import of drugs in Malaysia. The Drug Control Authority (DCA) of the Ministry of Health is the executive body established under the Regulations whose main task is to ensure the safety, quality, and efficacy of pharmaceuticals and health and personal care products that are marketed in Malaysia. In accordance with the legal requirements of the Act and the Regulations, the Guidelines for the Registration of Traditional Medicines were drawn up by the DCA.

As of 1992, all traditional medicines must be registered under the Sale of Drugs Act. The DCA also ensures that all registered products are labelled according to stipulated labelling requirements. A product will be registered only if it satisfies all the requirements of the DCA through laboratory screenings, especially with respect to safety, efficacy, and quality of the product. After a product is registered, the applicant can apply for a licence for it to be manufactured, imported, or wholesaled (Ng and Burgess, 2004). Every registered product is given a registration number, which must be printed on its label or package. These numbers start with 'MAL' or 'PBKD', followed by 6 or 8 digits, and ending with the letter 'T' for traditional medicine products (Pereira et al., 2002).

1.4.3.3 National Parks Act

The National Parks Act 1980 (amended in 1983) provides for the establishment of national parks and 15 applies to Peninsular Malaysia. It is implemented by DWNP. The Act, as amended, allows the appropriate Federal Minister to request that any state land be reserved for the purpose of a national park, although this has no legal force without the assent from State authorities. Despite the federal budgetary allocation for the park management, the states have been cautious to establish new conservation sites, with the only one exception being the Penang National Park in 2003. Taman Negara was established before this Act and the power of the Act does not apply to the park.

Other legal instruments for the establishment of protected areas in Peninsular Malaysia include the National Land Code 1965, Local Government Act 1976, Johor National Parks Corporation Enactment 1989, Perak State Parks Corporation Enactment 2001, and (amended) Perlis Forestry Enactment 2001.

1.4.3.4 Taman Negara Enactments and Taman Negara Master Plan

The Taman Negara National Park was established by three separate enactments, which cover the three states the park spans:

i. Taman Negara Enactment (Pahang) No. 2 of 1939
ii. Taman Negara Enactment (Kelantan) No. 14 of 1938
iii. Taman Negara Enactment (Terengganu) No. 6 of 1939

The content of the three enactments are similar. These enactments empower DWNP to manage Taman Negara as one National Park in accordance to the Taman Negara Master Plan (DWNP, 1987).

1.4.3.5 National Forestry Act

The National Forestry Act 1984 (amended in 1993) was formulated to standardise and update the various State Forest Enactments, which were adopted in the early 1930s and enables the Forestry Department to implement the National Forestry Policy. The Act provides for the administration, management and conservation of forests and forestry development throughout Peninsular Malaysia and is enforced by the respective State Forestry Departments. It classifies the Permanent Reserve Forests into eleven categories depending on its purpose and ensures that production forests are managed sustainably and the virtues of other forest types are protected permanently. Apart from production forests where logging is allowed, protection forests are broken down to ten categories depending on specific purposes: soil protection, soil reclamation, flood control, water catchment, forest sanctuary for wildlife, virgin jungle reserve, amenity, education, research, and forest for federal purposes. State governments have formally agreed to adopt the categories and restrictions on use in each category, although these differ slightly from state to state. Since 2002, Perlis, Kelantan and Selangor, have amended their respective National Forestry Enactments (the National Forestry Act as adopted by the individual states) to create an additional category of forest use, i.e. "state park". Selangor was the first to use this approach to gazette the Selangor Heritage Park in 2007.

To further supplement forest management and harvesting plans, the Forestry Department has adopted regulations and guidelines for sound forest harvesting, including 'Standard Road Specifications' and 'Forest Harvesting Guidelines' with special emphasis on environmental conservation measures. These regulations and guidelines are incorporated into harvesting licences issued to logging contractors and their implementation is monitored and supervised by State Forestry Departments' personnel.

1.4.3.6 Town and Country Planning Act

Conservation is specifically recognised to be an essential element of land-use planning under the Town and Country Planning Act 1976, which is enforced by the Department of Town and Country Planning (DTCP). The Act gives the provision to the state and local authorities to set aside certain land to be conserved and protected in one way or another. However, the form and content of the Town and Country Planning Act adopted by states may differ significantly from the parent Federal Act. Rather than as a mandate, the Federal DTCP advises the state DTCP in the state land management plan.

1.4.3.7 Environmental Quality Act

Besides regulating the sources of possible pollutants to the environment, the Environmental Quality Act 1974 was amended to include Environmental Impact Assessments in 1985 which came into force in 161987. It is enforced by the Department of Environment. Detailed EIAs prepared by the project proponent are required by law to be made available to the public who are afforded an opportunity to comment on the Detailed EIA. The Environment Quality Act, Order 1987 contains a list of Prescribed Activities for which Detailed EIAs are required to be undertaken by the project proponent. For activities that do not fall under the list of Prescribed Activities, Preliminary EIAs may be prepared but these are exempted from the public participation process. Prescribed Activities involving logging and land conversion of forests are as follows:

i. land development schemes converting an area of 500ha or more of forest land into a different land-use;
ii. drainage of wetland, wildlife habitat or virgin forest covering an area of 100ha or more;
iii. land-based aquaculture projects accompanied by clearing of mangrove forests covering an area of 50ha or more;
iv. conversion of hill forest land to other land-use, covering an area of 50ha or more;
v. logging or conversion of forest land to other land-use within the catchment area or reservoirs used for municipal water supply, irrigation or hydro-power generation or areas adjacent to state and national parks, and national marine parks;
vi. logging covering an area of 500ha or more;
vii. conversion of mangrove forests for industrial, housing or agricultural use covering an area of 50ha or more;
viii. clearing of mangrove forests on islands adjacent to national marine parks;
ix. other activities which may affect forest, such as coastal reclamation.=

1.4.4 Stable socio-political and economic system

As more and more tigers live in human-dominated landscapes, they have to contend with a myriad of threats brought by human activities. This is why their survival largely depends on the people who share the same landscapes. When the basic livelihoods of people are threatened by political unrest, social turbulence and unstable or unbalanced economies, wildlife suffers. In many countries where the rural poor are struggling for bare essentials such as clean water, cooking fuel, electricity, and sanitation, there is a perception among conservation and humanitarian organisations, a fairly recent concern for the former, that the first need is to alleviate the poor living conditions of the people with whom, for example, tigers have to share limited resources. Furthermore in nations where people's basic needs are not secured, it is difficult for the government to commit itself to saving wildlife before saving its people; yet such high level commitment is what is most needed to save the big cats (Jackson, 1997; Thapar, 1999; Dinerstein *et al.,* 2007).

Whether poverty alleviation actually makes a significant positive contribution towards conservation goals is unclear, but this is not of high, immediate concern for tigers in Malaysia, for the basic needs of most Malaysians are met, and poverty levels are among the lowest in the tiger nations (CIA, 2007).

Malaysia has one of the strongest Tiger Economies next to Singapore and Hong Kong. After the Asian financial crisis in 1998, Malaysia was the first to recover among the Southeast Asian tiger nations.

While maintaining steady national economic growth, the government thrives to eradicate rural poverty by improving welfare, youth and sports programmes, education, agricultural subsidies, low-income housing and health care. Malaysia is also one of a few countries in Southeast Asia where racial harmony is maintained. Malaysia, in fact, has bilateral agreements with the governments of neighbouring countries to assist them in improving social harmony.

Educated people tend to be more vocal in defending their interests and confronting unrepresentative governments. Research found that civil and political liberties are linked positively to improved governance, which in turn is positively associated with per capita income, quality of health care, and sustainable environment (Thomas *et al*., 2000). Due to the distortion it introduces into the policy-making process, corruption is incompatible with sound natural resource (such as logging) or environmental management.

The level of corruption is expected to be high in politically unstable, low-income nations (Transparency International, 2001). Among the tiger nations, Malaysia is the second-least corrupted nation after Bhutan (Transparency International, 2006).

Government accountability and transparency, together with the political will to prioritise conservation issues, are all important prerequisites for allowing the effective expenditure of conservation funds and for gaining public support. The case of the tiger reserves in India is a good example of how, despite lucrative 17 financial allocations, the lack of these three requirements can still result in disaster (Thapar, 1999; Gupta, 2005; Dinerstein *et al*., 2007). Malaysia, however, has the political will and reasonably effective anti-corruption measures necessary to avoid a tiger disaster. The Malaysian government has made clear its priority to conserve wild Malayan tigers by seeking to consolidate national expertise, through the initiation of the Malaysian Conservation Alliance for Tigers (MYCAT) in 2003 (*Sec. 1.4.6*). In fulfilment with the fifth objective of the NPBD to enhance the scientific knowledge on biodiversity, DWNP has supported external tiger research projects such as those conducted by WWF-Malaysia, New York-based Wildlife Conservation Society, and the University of Florida in the past decade. DWNP is in the process of doubling its manpower and once the positions are filled, 17 entry/exit points in nine states will be manned permanently in an effort to eradicate illegal wildlife trade (Misliah, B., DWNP, pers. comm.). Enforcement efforts are further strengthened by cooperation with the Royal Malaysian Army, Anti-smuggling Unit of the Royal Customs and Excise Department, Immigration Department and Royal Malaysian Police. With the support from the Army, for example, DWNP had arrested an unprecedented number of foreign poachers, 75 in the Protected Areas between 2001 and 2005 (DWNP, unpublished data). In addition to the existing enforcement units, to forge better networking among the staff with the intention to strengthen actions and produce efficient results, DWNP established a flying squad called the Wildlife Crime Unit in 2005.

These social contexts are not merely a background to biophysical requirements for tigers' long-term survival. A stable socio-political system and economy, coupled with sound conservation priority, are important for successful and cost-effective tiger conservation. So are the education and governance of

the people. This is why Malaysia stands a good chance of saving its tigers in the long run.

1.4.5 Contiguous forests and wide tiger distribution

As mentioned in the preceding *Sec. 1.3*, based on the data collected between 1991 and 2003, Malayan tigers are widely distributed in existing forests and even in non-forested habitats. There appeared many small tiger populations still surviving in isolated forests such as the Krau Wildlife Reserve (624km2) and Kemasul Forest Reserves (460km2) in Pahang, Mercang Forest Reserve (87km2) and Rasau-Kertih Forest Reserve (168km2) in Terengganu and Jemaluang-Tengaroh Forest Reserves (168km2) in Johor with little or no protection on the ground (DWNP, unpublished data). Whilst these populations may not be viable in the long run, they illustrate Peninsular Malaysia as a unique case where tigers are still found outside the major forest blocks or PAs. The tiger distribution is synonymous to the forest coverage (Fig. 3) and the proportion of tiger habitats vs. non-tiger habitats is similar to the proportion of forests vs. non-forests (Fig. 4).

Large contiguous forests, and therefore the largest contiguous tiger distribution in Peninsular Malaysia, are mainly found in the north of the Pahang River, in the Main Range to the west connected to the Greater Taman Negara Landscape to the east. At 49,181km2, this area corresponds with the 5th largest landscape of the 76 Tiger Conservation Landscapes identified in Asia and assumes a significant conservation value to the global tiger conservation effort (Dinerstein *et al.,* 2006). More than 50% of the tiger habitat fall within forests with good conservation value and the majority of the remaining forests are managed by FDPM as PRFs or DWNP and other state agencies as PAs (*Sec 1.3*). Encroachment and land-use changes threaten PRFs, but a majority of tiger habitat appears to be secured from large-scale forest conversion. Forest fragmentation such as that caused by road construction is of a greater concern (Sec 1.5.1).

1.4.6 Conservation partnership, MYCAT

"The future of the tiger lies in reaching out and forging and sustaining key partnerships." - John Seidensticker, Sarah Christie and Peter Jackson, Riding the Tiger, 1999.

Those working to save wild tigers have come to recognise there is no "silver bullet"; saving wild tigers requires supportive tiger range governments in partnerships with NGOs and individuals, engaged in continued actions at multiple scales to contain and reduce threats over the long term (Seidensticker, 1997; Gratwicke et al., 2007). Besides addressing the multitudes of threats directly, what is also needed in this century is a major shift in human values, interests, and behaviour that will allow tigers and their prey to share their landscape with humans. Such changes in the fundamental values and perceptions of quality of life involve a long and complex process of conscious actions by many and varied stakeholders all driven by a shared vision and a willingness to work together.

Stakeholder engagement that starts with dialogues with immediate partners is vital in finding solutions to the challenging dilemmas in the human dimension of wild tiger conservation. Frequent and open dialogues strengthen and broaden partnerships; it is the best

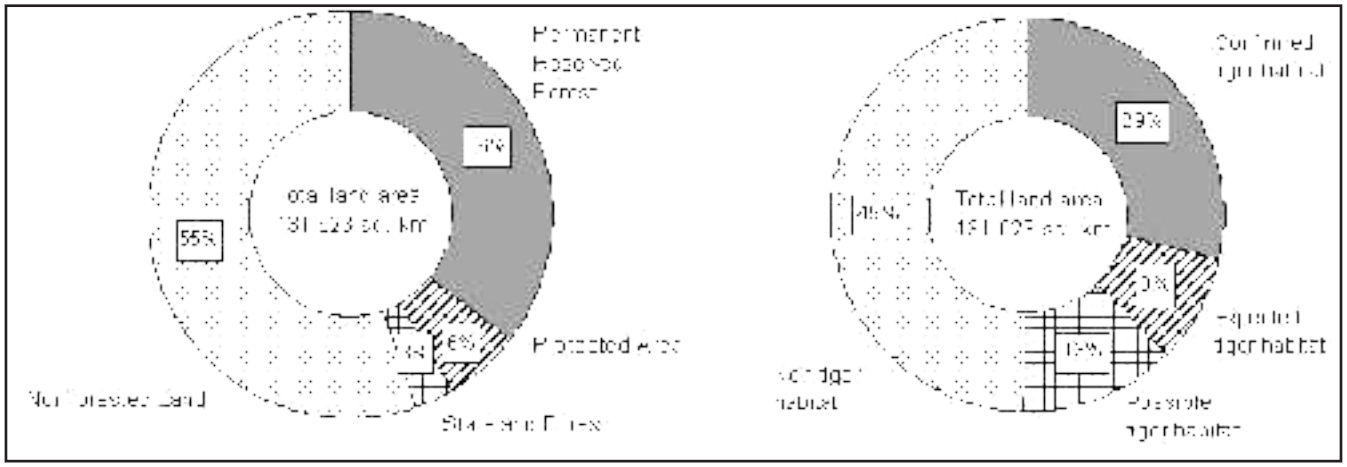


Fig. 4 : Comparison of the forest coverage (FDPM, 2006) and the three categories of tiger habitat (Kawanishi *et al.,* 2003) in Peninsular Malaysia. Detailed descriptions of the three habitat categories are in *Sec. 1.3.*

strategy to address the complex problems and create the solutions needed to sustain wild tiger populations.

Recognising the complexity of the challenges to conservation and importance of the partnership, international organisations are increasingly teaming up to share resources and expertise for wildlife conservation. Such alliances among groups that share similar goals can result in mutually beneficial programs. Partnerships increase efficiency by reducing duplication in effort and provide more innovative solutions to problems by bringing people together with a variety of experiences and perspectives. They strengthen public influence by pooling support, and further reduce inter-organisational conflicts through open communication and long-term collaboration, based on understanding. In its National Policy on Biological Diversity 1998, the Malaysian government recognises the importance of partnerships in biodiversity conservation.

As the lead government agency for wildlife conservation in Malaysia, DWNP promotes the integration of and collaboration with conservation partners in reaching the goal of conservation excellence.

For an integrated approach to conservation, close coordination amongst researchers, members of the public and the policy makers, is crucial. With the overarching spirit of partnership, DWNP initiated the Malaysian Conservation Alliance for Tigers (MYCAT) in 2003 (Siti Hawa and Kawanishi, 2003). It is chaired by the Director General of DWNP and the MYCAT Secretariat's Office (MYCAT SO) is led by the DWNP Division Director of Biodiversity Conservation.

MYCAT is an alliance of conservation organisations with a unified goal of saving the Malayan tiger in the wild. MYCAT's primary objective is to provide a formal yet flexible platform for information exchange, collaboration, and resource consolidation among the conservation partners. It is the first Malaysian partnership to be focused exclusively on the conservation of tigers, their habitat and prey species. Internationally, it is the first formal coalition of tiger conservation organisations initiated and led by a national government. The current partners of MYCAT are: DWNP, MNS, TSEA, WCS and WWF-Malaysia.

The alliance's primary function emphasises the importance of communication among the partners. Enhanced knowledge of the focused areas and strength of the others help each partner ascertain ways to compensate weaknesses and share benefits while avoiding duplicities towards the common goal. As a result of increased communication, MYCAT has experienced the benefit of consolidating resources such as funds, manpower, information, and expertise, across institutional boundaries, leading to the development of this National Action Plan.

To better facilitate close and regular communication, the MYCAT Working Group was established in March 2005. The members are representatives from the partner organisations. The Working Group meets quarterly to update and learn from each other the status of their respective tiger work, and discuss relevant issues or joint projects. Besides the quarterly meetings, subsets of the Working Group, consisting of personnel directly involved in joint projects, meet more often. Some of the members are trained biologists and thus are able to provide technical advice to partner organisation's research projects or 19 provide timely, ecologically sound information to policy makers on conservation issues ranging from an Environmental Impact Assessment on a development project in a critical wildlife corridor area to management of tigers in Human-Tiger Conflict situations.

The MYCAT SO receives institutional support from DWNP and financial support from external donors. Strategically located in the DWNP Headquarters, MYCAT SO serves as a hub of communication among the partners through Working Group meetings and other conventional communication means, as well as with the members of the general public through a media network, publications and the MYCAT e-group (http://groups.yahoo.com/group/malaysian_cat/). A case study of MYCAT's web-based communication is presented in Sec 1.6.2.4. Since 2003, more than 1,700 e-news and discussion items have been registered in the MYCAT e-group. The partners provide space in respective publications such as MNS' Pencinta Alam and the Malaysian Naturalist to raise public awareness and promote tiger conservation. In addition, the partners have jointly raised funds from international donors and the local corporate sector to support basic operational costs and joint projects. Besides the joint fundraising and in-kind support, the partners have directly contributed funds to MYCAT joint projects, such as WWF-Malaysia's contribution to the costs of drafting of this Plan or all partners' contribution to printing of the annual newsletter, MYCAT TRACKS, in 2005.

In addition to providing a platform for communication, since 2005, MYCAT has expanded the scope of its

partnerships by collaborating on joint projects coordinated by the MYCAT SO and led by an individual partner. Some of the notable examples are the DWNP Malayan Tiger Conservation Workshop, DWNP Taman Negara community outreach, WCS Teachers for Tigers (T4T) Zoo Educators Training Course, and TSEA Media Workshop Media Tigers. In 2007, MYCAT SO led a series of targeted campaigns against the local trade and consumption of tigers and their prey with newly identified partners at local levels such a sthe Johor National Parks Corporation and a local communications agency, 9-Lives Communications Sdn Bhd. The MYCAT network enables campaigns like this to be mobilised using a unique approach; the community outreach programmes in tiger trade hotspots are closely coordinated with DWNP's law enforcement arm.

In effect, MYCAT fulfils eight strategies in the National Policy on Biological Diversity as follows:

i. Strengthen and integrate conservation programmes (Strategy V)
ii. Improve the scientific knowledge base (Strategy I)
iii. Exchange of information at the local and international levels (Strategy XIV)
iv. Enhance institutional and public awareness (Strategy XII)
v. Promote international cooperation (Strategy XIII)
vi. Determine funding mechanisms (Strategy XV)
vii. Encourage private sector participation (Strategy VIII)
viii. Enhance skill, capabilities and competence (Strategy VIII)

Through the collaborative platform, the conservation partners try to balance competing interests and institutional differences for the effective implementation of the Action Plan. MYCAT is still a relatively new initiative, yet, the benefit of the alliance is clearly felt by all the partners. One of the challenges faced by MYCAT is quantifying the positive impact of from the partnership on wild tigers in Malaysia. In the immediate future, the success of MYCAT will be reflected in the implementation and monitoring of the progress of this Plan (Sec 2.7).

1.5 Key Threats

Most declining tiger populations are threatened, primarily, by habitat loss and fragmentation, commercial poaching, Human-Tiger Conflict, declining prey base, and science deficiency in monitoring of tiger and tigers' prey (Nowell and Jackson, 1996; Seidensticker, 1997; Karanth et al., 2002; Sunquist and Sunquist, 2002; Myanmar Forest Department and Wildlife Conservation Society, 2003; Bhutan Department of Forests, 2005).

In Malaya, during colonial times, tigers were hunted for sport, and bounties were paid for tigers killed as a measure of pest control (Locke, 1954; Blanchard, 1977), which undoubtedly contributed to the earlier decline of tiger populations. After Malaya's independence from Britain in 1957, tigers continued to be actively hunted to make way for agriculture and development. In 1976, the species was finally listed as a totally protected species under the Protection of Wild Life Act 1972. Today, tigers can only legally be killed in Malaysia under exceptional circumstances where they threaten lives or property, and by law, any such 20 incidents must be reported to DWNP.

While a loss of genetic diversity is potentially a problem for tigers, large carnivores, especially felids, are known to maintain naturally low genetic heterozygosity. Even in a small population, say less than 50 individuals, a low level of genetic exchange of one male per generation appears sufficient to maintain genetic health (Sunquist and Sunquist, 2001). As we are most concerned about the next 100 yefars, the loss of genetic diversity or consequence of inbreeding is considered insignificant in comparison to other threats described in more detail below.

1.5.1 Habitat loss and forest fragmentation

The endangered status of the tiger in the larger part of the last century is a direct consequence of habitat loss and active persecution of tigers. The frequently quoted estimate of a reduction in tiger numbers from 100,000 to 5,000 during the 1900s directly reflects the severity of the habitat loss (Sec 1.3). Today, tigers number less than 3,000 as the cumulative impacts of all threats mentioned above in the recent past have taken a devastating toll, especially on India's populations that used to constitute more than half of the total number of wild tigers.

Although Malaysia still retains 45% of the land area as forest cover (FDPM, 2006) and there are other habitat types that support tigers (Kawanishi et al., 2003), the loss of majority of lowland forests in the last century certainly caused a great decline in the numbers of many large mammals, including tigers. Displaced animals have a higher tendency to be involved in conflict situations with humans, and are either physically removed by the authorities or killed by locals (Zainal Zahari et al., 2001). The Javan rhinoceros

Rhinoceros sondaicus is extinct; the Banteng Bos javanicus with a few alleged sightings may be ecologically extinct in Peninsular Malaysia (Aiken and Leigh, 1992), the Sumatran rhinoceros is critically endangered (IUCN, 2006) and the gaur exists in isolated populations of a few hundred in total (DWNP, unpublished data).

1.5.1.1 Rates of habitat loss in Malaysia

At the turn of the 19th century, primary rainforest covered over 90% of Peninsular Malaysia (Collins et al., 1991). By 1957, the estimated forested cover had declined to 74% (Myers, 1980). However, since then, vast areas of lowland forest (<300m asl) have been converted to agricultural use by the Federal Land Development Authority (FELDA) and other state agencies. Forest cover declined further during the 1970s (61%) and 1980s (47%) with an annual loss of around 7,000 km2 (Lanly, 1982).

By the mid-1980s, there were little remaining lowland dipterocarp forests outside of protected areas available for large-scale conversion and the overall proportion of the forest cover has remained steady during the past two decades under the National Forestry Act 1984. Most of the remaining forests are found in mountainous regions (which, naturally, support a lower density of large ungulates), namely the Main Range in the west, the Tahan Range in the centre, and the Eastern Range in the east and the majority of these are logged-over forests. By 1985, only 9.8% or 13,000km2 of the land area was intact primary forest (Collins et al., 1991). In Peninsular Malaysia where the deforestation rate has stabilised and its main economy has moved from the forestry sector to industry to service, it is not necessarily the loss of habitat per se but cumulative impacts of forest fragmentation due to construction of roads, pipelines and railways that may impose a greater lasting threat to the tiger.

1.5.1.2 Forest fragmentation

Life history traits of large mammals generally make them more vulnerable to the effects of forest fragmentation and smaller populations are more susceptible to extinction due to stochastic events (Soule et al., 1979; Eisenberg and Harris, 1989). Seidensticker (1986, 1987) attributed the extinction of Balinese and Javan tigers mainly to extensive habitat fragmentation and the isolation of small forest blocks (less than 500km2) as well as the loss of critical ungulate prey.

To support a minimal viable population of six breeding females suggested by (Karanth and Stith, 1999), under strict protection with no poaching of tigers and tigers' prey, a reserve must be at least 1,000km2 in tropical rainforest. This argument uses 1.6 adult tigers/100km2 as the typical tiger density in tropical rainforest (Griffiths, 1994; O'Brien et al., 2003; Kawanishi and Sunquist, 2004). Of 42 Protected Areas in Peninsular Malaysia, only Taman Negara and Belum are greater than 1000km2. It is clear, then, that the long-term survival of the Malayan tiger largely depends on improving protection mechanisms within the country's Forest Reserves (PRFs).

Currently, PRFs are criss-crossed by logging roads. Tigers that often come into contact with humans or livestock at the edge of PAs and on roads outside of PAs tend to be subject to relatively high mortality rates. Generally, the construction of linear features, such as roads or above-ground pipelines, result in habitat fragmentation and, thus, increases the potential for extinction in small populations by habitatremoval and division (Schonewald-Cox and Buechner, 1992); the creation of barriers that inhibit the daily, seasonal and dispersing movements of animals (e.g. Fehlberg, 1994); area avoidance (e.g. Mace et *al.* 1996; Lovallo and Anderson, 1996) and the provision of corridors for the immigration of non-resident species (e.g. Seabrook and Dettmann, 1996). More direct effects include disturbance of breeding activity (e.g. Reijnen *et al.* 1997) and, ultimately, an increase in levels of mortality (e.g., Bruindernik and Hazebroek, 1996; Putman, 1997; Philcox *et al.,* 1999; Woodroffe and Ginsberg, 1999).

The numerical impact of forest fragmentation to large mammal populations is virtually unknown in Malaysia. The analysis based on the data collected by DWNP between 1991 and 2003 shows that the construction of the North-South Highway that was completed in 1994 effectively eliminated tiger habitats west of the road. Spanning 966km in distance, it runs from Bukit Kayu Hitam in Kedah near the Malaysian-Thai border to Johor Bahru in southern Malaysia and is the longest highway in Malaysia. Tigers are reported every year in the east coast Malaysia where an improved transportation network is proposed with a highspeed rail connecting Kota Bharu at the Malaysian-Thai border and Johor Bahru, a multi-lane express way between Kuala Terengganu and Kuantan similar to the North-South Highway, and an upgrade of the existing coastal road (DTCP, 2005).

Forest corridors are imperative for the dispersal of sub-adult tigers, especially males. Without these corridors, the young dispersal-aged males are either killed by resident males or forced into inhospitable habitats and killed by humans as seen in the on-going case of the Florida panther (Smith, 1993; Maehr, 1997).

Maximising the size of contiguous, unfragmented protected areas and minimising the potential for conflict between tigers and humans is the single most important strategy for tiger conservation (Woodroffe and Ginsberg, 1998). In Malaysia where most PAs are too small to support viable tiger populations, the vast PRFs need to be considered as "unfragmented protected areas" of the future. The strengthening of enforcement and patrol efforts on main access roads near PAs in the Russian Far East has contributed to increased and stabilised populations of the Amur tiger despite fairly extensive poaching pressure on tigers (Kerley *et al.*, 2002; Miquelle *et al.*, 2005; Seidensticker, Save the Tiger Fund, pers. comm.). Collaboration with FDPM and other forestry sectors is critical to enhance the tiger's survival in Malaysia's vast PRFs.

1.5.2 Poaching and wildlife trade

While habitat protection is essential for the long-term survival of the tiger, illegal trade is a more urgent threat, having the greatest potential to do maximum harm in a short time (Nowell and Jackson, 1996). Tiger populations have been decimated in many parts of their former range due to illegal hunting for their skins, bones and other body parts (Banks and Newman, 2004; Shepherd and Magnus, 2004; EIA-WPSI, 2006; Nowell and Xu, 2007).

Tiger parts © DWNP

Table 2 : Tiger-related offences apprehended and fined either by court or DWNP from 1990 to 2006.

Type of Offence	'90	'91	'92	'93	'94	'95	'96	'97	'98	'99	'00	'01	'02	'03	'04	'05	'06	Total
Stuffed tiger	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Skin	2	0	2	0	1	0	0	1	0	0	0	0	0	0	0	0	0	6
Bone and skull	1	1	2	0	0	1	0	0	0	0	0	1	0	2	0	0	0	8
Claw	3	1	3	0	0	0	1	0	1	0	0	0	0	2	0	0	0	11
Tooth	1	0	3	0	0	0	1	0	0	0	0	0	0	2	0	0	0	7
Penis	0	0	0	3	0	0	0	0	0	0	0	1	0	0	0	0	0	4
Meat	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
Illegally importe	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
Tiger killed	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2	1*	0	4
Misc. case	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1*	0	1
TOTAL	8	2	11	3	1	2	2	1	1	0	0	3	1	7	2	3	0	47

* A tiger was found butchered and stored in a fridge.

** A tiger cub was 'rescued' or bought from a restaurant and handed over to DWNP.

Data source: Elagupillay et al., 2001; Anon., 2002; Chandrasekaran, 2003; DWNP, 2004; Anon., 2004a; Anon., 2004b; Abdullah, 2005; Chia, 2005; Chiew and Teoh, 2005; DWNP, unpublished data.

Throughout Southeast Asia, one of the main threats comes from the trade in tiger parts for use in traditional medicines. Many different cultures use tiger parts for their purported medicinal qualities (Chalifour, 1996), including the bones, blood, sexual organs and other parts. Bones are the most valuable part of the tiger, more so than the skin (Sunquist and Sunquist, 2002). In a number of countries, skins, skulls, claws and canine teeth are traded as trophies and talismans, and meat consumed in restaurants serving exotic dishes.

The frequency of apprehension of tiger poachers or finding poached tigers has been on average less than 22 one case per year, excluding the cases pertaining to the illegal possession of tiger body parts for which the origin is unknown (Table 2). The actual number is suspected to be higher, but the detection of "redhanded" cases is difficult and more realistic figures are not available. Despite the lack of actual figures of tigers poached, it is obvious that tiger poaching continues and is likely to be having an adverse impact on Malaysia's tiger populations.

Tigers are also killed in retaliation to livestock depredation (see Sec. 1.5.3.1). It is suspected that some of these "conflict" tigers also enter the illegal trade, as was found to be the case in Sumatra (Shepherd and Magnus, 2004), but the relationship between these mortalities and the trade are unclear here. Potential impact of poaching of tigers' prey is discussed in Sec. 1.5.4.

1.5.3 Human-Tiger Conflict

DWNP defines Human-Tiger Conflict (HTC) as "attacks by tigers on humans or livestock, or the perceived fear of attacks". The nature of the tiger and Man means that wherever the homes of either meet or overlap there will be conflict. Unfortunately, this overlap happens far too often as both species seek the benefits associated with lowlands with relatively fertile soils and the mechanisms for dealing with the consequences are lacking on the whole. As a direct result of this, tigers are pushed up into higher and less productive grounds and now, as discussed earlier, inhabit only a fraction of their original habitat.

Further exacerbating the problem is people competing with the tiger for large ungulates as a source of protein. This has effectively reduced the carrying capacity of remaining forests for tigers whilst encroachment into the forest has, through the concept of the "edge effect", increased the likelihood that tigers, an ecotone species and naturally drawn to such areas, will encounter humans and their livestock. Such encounters invariably result in the death of livestock, or in rare but extreme cases, humans. Both will lead to the removal of the tiger. Inappropriate management of some human interests, such as commercial plantations and livestock, augment this clash and, in some areas of the world, HTC has become a significant source of tiger mortality.

Ultimately, the impact of HTC on tiger conservation is compounded immeasurably as people who fear for their safety or perceive economic risks from tigers will not generally support conservation agendas. It is also suspected that poachers operate in high HTC areas in Sumatra, turning problem tigers into cash (Shepherd and Magnus, 2004).

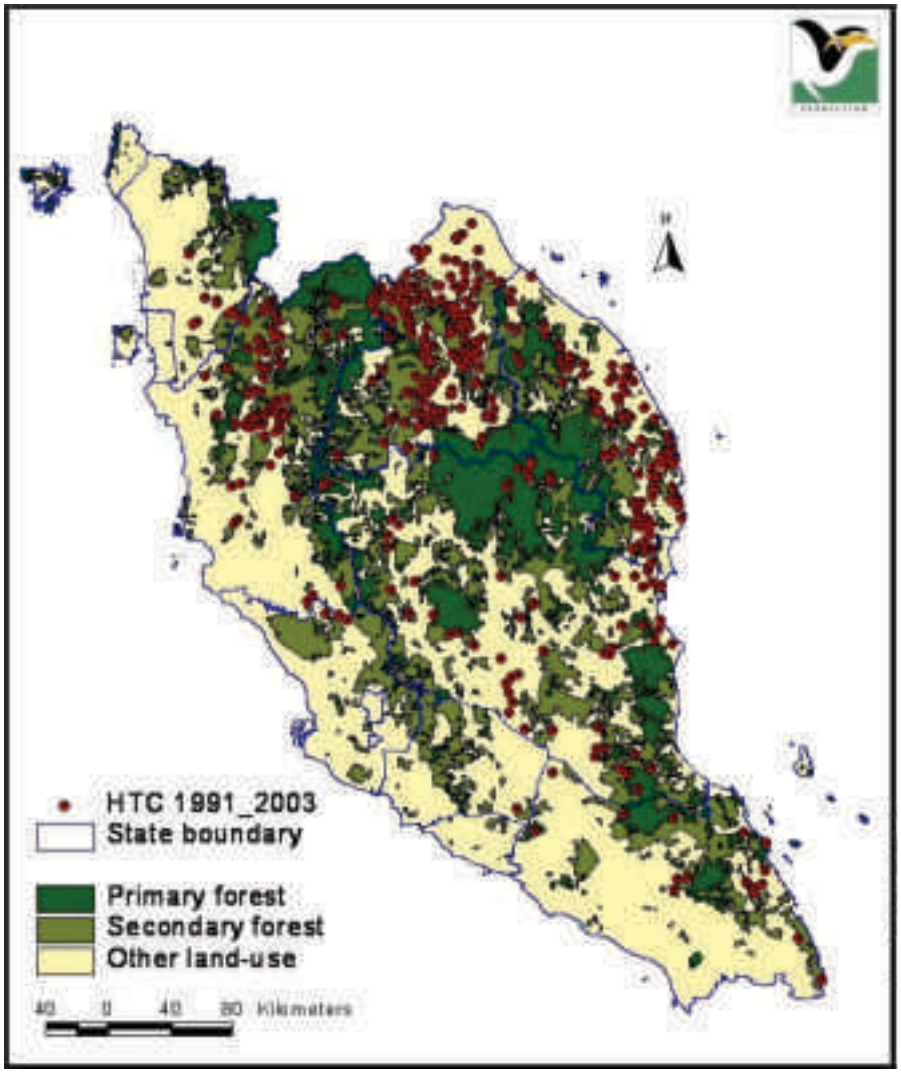
In Malaysia, when HTC events are reported, a response team is dispatched as soon as possible and such a rapid response is a routine task for the DWNP. Cases of HTC in Malaysia, consistently over the years, constitute only around 4% of general human-wildlife conflict events, whilst frequencies of those involving, for example, long-tailed macaques *Macaca fascicularis*, elephants and viverrids are 54%, 17%, and 6%, respectively (DWNP, 2004).

All states with tiger populations are affected by HTC (Fig. 5) and between 1991 and 2006, 2,398 HTC complaints, including tigers attacking humans, livestock, or merely tigers sighted by villagers, were filed at an average of 160 cases annually. The number of cases reported is in decline (from 355 cases in 1999 to 123 cases in 2006) but the reasons behind this are unknown as data is incomplete (DWNP, unpublished data).

1.5.3.1 Livestock depredation

Incidence of livestock depredation by tigers increased substantially in the 1970s due to a combination of two factors; the conversion of forest for other land use and the introduction of large scale livestock farming either on commercial basis or subsistence farming. This led to the killing of tigers by farmers and farm managers in defence of their livestock. As a result the DWNP had to undertake management interventions to resolve the conflict and protect the tiger population. One of the interventions was the creation of Tiger Management Units at the state level and a Tiger Research Unit headed by Richard Blanchard from the American Peace Corps (Elagupillay, 1983). To resolve the increasing livestock depredation by tigers, Tiger Management Units were deployed to devise methods to trap such tigers rather than kill them.

Fig. 5: Location of Human-Tiger Conflict cases reported to DWNP between 1991 and 2003.



Source: DWNP, unpublished data

About 23% of 204 HTC complaints filed in 2005 and 2006 constituted livestock depredation cases. The minimum economic losses estimated for 72 cattle and 12 goats were RM124,750 (DWNP, unpublished data). The seriousness of livestock depredation is probably much greater, however, as a gross disparity between the number of cases reported to DWNP and that to the Department of Veterinary Services (DVS) indicates that only a small fraction of cases is reported to DWNP. There is no compensation for loss, but because many breeding cows are on loan to the farmers by DVS, the loss has to be reported to DVS before applying for another loan (Noraini Kanis, Division of Livestock Commodity Development, Department of Veterinary Service, pers. comm.). It is also important to note that the figure represents only those cases that are reported to DWNP headquarters, where annual statistics are calculated; there are an additional number of reports that only get as far as the state-level agencies and maybe many more that go completely unreported. For example, according to records kept by the Terengganu DVS, the average number of cattle reported killed by tigers in that state, between 1999 and 2003, was 309 per year. At an estimated value of RM1,200 per head of cattle, this represents a loss of almost RM2 million over the five year period, or RM380,000 annually (Sharma et al., 2005; WWF-Malaysia, unpublished data). A site-specific and detailed study of livestock depredation patterns in Jerangau Barat, Terengganu shows that, within only a six month period, 53 heads of cattle were killed by tigers with one particularly busy night that saw as many as 30 heads of cattle killed (Sharma et al., 2005).

Upon receiving a report, the relevant DWNP state office dispatches a response team to investigate the site and decide on further action following the stipulated guidelines (DWNP, 2006). Subsequent actions depend on the seriousness and urgency of the situation and include: monitoring, patrolling, drive-off shooting, trapping for placement in zoo, and shooting to kill.

Public safety is DWNP's priority and the team will advise farmers on safety measures and on ways to improve plantation and livestock management. DWNP also collaborates with police and Angkatan Relawan Malaysia (RELA), Malaysia's voluntary enforcement force, to enhance public safety. Frequent dialogues with those affected by HTC are important, if only to motivate communities to protect themselves effectively and DWNP does this on an informal basis. Villagers often assist the team with their investigations and may also be called upon to assist with subsequent actions. A community outreach programme, to enhance the working relationship between remote communities and DWNP, has just started near some of the priority wildlife conservation areas, such as Taman Negara (Kawanishi, 2005; Kawanishi and Soosayraj, 2005).

1.5.3.2 WWF-Malaysia experience in Jerangau: success and lesson learnt

WWF-Malaysia's pilot mitigation project in Jerangau, Terengganu (Sharma et al., 2005) showed that cattle depredation can be minimised if certain Best Management Practices (BMP) are applied to existing livestock husbandry systems. In the study, WWF-Malaysia assisted selected communities to build paddocks to house otherwise free-roaming cattle at night. Loss of cattle to tigers was, accordingly, prevented (for those who took part in the study) but a problem of continuity was identified, whereby, upon perceiving the threat to have been lifted, cattle owners would revert to allowing their animals to roam free at night. A longer-term solution, then, requires the programme participants to continue using these mitigation measures once support from organisations, such as WWF-Malaysia, have left. As Jerangau is one of many areas affected by livestock depredation by tigers, financial sustainability for replicating WWFMalaysia's success is the biggest challenge. WWF-Malaysia is currently undertaking studies to identify economic approaches to HTC.

1.5.3.3 Attack on humans

Between 1979 and 2006, 31 attacks on humans were recorded by DWNP (an annual average of just over one person), half of which were fatal (Badrul Azhar, 2003; DWNP, unpublished data). The figures also reveal that rubber tappers are a relatively high risk group, being involved in 39% of the attacks. In contrast to reports of livestock loss, almost all cases involving humans are reported to DWNP with possible exceptions being those involving aborigines (orang asli) living in the forests. An inter-state comparison shows that 15 cases, or nearly 50% of attacks on humans, occurred in Kelantan, followed by seven cases in Pahang and three each in Perak, Terengganu and Johor.

Though the tragedy of people being killed cannot be ignored, we must put these incidents into the context of conservation priority. Overall, only about 2% of all tiger-related complaints detail attacks on humans, and this constitutes less than 0.1% of the combined total of all human-wildlife conflict events reported to DWNP (DWNP, unpublished data). Despite this relatively small number, these cases usually feature prominently in the local and vernacular media. Though interest in these cases is understandable, the sensationalising of the issue compounds the overall negative impact that HTC has on tigers. People learn to fear and, therefore, hate the animal.

1.5.3.4 Removal of tigers due to HTC

Tigers are removed from high conflict areas by either trapping for relocation to Zoo Melaka, DWNP's wildlife rescue centre, or in cases of where humans have been attacked, are shot as the last resort if

Tiger of Gua Musang @ DWNP

trapping fails. Before 1981, all problem tigers were shot by DWNP for "agricultural protection"; between 1960 and 1967, 132 tigers were removed in this manner (Stevens, 1968). This practice, however changed, and DWNP began capturing problem tigers for relocation to zoos in 1981 (Ismail, 1981).

Since 1991, 13 tigers have been killed by the authorities whilst over the past decade 25 tigers have been captured and placed in Zoo Melaka (22) and Zoo Taiping (3) at an annual average of less than four tigers officially removed (DWNP, unpublished data). The restrictions laid down by the PWA mean that these actions must be carried out by DWNP staff, occasionally assisted by the police or RELA. However, there is a clause in the law (Section 56) that allows any person to kill a tiger that poses an immediate danger to human life. Another clause (Section 55) allows landowner, occupier or his servant to kill tiger which is killing (or about to kill) livestock. In both cases, the person who has killed the tiger has a legal obligation to report the incident to DWNP and the remains of thetiger are the property of the state.

The annual average of 3-4 tigers removed does not, of course, incorporate the retaliatory killing of tigers by villagers and the difficulties associated with obtaining this kind of data means that its impact remains unknown. However, of 112 Felda Jarangau Barat settlers interviewed, around 22 (20%) admitted to having the intention to kill tigers if they continued to attack livestock. Though most settlers could not recall an actual figure when asked how many tigers had been killed in the area, one claimed that he knew of about 10 tigers killed in retaliation (Sharma et al., 2005).

The overall decline in the number of HTC events reported to DWNP is not, necessarily, a cause for complacency as it could reflect any number of underlying causes, including a commensurate decline in tigers. The estimated tiger density in the forests surrounding Jeli, Kelantan is 2.59 tigers/100 km2 (Darmaraj, 2007), the highest recorded density in Peninsular Malaysia. The removal of one animal a year would not seem to represent a significant threat to tiger populations, though further research is warranted. However, the frequent removal of resident tigers will have an impact on the stability of that population's land tenure system; one result could be an escalation in HTC.

1.5.3.5 Possible translocation of captured problem tigers

Tigers captured in HTC cases by DWNP are sent to zoos and are currently not considered for release back to the wild. The difficult but, in many respects, preferred option of euthanasia is avoided due to the risk of public outcry. Although it has tremendous appeal, the translocation or reintroduction of large carnivores, especially of those labelled as problem animals, is extremely difficult both socially and biologically (Breitenmoser et al., 2001). Because tigers are wide-ranging and territorial predators, there is considerable risk and cost (both in terms of funding and manpower) involved in the release and subsequent monitoring.

Furthermore, there are currently no tried and tested methods for reliably monitoring post-release tigers in tropical rainforests, though recent advances in telemetry equipment are making this more and more feasible. Ultimately, however, this approach may merely result in relocating the problem itself, introducing HTC into an area in which it had not been an issue before.

1.5.3.6 Relief Fund for Wildlife Attack Victims (Tabung Bantuan Mangsa Serangan Binatang Buas)

There is financial support available for tiger attack victims. The Relief Fund for Wildlife Attack Victims, setup by the Malaysian Cabinet, has been operational since 2005. The fund is managed by the Ministry of Women, Family and Community Development under the Department of Welfare, with an annual grant of RM1 million. Either DWNP or the police are required to verify the authenticity of each claim and only serious injuries, causing permanent disability or death, qualify for compensation. The applicant has to be a Malaysian citizen who was not hunting, legally or illegally, at the time of attack. Cases in which an attack was provoked by the victim are automatically disqualified.

1.5.4 Depletion of Tiger Prey

The most important ecological determinant of tiger density is the abundance of large (>20kg) prey in a given area (Sunquist, 1981; Seidensticker, 1986; Karanth and Sunquist, 1995; Karanth and Stith, 1999; Sunquist et al., 1999; Karanth et al., 2004). Karanth and Stith (1999) used a stochastic demographic model to show that prey depletion has a strong impact on tiger populations by reducing the carrying capacity for breeding females, decreasing cub survival and, ultimately, decreasing population size. Similarly, prey depletion, due to adverse human impact, has been identified as a primary cause of decreasing tiger densities in 11 ecologically diverse sites around India (Karanth et al., 2004).

A basic understanding of feeding ecology and prey population dynamics is needed. Little is currently known about the ecology of the Malayan tiger, let alone its feeding ecology or prey population dynamics (Sec. 1.1.2). Basic knowledge of general rainforest ecology provides some insight. For example, tropical rainforests, particularly those dominated by dipterocarps, tend to have low primary productivity at the ground level and, as a result, the diversity and abundance of browsers, such as deer, is naturally low (Eisenberg, 1980). The low density of ungulates coupled with the low visibility of the rainforest may affect the hunting strategy of tigers that use visual cue to locate a prey (Schaller, 1967). This leads to the assumption that rainforest tigers are opportunistic, rather than selective, hunters (Sec. 1.1.2). However, understanding of the basic large mammal energetics also tells us that tigers cannot live on only smaller mammals, such as mousedeer Tragulus spp. and pangolins Manis javanica (Sunquist et al., 1999). In rainforests where very large ungulates (>40kg) are scarce, medium-size and abundant mammals such as wild pigs are likely to be important prey species for tigers.

The population status of the three expected primary prey species – wild pigs, barking deer and sambar deer – are even less understood than that of tigers. They are all protected species under the PWA, but all can be legally hunted with an appropriate licence from DWNP. Assuming a positive relationship between the number of photographs taken and the abundance of the species, 6,000 wildlife photographs taken in 13 camera-trapping studies carried out throughout Peninsular Malaysia give us some insights into the relative abundance of tiger prey. The studies jointly expended nearly 35,000 trap nights between 1998 and 2005 (Laidlaw et al., 2000; DWNP/DANCED, 2002; Mohd Azlan and Sharma, 2003; Kawanishi and Sunquist, 2004; Ahmad Zafir et al., 2006; Darmaraj, 2007; Lynam et al., 2007).

Sambar deer ©DWNP

We recognise the problems associated with relative abundance indices based on count statistics (Thompson et al., 1998; Nichols and Karanth, 2002) and we do not assume a perfect detection probability of animals or equal and constant probabilities among different animals at different sites. Almost unequivocally at all sites, however, the most abundant ungulate species, excluding elephants, appear to be the wild pig, followed by barking deer and tapir. Photographs of sambar deer, serow and gaur were all rare with the majority of them taken in the protected area, Taman Negara (Table 3). Next to the Sumatran rhinoceros, of which no photographs were taken, the gaur appears critically rare. These data combined with DWNP inventory and licence data can be used to gain a deeper insight into the critical status of some of the tigers' prey species needing urgent conservation actions.

Table 3: Preliminary analysis of the relative abundance of tigers' primary prey species based on 13 camera-trapping studies conducted in Peninsular Malaysia between 1998 and 2005.

Species	Total no. photos	No. sites recorded (Max no = 13)	Proportion of photos taken in Taman Negara (%)
Wild pig	2295	13	22
Barking deer	1391	13	42
Tapir	1156	12	46
Sambar deer	426	3	75
Serow	56	5	93
Gaur	10	2	90

Data source: Laidlaw *et al.,* 2000; DWNP/DANCED, 2002; Mohd Azlan and Sharma, 2003; Kawanishi and Sunquist, 2004; Ahmad Zafir *et al.* 2006; Darmaraj, 2007; Lynam *et al*., 2007.

Relative abundance does not, however, give us any clues as to how much food, in terms of biomass, is available for tigers. In one of the 13 studies, in Taman Negara, the prey biomass was roughly estimated to be between 270 to 430 kg/km2 and consists mainly of wild pigs and barking deer. This is comparable to other estimates suggested from Indonesian rainforests, all of which were below 500 kg/km2 (Seidensticker, 1986). These biomass estimates are an order of magnitude less than biomass estimates from semi-tropical or seasonal forests in India that support ten times as many tigers in a unit area (Karanth *et al*., 2004). Tigers naturally occur at low densities, but they are even rarer in tropical rainforests due to the naturally low prey biomass. A decline in prey density is likely to change the Malayan tiger status in specific areas from rare to extinction. It is even more important in Malaysia's forests that the prey species are protected.

The perception of the omnipresent and hyper-abundant wild pigs is dangerous if not tested. A benefit to the Malayan tiger is that consumption and selling of pigs is a prohibited for the Muslims who constitute the majority of the Malaysian population. High tolerance for human disturbance, preference for agricultural ields, high fecundity, and their adaptability to a wide environmental variables, coupled with the cultural avoidance by people and legal protection, all result in a general perception of the wild pig as being hyperabundant and, thus a concern of possible food deficiency for tigers is unnecessary. Incidental data from research projects, DWNP inventory data and interviews with local communities in the main tiger states all seem to support this. A worrying effect of this is a false sense of security that tigers' prey is indeed abundant. The densities of wild pigs except for a few sites (Ickes, 2001; Kawanishi and Sunquist, 2004), the trends in their populations in response to hunting pressure or environmental variables and the relative importance of wild pigs in the tiger's diet remains unknown. The hunting licence for wild pigs does not have a quota but there is an additional albeit indirect restriction; first, one must obtain a firearm licence from the police to own a firearm, usually granted for sport (shooting range activities), crop protection, defence etc. If one wants to use the firearm for hunting purposes, then it is necessary to obtain approval of the hunting clause from the police, which would allow the firearm to be taken out of one's premises/district where the licence was issued. Once approval is issued, one can apply for a hunting licence from DWNP.

Managers and researchers urgently need to undertake studies on wild pigs and other tiger prey species. Just as foresters have sustainable methods for extracting timber from forests, wildlife managers must have sustainable methods to harvest game species. An important tool for this is population monitoring, which is difficult and costly in tropical forests. As a result, no one knows when the populations of the sambar, wild pigs or any other game species, reach their critical thresholds for recovery from either legal harvesting or poaching. Often, such species become ecologically extinct before we even notice a decline. At that point, any emergency actions are almost always too late. of tiger ecology from the realm of expert opinion to a more science-based approach (Seidensticker, 2002). Sampling-based research of large mammals in Peninsular Malaysia is still in its infancy. Without a doubt, there are many aspects of tiger ecology that are still unknown. For example, there is a lack of vital information on the tiger's feeding ecology; i.e. what they eat and in what proportion. How do tigers respond 29 to prey availability? No one knows the land tenure system and social organisations of tropical tigers. Technical difficulties hampered past attempts in Peninsular Malaysia to duplicate the efforts of successful predecessors in Nepal, Indian and Russia for radio-tracking tigers. Many questions important to tiger conservation remain unanswered, such as how many young a tigress produces in a lifetime, what affects the cubs' survivorships, how many years wild tigers live, how tigers communicate with one another, how tigers respond to different habitat matrices, how tigers respond to logging or any other human activity, how far a tiger can disperse in different land-use types, why tigers in certain areas are prone to a ttack humans,what values tigers have to humans, and how to make sustainable forestry management tiger-friendly. With new advancement in sophisticated technologies, a number of other innovative approaches to research methodology are underway and applications of these will allow us to delve deeper into the secret world of tropical tigers.

In the textbook used by tiger researchers and managers, *Monitoring of Tigers and Their Prey* (Karanth and Nichols, 2002), the authors talk about three goals of scientific monitoring of tiger and prey populations: 1) evaluate the success and failure of management interventions, so as to react adaptively and solve problems; 2) establish benchmark data that can serve as a basis for future management; and 3) develop a body of empirical and theoretical knowledge that can potentially improve our predictive capacity to deal with new situations. Goal 2 is basic research for biologists and managers and Goal 3 is applied research for academicians. Goal 1 is clearly the primary interest of wildlife managers and conservation agencies, but is currently not practised in Malaysia. Without monitoring of conservation

actions, resources can easily be spent on a wrong area or in an incorrect manner. Fifty years of global experience of tiger conservation suggests that surrogate measures such as money raised, number of schools reached and income generated for rural community are poor yardsticks for monitoring (Karanth, 2001). Two vital and direct measures of our success are distribution at the landscape level and population trend at priority areas (*Sec. 2.5*).
1.6.2 Insufficient public awareness and support
Tigers often invoke an emotional response from the public, either in support of these animals or in anger because of Human-Tiger conflict situations especially where death of humans have occurred. It is always much easier to work with groups that are supportive as the negative groups are not easily identified or open to discussions on education programmes to help save tigers, e.g. illegal traders, poachers and farmers. Researchers often have to go 'undercover' to find out more about these negative-impact groups and there is often a dearth of accurate information (Bulte and Damania, 2005; Goh and O'Riordan, 2007).

Malaysians are increasingly becoming more aware of the environment, given the repeated general awareness programmes on saving the planet from global warming, deforestation, toxic wastes, etc. through radio, television, newspapers and even within the school curriculum. Although surveys have been conducted to understand the awareness level, Rambo (2003) reported that only a few results have been published and are often anecdotal, or based on small, localised or biased sample sizes like those published in newspapers (e.g., Anon., 2007b). Furthermore, simply being aware of the issues does not translate to action (Wildlife Conservation Society and Sarawak Forest Department, 1996; Kingston, 2006). For instance, comparative studies done on different methods of communication between posters and hands-on activities have shown that whilst posters are useful in raising awareness, it does not lead to greater liking or empathy for conservation (Kingston, 2006; Gumal, unpublished data). There is thus a need to push the intended audience towards the conservation need (Ehrenfield, 2000; Nadkarni, 2004; Kingston *et al.*, 2006 Takacs *et al.*, 2006). Understanding how people learn (Leamnson, 1999; Nuhfer and Pavelich, 2001) and the different methods of effectively communicating with the audience are thus extremely important, if resources and opportunities are not to be wasted. However, it is beyond the scope of this Plan to go into the details of knowledge surveys, learning cycles, generators, fractals, rubrics, neurons and growing brains (Leamnson, 1999; Nuhfer and Pavelich, 2001). The Plan recommends educating the audience on 'what to think', i.e. conserving the tiger, its prey and habitats, as opposed to a more general approach of educating on 'how to think'. It also advocates a multi directional approach, where there is a sharing of information and perspectives (Brewer, 2002), instead of a unidirectional where all the knowledge is passed on from the scientist or educator to the audience. Finally, given space limitations, this section of the Plan will also only focus on three items: the audiences; methods of communication in getting the message out, and case examples of how to get the message across. Closer examination of existing data will determine the current state of conservation and knowledge on tiger prey species as well as identify gaps that require urgent attention. The method for data collection must be improved and greater resources are needed to monitor ungulate populations both in terms of density and occupancy for better management of these species.

Following the rationale behind the precautionary principle, and until we know more, we must assume the worst and adopt a cautious approach to the management of a species like the sambar, where the best available information suggests rarity. Better protection from hunting and poaching will allow sambar populations to recover in the forest naturally.

1.6 Challenges and Indirect Threats

1.6.1 Insufficient understanding of the tiger's response to various human impacts

Understanding the negative impact of human activities and the positive impact of conservation actions is a vital component of wildlife conservation and adaptive management. The job of conservation biologists is to inform the public and policymakers of practical solutions based on careful research. In reality, actions such as arresting poachers or removing problem tigers cannot wait for research, and therefore, many actions have to be taken without any prior scientific basis. If, however, all conservation efforts are based on ad-hoc reactions, there is no chance to solve the problems from the root cause, reverse the negative trend and create a better future for the tiger. Science, then, provides a less subjective foundation for more proactive conservation. Ideally, conservation strategies should be based on sound knowledge from scientific research and adapted according to the efficacy of the prescribed actions (*Sec. 2.7.1*). Even in less ideal situations, the basic ecology of the target distribution and abundance, has considerably improved. At the national level, DWNP complied and analysed data collected by its staff between 1991 and 2003 to determine the tiger habitat and crude potential population size in the whole of Peninsular Malaysia (Kawanishi *et al.*, 2003; *Sec. 1.3*). In more

detailed ecological studies, coupled with population models, the modern technologies allowed researchers to estimate densities of tigers in Taman Negara (Kawanishi and Sunquist, 2004) and Gunung Basor Forest Reserve in Jeli, Kelantan (Darmaraj, 2007). Camera trapping also provided information on the activity period of the tiger and its prey (Laidlaw *et al.*, 2000; Kawanishi Sunquist, 2004; Ahmad Zafir *et al.,* 2006; Darmaraj, 2007; Lynam *et al.,* 2007), crude estimates of prey biomass (Kawanishi and Sunquist, 2004), relative abundance of tigers (Lynam *et al.,* 2007) and prey species (Darmaraj, 2007) and incontestable evidence of breeding populations (Mohd Azlan and Sharma, 2003; Darmaraj, 2007). With these, we have made the transition in our understanding of tiger ecology from the realm of expert opinion to a more science-based approach (Seidensticker, 2002).

Sampling-based research of large mammals in Peninsular Malaysia is still in its infancy. Without a doubt, there are many aspects of tiger ecology that are still unknown. For example, there is a lack of vital information on the tiger's feeding ecology; i.e. what they eat and in what proportion. How do tigers respond to prey availability? No one knows the land tenure system and social organisations of tropical tigers. Technical difficulties hampered past attempts in Peninsular Malaysia to duplicate the efforts of successful predecessors in Nepal, Indian and Russia for radio-tracking tigers. Many questions important to tiger conservation remain unanswered, such as how many young a tigress produces in a lifetime, what affects the cubs' survivorships, how many years wild tigers live, how tigers communicate with one another, how tigers respond to different habitat matrices, how tigers respond to logging or any other human activity, how far a tiger can disperse in different land-use types, why tigers in certain areas are prone to attack humans, what values tigers have to humans, and how to make sustainable forestry management tiger-friendly. With new advancement in sophisticated technologies, a number of other innovative approaches to research methodology are underway and applications of these will allow us to delve deeper into the secret world of tropical tigers.

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Without monitoring of conservation actions, resources can easily be spent on a wrong area or in an incorrect manner. Fifty years of global experience of tiger conservation suggests that surrogate measures such as money raised, number of schools reached and income generated for rural community are poor yardsticks for monitoring (Karanth, 2001). Two vital and direct measures of our success are distribution at the landscape level and population trend at priority areas (*Sec. 2.5*).

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1.6.2.1 Conservation education philosophies and approaches

Underlying the push to garner public support are the basic goals to help individuals, communities and target audiences acquire

- Awareness: of the importance of tigers, their prey, and their habitats, and threats faced by these three elements;
- Knowledge: a basic understanding of the tigers, their habitats and their prey, its problems,
- and humanity's role in it; and
- Values: strong feelings of concern for the tigers, their habitats, and their prey, and motivation to participate in its protection.

At a much later stage, and with continued participation in either conservation education or training programmes, participants will then hopefully be able to acquire:

- Skills: the ability to investigate and offer possible solutions to these problems;
- Evaluation ability: the ability to evaluate conservation programmes on tigers, prey and their habitats; and
- Enthusiasm to participate: a sense of responsibility and urgency regarding the problems, stimulating appropriate action.

It is widely accepted that not all conservation education, training or even university education programmes will lead participants up to the levels of increased evaluation ability, thus sometimes, dampening their enthusiasm to participate.

Even in the longer-term contact between lecturer and students at universities, these higher levels of thinking up to the ability to self analysis are rarely met (Nuhfer, Idaho State University, pers. comm.). There are therefore several important concepts that need to be known to the educator:

i. Good teaching or instruction is learned.
ii. Individual tutoring produces the most learning.
iii. Conservation education programmes need Instructional Alignment. This refers to the degree to which intended outcomes, instructional processes, and instructional assessment match with efforts to produce the outcomes. Learning can be improved markedly by aligning the objectives with teaching and the evaluation. Instructional alignment is not pedagogy or an assemblage of "teaching tricks." It is an integrated approach to focused practice in a class or course.
iv. A component that is often missed is "what is in it for me – the intended audience?"

The basic planning sequence in trying to solicit support for tigers either within general awareness, conservation education or training programmes would be:

1. Identify the audience (e.g., rural communities, community leaders, general public, school children, teachers); and become closely acquainted with them and their problems, or opportunities for increase in tiger conservation;
2. Identifying the message to be conveyed (e.g., general awareness, practical guidance, motivation);
3. Choose the educational strategy (e.g., exhibitions, demonstrations, shows, dramas, role playing, mass media, posters);
4. Evaluate the effectiveness of the strategy.

1.6.2.2 Tiger conservation education focal groups

Some of the target groups for tiger conservation are shown in Table 4. These target groups are listed as they affect tigers, their prey or their habitats. They are not ranked in order of priority, as different government departments and NGOs have their own set of priorities.

Early efforts to study tiger ecology in Peninsular Malaysia revolved around livestock depredation

studies (Hussain, 1973; Blanchard, 1977; Elagupillay, 1983; Khan, 1987) as the then Game Department assumed the major duty to keep the wildlife menace under control. Wildlife officials had a great understanding of the nature of depredation and hotspots. The traditional methods of data collection were observation of secondary signs and interviews with expert rangers and affected communities. The results were mostly expert opinion and perception-based.

Today, we aim for informed conservation interventions guided by reliable ecological knowledge. Insufficient knowledge on the status of tigers hindered past efforts to formulate an effective conservation strategy for tigers in Peninsular Malaysia and elsewhere. Furthermore, the lack of scientific rigor in the approaches to assess the status of wild tiger and prey is now clearly recognised as a serious gap in global conservation efforts (Karanth *et*

Table 4: Some target groups affecting tigers in Peninsular Malaysia, and examples of where conservation education programmes are often held. species and its response to major threats should be laid out before strategies are developed.

	Target groups	**Examples of where the public awareness programmes are often carried out**
1.	School and university students	Schools, universities, nature camps, field trips
2.	Teachers and lecturers	Schools, teacher training colleges, universities
3.	Rural communities living in and around areas having tigers	Village centre, community halls, field visits to protected areas, on-the-job training at parks and research projects
4.	Park staff	Universities, training centres, on-the-job training
5.	Reporters and journalists	Workshops for media, scientific and popular publications
6.	Faith groups	Mosques, churches, temples, training centres for the religious teachers, religious associations
7.	Politicians	Opening of research or conservation projects or workshops, discussions at cabinet, resource centre for parliamentarians
8.	Police, RELA and military personnel	Workshops, presentations, booklets at their training centres and headquarters
9.	Customs and airport personnel	Workshops, presentations, booklets at their training centres and headquarters
10.	General public	Mass media – newspapers, magazines, journals and sometimes attending field trips
11.	Logging company personnel	Meeting rooms at logging camps and in boardrooms of company managers
12.	Oil palm plantations	Meeting rooms at oil palm plantations and in boardrooms of company managers
13.	State-level Information Department and District Offices	Policies and booklets sent to District Offices
14.	Poachers and traders	Village centres, mass media and courtrooms

Table 5: Conservation education programmes by various organisations

Organisation	Target audiences	Communication methods	Notes
DWNP	School students, teachers, special interest groups such as RELA	• Hands-on activities • Posters • Booklets • Dialogue	• 6 Biodiversity Education Centres • 3-day PPKB programmes • 3-day exhibitions • Community outreach programmes in PAs • 1 to 3-day programmes which includes T4T • Website news
MNS	School students and teachers	• Hands-on activities • Posters	• 2-hour activities on T4T during Nature Camps • Co-production of ACAP Teachers' Educational Kit with WildAid
MYCAT Secretariat's Office	General public, school students, rural communities at wildlife trade hotspots	• Hands-on activities • Interactive presentations • Dialogues • PowerPoint presentations • Interviews on radio/TV • Publications in popular magazines and newsletters • Online news • Posters, bookmarks • T-shirts	• Uses T4T and self generated interactive PowerPoint presentations • Interactive info booths/talks at invitation of schools conducting awareness programmes • Channels info to media contacts • MYCAT e-group which sends tiger news to 151 members currently
TSEA	Special interest groups such as airport personnel and customs, media	• PowerPoint presentations • 1 to 3-day workshops with hands-on activities • Booklets • Posters	• Self-generated PowerPoint presentations and other training modules • Ranges from hour-long presentations to 3-day workshops on wildlife enforcement and trade
WCS	Rangers, conservation educators in NGOs and zoos, rural communities	Workshops	• 3 to 5-day workshops with target audiences
WWF Malaysia	School students and teachers	• Hands-on activities • General awareness from mobile units • Publications in booklet form, newsletters • Calendars, notebooks • T-shirts • Folders	• 1 to 3-day programmes with target audiences. • Also carries out mobile conservation education with a van for schools throughout Malaysia. • Jeli community liaison

al., 2003). The life history characteristics of tigers make it difficult to study the animals, especially in the evergreen rainforest of Peninsular Malaysia, where chances of observing either the tiger or its prey are minimal. Even the most intensive scientific study on a tiger population done so far suffered from a weak inference due to a small sample size (Kawanishi and Sunquist, 2004).

The nature of scientific inquiry has changed as our ability and the tools to measure and quantify have advanced (Seidensticker, 2002). Application of infrared motion sensor cameras, "camera trapping", to detect otherwise difficult-to-observe wildlife brought an important advance in tiger research (Karanth, 1995; Karanth and Nichols, 1998). In India, the latest advance in analytical procedures of multiple years of camera trapping revealed demographic characteristics such as survival and recruitment rates of a tiger population that were possible only from radio-telemetry studies in the past (Karanth *et al.*, 2006).

In Peninsular Malaysia, since the late 1990s, with the advent of the modern technologies such as camera trapping and Geographic Information System, knowledge on the two basic aspects of tiger ecology:

1.6.2.3 Communication methods

The communication methods used by the various agencies in tiger conservation education are shown in Table 5. Only some of the organisations are listed.

1.6.2.4 Working examples – case studies

i. Web-based communication, linking research, education, policy and media

One of the main functions of the MYCAT Secretariat's Office is to facilitate communication among all the organisations, government and NGOs, working on tigers in Peninsular Malaysia. The Secretariat's Office also ensures that each partner organisation is kept up-to-date on individual partner activities, and consolidates current expert information from partner organisations so as to inform the public through the mass media. In terms of the latter, MYCAT has been constantly pushing conservation stories out to newspapers although the print media is generally more interested in human-wildlife conflict issues (see Table 7). The Secretariat's Office also maintains an online news and discussion group (http://groups.yahoo.com/group/malaysian_cat/), which focuses on issues pertaining to tiger conservation. Discussions range from scientific comments on occupancy surveys to promoting tiger awareness through various media such as brochures, t-shirts and popular journals (see Table 6). This egroup often results in ideas which lead to further collaboration, new research, or newspaper articles.

The increased discussion also reflects a greater communication between partners. The media plays a great role in influencing public opinions. To increase the quality and quantity of conservation-related articles in the local media, TSEA organised two media workshops in Kuala Lumpur (hosted by Zoo Negara) and Singapore (hosted by Singapore Zoological Gardens) in December 2005. It was attended by 15 members of the print, online and broadcast media. It is difficult to ascertain the effectiveness of the workshop, as feedback from the reporters who attended, indicated that they are often at the mercy of editors who try to balance other interests such as politics, health, economy and business, etc. Environmental reporting is quite new in Malaysia, although a very small handful of reporters have been in this field for over 10 years. There is also quite a high level of turnover of reporters themselves.

Table 6: The number of news and discussions registered in MYCAT e-group between 2003 (the inception of MYCAT) and 2007.

Year/Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2007	33	46	46	87	124	91	85	79	72	126	54	47	890
2006	52	58	42	62	32	52	63	77	43	29	46	70	626
2005		12	32	43	40	63	53	19	66	119	45	41	533
2004	2											5	7
2003									3	6	2	3	14

http://groups.yahoo.com/group/malaysian_cat/

Table 7: Breakdown of tiger- and wildlife-related reports carried by national Malaysian newspapers*.

Year	Tiger-related reports	Non-tiger related wildlife reports	Notes
2000	136	90	Four newspapers carried reports on tigers and wildlifethroughout the year. Reports ranged from attacks by tigers on humans, to tiger road kill.
2001	42	1	Three newspapers reported on tigers in 2001. Most of the reports were on HTC issues.
2002	37	36	Six newspapers have included reports on tigers this year. Most reports were on HTC issues.
2003	40	91	Most of the reports were on HTC issues. There were some reports on education programmes, enforcement issues and permits for exotic pets. Eight newspapers reported on these issues.
2004	57	100	Nine newspapers carried reports on tigers. Most were on HTC issues.
2005	65	289	Five newspapers carried reports on tigers. There is a marked increase in investigative reporting on wildlife issues and trade. Most of the
2006	35	132	reports were on HTC.

Source: *TRAFFIC Southeast Asia, in litt.*

* Numbers of tiger- and wildlife-related reports were extracted from the online archives of the New Straits Times, New Sunday Times, The Star, The Malay Mail, and to a lesser extent, Berita Harian and Utusan Malaysia, as not all reports are uploaded. The archive search of the Malay and Chinese language media is incomplete, as these were not all available online, but was included wherever possible. Reports in foreign newspapers as well as Malaysian regional newspapers such as the Borneo Post are not included.

To attain the objectives of having more conservation reports in newspapers and accurate reporting, it is therefore imperative that the editors and the higher management of the local media houses be targeted in future training exercises, and important fact sheets in vernacular languages, where necessary, are provided to reporters covering stories. Educators, scientists and project coordinators should also be on hand, if follow-ups are needed.

Some of the guidelines for environmental reporters are (Nelson, 1995):

1. write original stories;
2. build and maintain good sources;
3. prepare in advance;
4. translate environmental jargon;
5. make the story alive and relevant;
6. report science carefully;
7. be careful with statistics;
8. look for hidden interests;
9. seek balance;
10. follow-up.

A breakdown of newspaper reports on tigers and other wildlife since 2000 is shown in Table 7. Between 2000 and 2002, tiger-related reports dominated newspapers which carried cases on wildlife. However, by 2003, the ratio of tiger-related to general wildlife news (not tiger-related) decreased to about 44%. In 2006, the ratio declined to 27%. There are many factors which probably contributed to this change, among them increased media attention on other wildlife issues such as trade or other species and reduced Human-Tiger Conflict cases (reported to DWNP) over the recent years *(Sec 1.5.3)*.

ii. Training the trainers

In 1978, DWNP initiated the Nature Study Programme and Weekend Camping Programme, designed to create nature awareness among youth, primarily secondary school students. These programmes are conducted jointly with the Ministry of Education, and include field activities such as jungle trekking, river expeditions, wildlife observations. From 1978 until 1997, approximately 30,000 students had participated in these programmes (Abd Rahim and Aminuddin, 1997). In early 2000, these programmes were revised and are now known as the Biodiversity Conservation Education

Programme, mainly used at seven DWNP centres currently, although there are plans to expand its application to all the states.

It was only in 2004 that Malaysia started having tiger-focused conservation education programmes, through the WCS' *Teachers for Tigers* (T4T) Programme. The first programme was carried out with 41 participants from DWNP as well as from NGOs such as MNS, TSEA and WWF-Malaysia. T4T was fine-tuned to Malaysian conditions as well as translated to Bahasa Malaysia. Since then, T4T has been continuously used by DWNP, MNS, the MYCAT Secretariat's Office, WCS Malaysia and WWF-Malaysia. Between the training held in January 2005 to May 2006, MNS used T4T modules in 15 Nature Camps, attended by about 350 participants (teachers and students) from schools throughout Malaysia. T4T continues to be used, and in March 2007, DWNP used the modules in their conservation education camps at Penang National Park for 40 students and three teachers from three schools from Perak (Nurul Azura, DWNP, pers. comm.). The MYCAT Secretariat's Office also uses T4T for their education outreach programmes and in 2007 the activities were translated to Mandarin, targeting Mandarin-language schools in rural areas. It does appear that participants from the initial workshop benefited from the training. Evaluations before and immediately after the training revealed a major change in knowledge on tigers and how they can be studied or conserved. However, it should also be noted that the participants were a motivated lot and as such the training was almost 'preaching to the choir'. It would be probably most interesting to examine whether this approach would have a similar effect on school teachers, and rural communities or their leaders.

1.6.3 Insufficient human resources and capacity

1.6.3.1 Lack of staff

Lack of staff to help conserve and protect wildlife and their habitats has often been cited as one of the reasons why wildlife is constantly under threat in Peninsular Malaysia, from poaching, land clearance and illegal wildlife sale and trafficking (Misliah and Sahir, 1997; DWNP-DANCED, 1996). The lack of capacity was considered so severe that DWNP-DANCED (1996) proposed a large increase in staff numbers from 758 to 1,070. As DWNP's responsibilities have grown in recent years, the staff figures have also grown (Table 8) and it is expected to surpass the DWNP-DANCED (1996) projection. In fact, DWNP expects to have at least 1,497 staff by the end of the new departmental restructuring exercise in 2008.

It is often difficult to compare staff numbers and budgets between similar departments or protected areas across several countries, due to cultural, economic, poaching and local population stresses on the park (Bruner *et al*., 2001). A case-in-point would be, a comparison between staffing needs in Nagarahole National Park (India) (644km2) and Taman Negara (4,343km2) without considering poaching caused by local communities living close or within the protected areas. In Nagarahole, there are about 100,000 local people living inside or close to the park (@ 155 persons/km2), whereas in Taman Negara, there

Table 8: Increase in staff numbers, administrative and development expense (million RM) of the Department of Wildlife and National Parks Peninsular Malaysia and the size (km2) of Protected Areas in Peninsular Malaysia between 1996 and 2005.

Staff, budget/ Years	'96	'97	'98	'99	'00	'01	'02	'03	'04	'05
Staff numbers	716	689	677	684	684	793	794	737	869	971-1,475*
Administrative expenses 2	20.2	20.3	17.7	18.1	NA	24.2	27.9	29.4	30.9	38.5
Development expenses	5.7	5.5	13.6	26.8	21.2	29.7	13.6	17.1	17.5	21.7
Total size of PAs	7,514	7,514	7,514	7,514	7,514	7,514	7,514	7,527	7,527	7,527

Source: DWNP Annual Reports, DWNP-DANCED (1996)
* The higher figure is the number of posts that has been approved but not yet filled.

would probably be less than 5,000 people living within or close to Taman Negara (@ 1 person/km2). Thus the need for more staff for patrolling would appear to be much greater in Nagarahole as compared to Taman Negara. But using numbers of local people living within or close to a national park as the only index for potential poaching would also be insufficient due to the global nature of wildlife poaching, as some poachers have travelled long distances (crossing international boundaries) as seen by the nationality of arrested poachers in Taman Negara (DWNP, 2005). But, if one were to just examine the coarse trend in staffing numbers/100km2 in similar departments across Asia (Table 9), Taman Negara appears to have the lowest staffing/100km2. This trend is important as a study on the effectiveness of Protected Areas in protecting biodiversity in the tropics, found that PA effectiveness correlated very strongly with the density of guards (Bruner *et al*., 2001). In the 15 mosteffective PAs in the tropics, the median number of guards/100km2 was more than 3. This figure does not include administration staff, and the most effective PAs had in general, over eight times more staff than the least effective PAs. In the most extreme form, one PA had up to 200 staff/100km2, whereas another had none (Bruner *et al*., 2001). In a subsequent analysis, Bruner *et al*. (2004) also found that under-funding jeopardised the ability of protected areas to safeguard biodiversity and the benefits that intact nature provided to society. Taman Negara has had repeated poaching issues even recently in 2007 (Anon., 2007c). Sadly, of the 42 Protected Areas in Peninsular Malaysia, only Taman Negara is afforded with regular on-the-ground patrol. The majority of the 100+ Taman Negara staff is however engaged in the park administration, visitor facilitation, and law enforcement near the headquarters. DWNP alleviates this manpower issue by sending staff from state DWNP in rotation for 10 days a month to patrol Taman Negara jointly with the existing staff. With the limited manpower, DWNP also gets support from the Royal Malaysian Armed Forces to join the annual inventory that involves 100-200 men combing the forests in search of wildlife tracks and poachers. Poachers are apprehended or flushed out every year during the 2-week operation. Ideally, a patrol of this intensity or more should be conducted daily in a national park of such high conservation significance.

Since 2001, more than 80 foreigners have been apprehended for encroachment and poaching activities in Taman Negara. This is an issue of concern, given that the latest encroachment occurred in March 2007 (Anon., 2007c). Worldwide, tigers are disappearing from their natural range, and protected areas such as those in India have also become hotspots for poaching (Dinerstein *et al*., 2007). It is therefore important to follow-up, to critically examine whether there is indeed adequate budget and staff for field patrolling and enforcement to ensure protection of wildlife and tigers in Protected Areas. Both adequate staff and budget are listed as criteria in widely accepted tools used for assessing management effectiveness (Hocking *et al*., 2000).

Table 9: Staff numbers and annual operational budgets within protected areas with tigers.

PAs with tigers in various countries	Number of staff	Budget (million RM)	Total size of PA (km2)	Staff/100km2 of PA*
Malaysia Taman Negara	105	3.2	4,343	2.41
Thailand Huai Kha Khaeng NP	200	1.68	2,740	7.30
India Nagarahole NP	200	NA	644	31.06
Indonesia				
a) Gunung Leuser	229	NA	7,927	3.68
b) Way Kambas	166	NA	1,300	12.77
c) Berbak-Sembilan	76	NA	1,700	4.47

* Inclusive of administration staff.
NP – National Park
NA – Data not available

1.6.3.2 Occupational standards

In line with having adequate numbers of staff, there is also a need to ensure that the enforcement, fines or penalties be carried out to completion (Akella and Canon, 2004; Albers and Grinspoon 1997; Dinerstein *et al*., 2007; Gibson *et al*., 2005; Lee *et al*., 2005). Enforcement, patrolling and penalties when carried out regularly serve as a deterrent to poachers (Albers and Grinspoon, 1997; Gibson *et al*., 2005). As there has been high profile losses of enforcement cases due to technicalities (Hah, 2007), there is thus an urgency to improve competencies among various officers within DWNP, among them law enforcement staff.

Improving competencies is not new, as DWNP recognised the importance of occupational standards for its staff by participating in the drafting of the 'Competence Standards for Protected Area Jobs in Southeast Asia, 2001' (Appleton *et al*., 2001).

The document outlines clear sets of occupational duties and responsibilities by all officers at various levels. In late 2006, DWNP initiated discussions on a Training Needs Analysis in pursuit of increasing competencies among its staff.

Focus on staff competencies is important because increasing staff numbers alone without training and occupational standards does not mean a job well done. Increasing staff numbers may actually increase the level of corruption, thus dilution of conservation and enforcement efforts (Gupta, 2005; Brickle, WCS Indonesia, pers. comm.; Praveen, Centre for Wildlife Studies, pers. comm.).

1.6.4 Inadequate legislation, enforcement and penalties

Illegal wildlife trade is a major threat to the tiger and its prey species. The *Customs Act 1967* and the *Customs Regulations 1977* regulate the import and export of goods into and out of Malaysia. There are no specific provisions in the Act and Regulations regarding the import and export of protected and totally protected wildlife, though the Act identifies DWNP as the reference agency for import and export of any wild bird and animal, alive or dead. But, as the definition of "goods" does not explicitly specify parts or derivatives of wild animals, there is nothing that allows enforcement agencies, such as Royal Customs Malaysia or DWNP, to seize products that contain protected and totally protected animals in their ingredients, such as Traditional Chinese Medicine, at Malaysian ports of entry.

The trade of Traditional Chinese Medicines (TCM) containing tiger derivatives in Peninsular Malaysia continues partially due to a loophole in the PWA that allows non-readily recognisable parts and derivatives to be sold in the form of manufactured and processed medicines. The PWA states that "parts" of totally protected animals cannot be traded, but does not presently cover manufactured and processed medicines containing protected species (derivatives).

While on the subject of TCM, as of 1992, all traditional medicines must be registered under the *Sale of Drugs Act (Sec. 1.4.2.3).* The Drug Control Authority also ensures that all registered products are labelled according to stipulated labelling requirements. The TSEA surveys of TCM shops conducted recently found that some medicines that claim to contain tiger bones carried registration numbers (Nijman, in press). However, the *Guidelines for the Registration of Traditional Medicines* maintain that traditional medicines containing parts or derivatives of animals listed in Attachment 8 of the regulations will not be considered for registration. The tiger and leopard are listed under Table 2, Part 2, of the Attachment. This means that all TCM products claiming to contain tiger parts or derivatives sold in Malaysia are illegal either by having fake registration numbers or sold without registration. What is needed is the enforcement of the current law.

Enforcement in general throughout all tiger range states and in consuming countries, is still insufficient, as evidenced by the continual availability of tiger parts in trade and the serious decline in wild tiger populations as well as declines in tiger prey populations (EIA-WPSI, 2006). Strong political will in range states to stop and reverse the declines in tiger populations as well as sufficient resources to tackle the illegal killing and trade are sorely needed.

Furthermore, wildlife crime is still not considered a priority within the judicial system and penalties for such crimes are often extremely low and therefore do not serve as a deterrent. Maximum penalties currently amount to a total of a fine not exceeding fifteen thousand Ringgit (USD4, 286 at 2007 rates) or to a term of imprisonment not exceeding five years. No one, however, has so far received the maximum sentence. For instance, a Malaysian man in possession of one tiger skull, 31 tiger claws and 10 tiger canines was fined RM3,000 (USD857) by the courts in 2003 (DWNP, unpublished data), far less than the true market value of these items.

Seized tiger © DWNP

In another case, a Malaysian man found with a butchered tiger in his home was fined RM7,000 by the Magistrate's Court, despite the PWA providing a maximum custodial sentence of 5 years, or fine of up to RM15,000 (Table 10).

Table 10: Tiger-related offences recorded by the Department of Wildlife and National Parks Peninsular Malaysia between 2001 and 2005 and subsequent actions taken

Year	Offence	Action Taken
2001	Illegal possession of 15kg of tiger bones	Fined RM16,000 by court
2001	Illegal possession of 5 pieces of tiger penis	Fined RM3,000 by court
2001	Illegal possession of 1.5kg of tiger meat	Fined RM4,000 by court
2003	Illegal possession of 33.7kg of tiger bones, 4 tiger canines and 6 tiger claws	Fined RM6,000 by court
2003	Illegal possession of 1 tiger skull, 31 tiger claws and 10 tiger canines	Fined RM3,000 by court
2005	Illegal possession of 1 dead tiger	Fined RM7,000 by court; Later ordered retrial

Part 2

Action Plan

"Future generations would be truly saddened that this century had so little foresight, so little compassion, such lack of generosity of spirit for the future that it would eliminate one of the most beautiful and dramatic animals that the world has ever seen."

- George Schaller

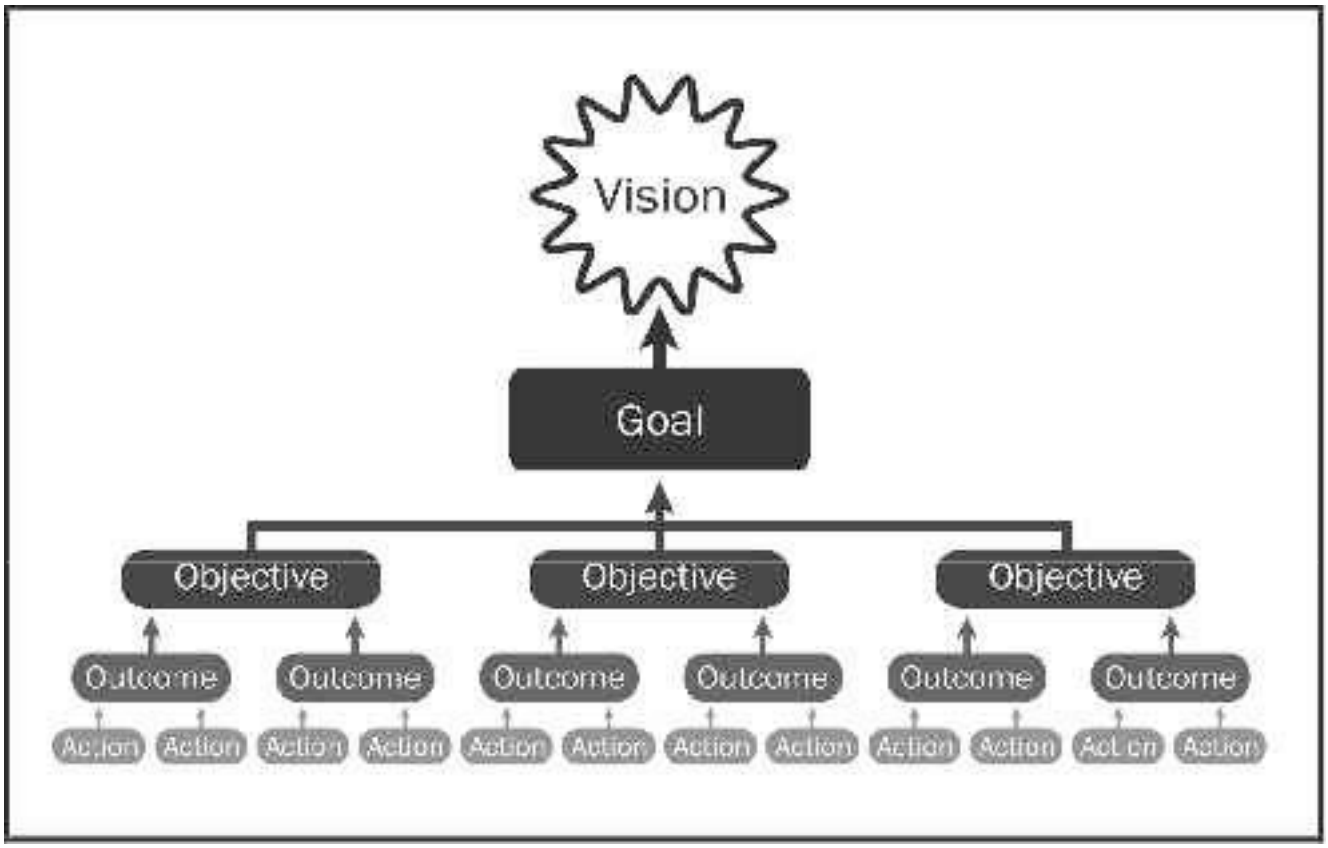
This Tiger Action Plan (hereafter referred to as the Plan) will guide Malaysian politicians, civil servants, NGOs, biologists and the general public to create the social conditions that allow tigers to co-exist with humans on the same landscape. When this Plan is implemented, Malaysia will secure the future for the Malayan tiger.

The aim of the Plan is to establish a holistic but focused conservation strategy that lays out specific actions for the next eight years (2008-2015) with the overall goal of securing viable tiger populations in Malaysia for the next century and beyond. We therefore need to have a clear vision of what we would like to see and a clear sense of how to get there. As such, we focus on short-term outcomes and measurable mid-term target, whilst keeping mindful of our ultimate vision. Obviously any conservation plan, in order to be useful, must be practical and in line with existing policies. To this end, the Plan was developed within the Malaysian Government's existing framework for environmental and biodiversity conservation. Specifically, the National Policy on Biological Diversity and National Policy on the Environment set the underlining principles, whilst the National Physical Plan laid out the spatial framework. It is a result-driven, adaptive action plan, bound by the commitment of the Malaysian government and other MYCAT partners. The Plan first presents the shared long-term vision for the century, followed by the mid-term goal and thirdly the four main objectives (Fig 6). The Plan then identifies several realistic short-term outcomes, which is finally followed by specific actions. It is important to note that not all outcomes necessary to achieve the four primary objectives are included in this Plan; only those considered as urgent or priorities, achievable in the next eight years, are detailed herein. Depending on the performance of our actions in the next eight years, the Plan will be revisited and next steps identified and implemented wherever necessary, or more outcomes will be added, or existing ones adjusted. As such, efforts will be maintained or increased to ensure that these realistic objectives are met. In situations beyond the control of all the partners and stakeholders, objectives will be reviewed, and if necessary, realigned. Each of these components from the vision to actions is described in detail in the subsequent sections.

Definitions of the terms used often in Part 2 are as follows:

Short-term	The eight year period between 2008 and 2015.
Mid-term	Foreseeable future from 2008 to 2020.
Long-term	The 22nd century and beyond.
Action	A concrete measure to be implemented in the short-term towards the outcome.
Outcome	A priority condition that needs to prevail in the short-term towards the mid-term objective.
Objective	A primary change that needs to take place in the mid-term range as a precondition for the goal.
Goal	The mid-term goal that is achievable in our life time towards the vision
Vision	The ultimate long-term aspiration of the Tiger Action Plan

Fig. 6: A schematic diagram of the framework detailing the pathway from actions to success.



2.1 Vision

A Malaysia in which tigers thrive in the Central Forest Spine in the 22nd century and beyond.

The Central Forest Spine is defined in the National Physical Plan (DTCP, 2005) as the backbone of the Environmentally Sensitive Area (ESA) network (Fig. 7). Through the protection and restoration of this forest system, the NPP aims to maintain the country's forest cover, reconnecting the fragmented forests for better protection of the nation's environment and biodiversity, all within a timeline that runs to the year 2020. Encompassing approximately 51,000km2, the CFS comprises mostly ESA Ranks 1 and 2, interspersed by smaller Rank 3 ESAs. The management criteria for the CFS (Table 11) are in line with tiger conservation in that it promotes the protection of core areas of biodiversity and resource rich forest (ESA 1) inter-connected through a system of large forest blocks where ecologically sound land-use, compatible with tiger conservation is practiced (ESA 2).

The CFS appears almost identical to the tiger habitat map (Fig. 3) because a generic forest cover map formed the base layer for both. That is to say, the tiger is a forest dweller and the majority of forest remaining in Peninsular Malaysia can be found within the CFS. The NPP also used the tiger and elephant as the flagship landscape species to aid in identification of ESA Ranks 1 and 2 as well as approximate locations of the potential corridors. The NPP also suggests the use of river corridors to maintain the integrity and connectivity of forest ecosystems, which, when combined with an intact vegetative cover, would also be readily used as dispersal corridors by tigers.

At the moment, however, the CFS concept is represented only as a coarse grain polygon corresponding with forest-cover map. The actual delineation of boundaries and definition of linkages are immediate actions planned in both the NPP and this Plan.

2.2 Policy Statement and Guiding Principles

Instead of symbolising the loss of forests and ecosystem in crisis, a healthy tiger population can be the star in the Malaysian Government's on-going efforts in implementing a number of policies regarding sustainable development and management of natural resources *(Sec 1.4.1)*, in addition to being the national symbol *(Sec 1.2)*. Adapted from the policy

Fig. 7: Central Forest Spine identified in the National Physical Plan (DTCP, 2005)

Table 11: The management criteria for the three types of the Environmentally Sensitive Areas in the Central Forest Spine.

ESARank	Criteria
1	No development, agriculture or logging shall be permitted except for low-impact nature tourism, research and education.
2	No development or agriculture shall be permitted. Sustainable logging and lowimpact nature tourism may be permitted subject to local constraints.
3	Controlled development where the type and intensity of the development shall be strictly controlled depending on the nature of the constraints.

Source: DTCP (2005)

A healthy tiger population across a landscape of well conserved and contiguous forest ecosystems indicates ecologically and socio-economically balanced progress of the nation that translates into a better quality of life for all Malaysians.

Table 12: Policy statements for the National Policy on Biological Diversity (NPBD) and National Policy on the Environment (NPE).

Policy	Policy statement
NPBD	To conserve Malaysia's biological diversity and to ensure that its components are utilised in a sustainable manner for the continued progress and socio-economic development of the nation.
NPE	For continuous economic, social and cultural progress and enhancement of the quality of life of Malaysians through environmentally sound and sustainable development.

Source: NPBD (MOSTE, 1998), NPE (MOSTE, 2002)

statements for the National Policy on Biological Diversity and the National Policy on the Environment (Table 12) the operative policy statement for this Plan is:

The definition of a healthy tiger population for the purpose of this Plan is:

A contiguous population of about 1000 adult tigers in the Central Forest Spine that has a greater than 90% projected survivorship into the 22nd century.

The following underlying Principles which are primarily based on the National Policy on Biological Diversity and National Policy on Environment form the basis for this Plan. Whilst the actions planned in this document are to address the priority and/or urgent issues for the next eight years, the Principles should be referred to for guidance in identifying actions needed to deal with emerging threats or events that are not specifically included in the Plan:

i. Wild Malayan tigers are the pride and heritage of the people of Malaysia and the rest of the world. Decision makers, resource users, and NGOs, with support from the general public, are committed to securing the forests, and wild tigers, for future generations, and are accountable in formulating and implementing the Plan. Securing the continued existence of the tiger and its habitat while managing the forests in a sustainable manner is an indication of our ongoing effort to achieve a sustainable society and excellence in conservation. *Adopted from Vision 2020; NPBD Principles ii, iii, vi, v; NPE Principles 2, 4, 7 and Objective iv*
ii. Conservation ethics, including the inherent right to existence of Malayan tigers in the wild, is deeply rooted in the religious and cultural values of all Malaysians. *Adopted from NPBD Principle i; NPE Principle 2*
iii. Challenges to tiger conservation transcend political boundaries and Malaysia continues to

exercise a proactive, collaborative and constructive role in international activities with the aim of conserving forests and Malayan tigers.
Adopted from NPBD Principle viii; NPE Principle 8

iv. Public awareness and education as well as collaboration, information exchange, capacity building and research are all essential components of integrated conservation programme for Malayan tigers.
Adopted from NPBD Principle x, Objective v and Strategies I, V, VII, XII, XIII, XIV

v. Malaysia prohibits the commercial trade of live tigers and tiger parts, whether sourced from wild populations or captive bred stock.
Protection of Wild Life Act 1972; CITES

2.3 Goal

The vision of ensuring a future for wild Malayan tigers beyond the 22nd century is the ultimate national level, long-term aspiration. Achievable in our lifetimes, our goal is:

Tiger populations actively managed at carrying capacities across the three landscapes within the Central Forest Spine and connected with functioning corridors.

The goal is broken down to a set of sub-goals that vary in terms of their implementation in space and time. In order to be able to define these sub-goals the Plan uses three spatial scales, Nation, Landscape and Priority Area, (Fig. 8) and two temporal scales, short-term (2008-2015) and mid-term (2008-2020) to define how these goals will be achieved (Table 13).

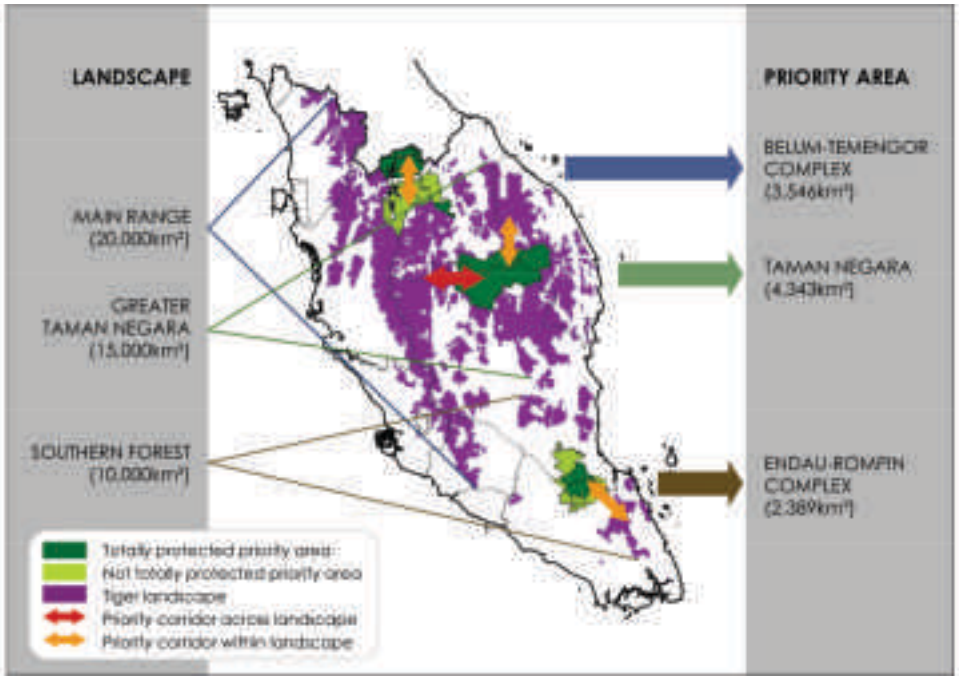
Each of the three tiger landscapes has a core priority area and priority corridor. The Belum-Temengor Complex in the Main Range Landscape contains the Royal Belum State Park, Gunung Stong Tengah State Park, Temengor PRF, Gunung Basor PRF and Gunung Stong Utara PRF. Taman Negara is the only priority area in the Greater Taman Negara Landscape. The Endau-Rompin Complex in the Southern Forest Landscape contains Endau Rompin National Park, Lesong PRF, Labis PRFs, Endau PRF and Pukin PRF (Fig.8).

The priority ecological corridor to be restored and maintained across the landscapes is the Main Range-Greater Taman Negara linkage. Within the landscapes, there are three areas where the habitat connectivity needs to be maintained and enhanced: Belum-Temengor, Taman Negara-Lebir-Tembat, and Endau- Rompin-Mersing (Fig. 8).

The sub-goals that vary in terms of their implementation in space and time are shown in Table

13. The two temporal tiers are the short-term and the mid-term. The year 2020 was chosen as the end-year due to its

Fig. 8: The three priority areas in the three respective tiger landscapes with important corridors to link tiger habitats within and across the landscapes.



national significance, as defined by Vision 2020 and its restriction to what can be classed as the foreseeable future. Furthermore, 2020 sets the limit for our measurable target because any response to conservation efforts that will be seen in tiger population dynamics will, realistically, take longer than the initial eight years to manifest. During that initial period, however, a reliable and practical scientific methodology to better monitor the target tiger populations and their distribution is envisaged to be established.

2.4 Objectives and Outcomes

The four realms of consideration in the Plan to address the different types of threats described in Part 1 are: 1) Central Forest Spine; 2) patrol and enforcement; 3) habitat management, conflict resolutions and land-use; and 4) conservation science and monitoring. Some issues are cross-cutting and thus the realms are not mutually exclusive, but this division was necessary for the ease of planning, implementation and monitoring. One main objective for each realm was identified, together to achieve the goal by the year 2020. Not all possible outcomes but three to four priority outcomes that need to take place in the next eight years to achieve each objective have been identified (Table 14 and also see *Sec. 2.6* for details of planned objectives and outcomes).

Addressing these objectives is not a feat that can be accomplished by the members of MYCAT and other primary stakeholders alone; it will certainly need support from the public through awareness programmes, support from other institutes in building local capacity and, of course, financial support from industry, international agencies and private philanthropists. Therefore, these enabling factors, awareness, capacity and financing are implicit in each objective (see *Sec. 2.6.5* for a discussion on public awareness programmes as part of a wider-view that benefits more than one objective).

Mangrove Forest @ DWNP

Table 13: Scale-dependent implementation of the goal for tiger conservation in Malaysia between 2008 and 2020.

		Temporal	
Spatial		**Short term/Phase I 8 years (2008-2015)**	**Mid term Vision 2020 (2008-2020)**
Priority Area	Belum-Temenggor Complex	• Improved protection of habitat, tigers and their prey • Connectivity between Belum, Temengor and others in the Complex maintained/restored • Establish a benchmark for monitoring of tiger population • Improved knowledge on the population status of tigers, their prey, and key threats • Strengthening management capacity	• Increased carrying capacity of tigers • Maintenance of breeding tiger populations at the maximum potential density in each priority area • Strictly protected tigers and their prey with no loss to poaching
	Taman Negara	• Maintained occupancy of tigers • Stabilized tiger density at 1-2 adults tigers/100km2 • Improved protection of habitat, tigers and their prey • Improved knowledge of tiger ecology and continued monitoring of the population • Strengthening management capacity	
	Endau-Rompin Complex	• Establish a benchmark for monitoring of tiger population • Improved knowledge on the population status of tigers, their prey, and key threats • Improved protection of habitat, tigers and their prey • Strengthening management capacity	
Landscape	Main Range | Greater Taman Negara | Southern Forest	• Improved knowledge on tiger distribution • Directed patrol of selected key forests • Directed campaign against local consumption of tiger and their prey at selected hotspots • The landscape connectivity mapped and threats to fragmentation identified • Maintenance of landscape connectivity • Promotion of ecologically sound land-use, compatible with tiger conservation and forestry practice outside the core areas • Community-based mechanisms and sustainable= financing means to reduce HTC identified and implemented at the local level • Land-use guidelines and recommendations for existing/potential HTC areas developed and incorporated into Local/Structure Plans at the state level	• Tiger distribution and landscape connectivity maintained in each landscape • Loss of tigers suppressed • Improved protection for prey
National	Peninsular Malaysia	• Tigers present in natural habitats across the three landscapes (CFS) • Maintenance of existing connectivity between Greater Taman Negara and Main Range • No loss of forest cover in CFS • Improved legislation for tigers and their prey • Improved enforcement of existing legislation • Established scientific monitoring system and research plan for tigers and their prey • Nationwide consumer education campaign and awareness programmes • Increased awareness and capacity • Overall management capacity strengthened	• Tiger populations actively managed at carrying capacities across the three landscapes within the CFS and connected with functioning corridor

Table 14: The pathway from short-term outcomes to the overall vision.

VISION

A Malaysia in which tigers thrive in the Central Forest Spine in the 22nd century and beyond

GOAL

Tiger populations actively managed at carrying capacities across the three landscapes within the CFS and connected with functioning corridors

Realm	Central Forest Spine	Patrol and Enforcement	Habitat Management, Conflict Resolution and Land-use	Conservation Science and Monitoring
Objective (2008-2020)	CFS with strictly protected priority areas in landscapes connected with corridors	Effective and longterm protection of tigers and their prey	Ecologically sound land-use, compatible with tiger conservation outside the priority areas	Application of science in monitoring the efficacy of conservation actions and improving knowledge of tiger ecology
Outcome 1 (2008-2015)	Priority areas important to tigers are strictly protected, expanded, or sustainably managed	Strengthening of wildlife legislation	Sustainable utilisation of land areas in current and potential Human-Tiger Conflict areas as well as forest reserves with strengthened management capacity	*Malayan Tiger and Large Mammal Monitoring Guidelines* based on existing mechanisms in place within the DWNP and internationally accepted methods established
Outcome 2 (2008-2015)	Important tiger habitats outside the priority areas identified and effectively managed as Environmentally Sensitive Area 1 or 2 at state and local levels	Improved legislative or regulatory protection of key prey species	Community-based, Better Management Practices to mitigate HTC established in affected areas	Monitoring of the occupancy of tiger and their prey across landscapes and tiger densities in priority areas
Outcome 3 (2008-2015)	Critical areas for landscape connectivity acknowledged, established and managed at state and local levels	Marked focused and intelligence driven anti-poaching patrol of key forest sites and enforcement of wildlife and wildlife trade laws	Effective awareness programmes in HTC areas at state and district levels	Improved planning, coordination and scientific integrity of research on tiger ecology and conservation through development and implementation of the tiger component of the *Wildlife Research Plan*
Outcome 4 (2008-2015)			Sustainable financing mechanism to mitigate HTC in place	Enhance knowledge and information base on tiger ecology and conservation
Enabling means and resources	**Awareness building – Capacity building – Securing funds**			

2.5 Target

Wild tigers are the primary beneficiary of this Plan. Ultimately, the success of any conservation action must be reflected in their population status and dynamics that need to be first determined, next stabilised and then finally increased – both in terms of distribution and density. By using the population status as the overall indicator of success, we hold ourselves accountable to wild tigers for which the resources are mobilised. The overall indicator of success is:

About 1,000 wild tigers surviving on wild prey in the Central Forest Spine by the year 2020.

Contrary to common belief, we will not count each and every individual tiger in the forest to measure our success. The target population figure is a function of estimates of the proportion of forest habitats that are occupied by tigers and estimates of tiger densities at representative sites. Currently, the maximum potential tiger population size, in all tiger habitat available in Peninsular Malaysia, is 1,480 adults. This is based on an expected mean density estimate of 3 tigers/100km2 within 49,329km2 of contiguous tiger habitat (Kawanishi et al., 2003) excluding small isolated forests where tigers are still present. Recent studies in Malaysia indicates that tiger densities range from 1.10 to 2.59 tigers/100km2 (Kawanishi and Sunquist, 2004; Darmaraj, 2006).

With improved protection of tigers, their habitats and their prey, we expect the overall carrying capacity of tigers to increase by the year 2020. By then, most of the fragmented and isolated forests, and their associated tiger populations, that lie outside of the three main tiger landscapes (Fig. 8) may disappear. Since the future of the habitats outside the three landscapes are uncertain, this Plan focuses on the CFS to maintain and re-connect tiger populations. We can hypothesise multiple models that achieve the same target. For example:

i. Tigers present with 100% occupancy in the CFS at a mean density estimate of 2/100km2
ii. Tigers present with 80% occupancy in the CFS at a mean density estimate of 2.5/100km2
iii. Tigers present with 100% occupancy in the three priority areas at a mean density estimate of 2/100km2 and 80% occupancy in the rest of CFS at a mean density estimate of 2.5/100km2

During the next eight years, we will work on establishing a nationwide tiger monitoring system, based on internationally accepted methods, which will allow us to test these hypotheses. Once these methods are shown to be field-worthy they will form the basis for a long-term monitoring programme. Note that, according to the principles of modern wildlife management, these models are adaptable to emerging knowledge and technologies as well as the success, or failure, of conservation interventions. For example, as a purely hypothetical situation, if we successfully increase the average carrying capacity of tigers in Malaysia to ten adult animals/100km2, similar to the high densities documented from Indian forests, then our long-term measurable target will be raised. Given the potential prey biomass naturally supported in tropical dipterocarp forests, this is not however probable in any foreseeable future. Raising the mean carrying capacities to 2-2.5 tigers/100km2 at the high occupancy rate of 80-100% in CFS is reasonably achievable in the next 13 years. Therefore, despite the potential to be much more ambitious, we set the minimum target of about 1,000 adult tigers in CFS.

In addition to directly monitoring tiger population status as the overall indicator of success, some other quantifiable indicators that could measure the progress of conservation actions include:

- Recruitment and mortality rates within the tiger population
- Population status of the main tiger prey species
- Nett loss or gain of forests in CFS
- Area of forest reserves in ESA 1 and ESA 2 gazetted as protection forests under the National Forestry Act
- Number of corridors maintained and actually used by tigers
- Number of traditional medicine practitioners selling medicines claiming to contain tiger
- Number of actual man-hours patrolled
- Size of area patrolled
- Proportion of tigers diet consisting of natural prey
- Number of cattle killed by tigers
- Number of offenders sentenced to imprisonment
- Number of snares confiscated

2.6 Actions, Implementing Agencies, Indicators and Timelines

This section translates the principles of conservation objectives and desirable outcomes *(Sec 2.4)* into concrete measures and tangible activities to be implemented in the field. It presents the steps which must be taken, and by whom and when, in order to deliver each outcome (summarised in Table 15 at the

end of this section). Besides the leading and collaborating agencies, each action lists a measurable indicator against which the progress will be monitored (*Sec. 2.7.4*). The leading agency will be ultimately responsible for implementation of the action and reporting the progress. Collaborating agencies in reality may include more than those listed since only currently known partners are included in the Plan. Some outcomes are achievable within the next eight years. Others may not be, and any additional time required for these is dependent on the performance by the related agencies over the next eight years. Not all the steps are in a sequential order; for the chronology of the steps, refer to the timeline for each step.

2.6.1 Secure the Central Forest Spine with strictly protected priority areas in the landscapes connected with corridors

The three outcomes are:

i. Priority areas important to tigers are strictly protected, expanded or sustainably managed.
ii. Important tiger habitats outside the priority areas are identified and effectively managed as ESA 1 or 2 at state and local levels
iii. Critical areas for landscape connectivity are acknowledged, established and managed at state and local levels

This objective is primarily to secure the physical habitat requirement of a healthy, viable population of tigers (defined in *Sec. 2.2*). It is heavily driven by the National Physical Plan with an emphasis on the Central Forest Spine with Environmentally Sensitive Areas connected with corridors. As such, the collaborating agencies encompass a wide array of government agencies, especially at the state level. This poses a challenge to the DWNP, collaborating agencies and other stakeholders in terms of efficient coordinating and monitoring. Since DWNP and WWF-Malaysia are part of the Working Group for the NPP's Master Plan for Central Forest Spine (DTCP, in prep), the rest of the MYCAT partners will work closely with DWNP and WWF-Malaysia to implement and monitor the actions. Demarcation of CFS and ESAs conceptualised in NPP is identified as one of the priorities in the CFS Action Plan. Therefore the focus of the Tiger Action Plan is on the three priority areas and priority corridors (*Sec. 2.3*). Effective management of the three priority areas is included here as well.

The three existing PAs are to be expanded by inclusion of Temengor as a gazetted National/State Park and/or buffer zones around the Protected Areas. All PAs must develop management plans, that include staffing and budgetary needs. Existing management plans for Taman Negara and Endau Rompin will be reviewed, updated and improved using existing guidelines, including those from IUCN and the Rapid Assessment and Prioritisation of Protected Areas Management (RAPPAM) methodology (Ervin, 2002). Other important tiger habitats, especially for breeding and dispersal, outside the priority areas, need to be first identified in order to secure these areas. The options and decisions to manage them as new PAs, buffer zones or protection forests are dependent upon national and state priorities and initiatives, and are within the prerogative of respective state governments, where land is concerned. Towards maintaining and improving the critical landscape linkages, specific sites must be acknowledged as wildlife corridors with appropriate management prescriptions in state Spatial Action Plans, Local Plans and Structure Plans.

2.6.2 Provide effective and long-term protection of tigers and their prey

The three outcomes are:

i. Strengthening of wildlife legislation
ii. Improved legislative or regulatory protection of key prey species
iii. Marked improvement in focused and intelligence-driven anti-poaching patrol of key forest sites and enforcement of wildlife and wildlife trade laws

More effective wildlife legislation will be enacted and implemented. It is anticipated that the amended legislation will raise the penalties, including mandatory jail sentence, for offences committed against totally protected species. There will be an increased emphasis on better protection of primary prey base through increased knowledge, upgraded status from protected game to totally protected species and regulation of issuance of hunting and dealer licences. In order to upgrade the protected status of threatened prey species, status reports for each species will be compiled based on existing information that will also identify knowledge gaps. In selected sites, the status of prey species will be closely monitored to determine the numerical response of the prey populations to the moratorium on the issuance of hunting licences. In addition to these ecological studies, monitoring of hunting and trade of tigers and their prey species will be continued.

Marked improvement in focused and intelligence-driven anti-poaching patrol and enforcement of wildlife and wildlife trade laws was identified as the utmost urgent priority by many at the National Tiger Conservation Workshop in 2006. The current effort will be enhanced with greater commitment, skills, resources, collaboration and a monitoring mechanism. To achieve this, prioritised needs for critical resources (e.g., skills, manpower, equipment, funds) for better enforcement/patrol will be identified and the ways to acquire them will be strategised. The performance and effectiveness of enforcement and antipoaching patrols will be monitored. Furthermore, inter-agency collaboration will be enhanced with FDPM to actively enforce the wildlife laws at checkpoints on key logging access roads and spot-checks at logging concessions; with local authorities/councils to revoke business licences from restaurants and traditional medicine shops that violate the wildlife laws; with other national enforcement agencies (e.g., Royal Customs of Malaysia, Anti-smuggling Unit, Immigration Department, and Royal Malaysian Police) for broader intelligence network; and with ASEAN-WEN and CITES member countries to reduce illegal trade across the national borders.

In addition, a study will be conducted to determine the feasibility of providing incentives to Customs, cargo and FDPM personnel for good detection of wildlife trade offences. Capacity building for trans-boundary enforcement/patrol and building and managing informant networks is planned for enforcement staff.

2.6.3 Promote and practice ecologically sound land use, compatible to tiger conservation outside the priority protected areas

The four outcomes are:

i. Sustainable utilisation of land areas in current and potential Human-Tiger Conflict areas as well as forest reserves
ii. Establishment of community-based Better Management Practices (BMPs) to mitigate HTC in affected areas
iii. Effective awareness programmes in HTC areas
iv. A sustainable financing mechanism to mitigate HTC

Habitat management and land-use practices inside the priority areas are addressed by the first objective (*Sec 2.6.1*). Here, land-use practices and human activities outside the priority areas, especially in the HTC areas, are dealt with. Besides the HTC issues, ecologically sound forestry practice, compatible with tiger conservation is addressed by implementing sustainable forest management in PRFs, with practical and scientifically acceptable wildlife monitoring procedures incorporated into the management.

Land-use guidelines and recommendations for both existing and potential HTC areas (as based on spatial modelling) will be incorporated in the subsequent NPP review and eventually reflected in Local or Structure Plans. Community-based BMP to mitigate HTC will be established and complemented with sustainable financing mechanisms.

Where applicable, negotiations will be conducted with private land owners to ensure land use and activities on private lands are compatible with tiger conservation. Where it is difficult to impose restrictions on private land, the concept of conservation easements should be explored whereby land owners are compensated for giving up certain options pertaining to land use and activities.

2.6.4 Apply science to monitor the efficacy of conservation actions and to improve the knowledge of tiger ecology

The four outcomes are:

i. Establishment of the *Malayan Tiger and Large Mammal Monitoring Guidelines* by adapting existing mechanisms in place within the DWNP and based on internationally accepted methods
ii. Monitoring of the occupancy of tiger and their prey across landscapes and tiger densities in priority areas
iii. Improved planning and coordination of research conducted on tiger ecology and conservation through development and implementation of the tiger section of the *Wildlife Research Plan*
iv. Enhanced knowledge and information base on tiger ecology and conservation

The indicator of success is measured in tiger occupancy across landscapes and population sizes or densities in priority areas *(Sec. 2.5)*. The nationwide occupancy survey will determine the distribution of not only tigers but also all large mammals, including tigers' main prey species that can be detected and identified by their secondary sign. In addition to the occupancy survey, the intensive camera-trapping studies in priority areas will provide information on not only tiger densities, but also on the relative abundance of many other wildlife species. Because

nationwide monitoring requires the collaboration of multiple parties, the basic sampling framework will be standardised using internationally accepted scientific methods. This is not a strict protocol, but a set of guidelines which remain flexible to site variables or the specific needs and priorities of a particular organisation. The minimum standard, such as the use of a unified grid and basic methodological frameworks, will be standardised and agreed by the involved partners. Proposed methods will be rigorously tested in the field and revised and updated until the guidelines are finalised. The nationwide monitoring will commence once the guidelines are established.

Besides the monitoring of the status of tigers and their prey, there are many other studies that can be conducted in order to deepen the understanding of tiger ecology and conservation. During the National Tiger Conservation Workshop in 2006, participants made a list of questions that could be addressed through such studies – questions that lend themselves to specific research topics for the future. The list encompassed a variety of topics, from biological to social issues, regarding wild and captive tigers. The next step is to prioritise these topics and identify the resources (skills, manpower and funds) required for their implementation in a MYCAT-organised workshop where MYCAT partners, local universities, other independent tiger researchers and potential donors are involved. The tiger section of the *Wildlife Research Plan* will provide guidance to planning, endorsement, and fundraising for tiger research in the future. Request for proposals by DWNP according to this section will be reviewed by MYCAT, assisted by international tiger experts when necessary, to ensure the integrity of the research conducted.

2.6.5 Educate and empower the public for greater support and engagement in tiger conservation

The steps to build capacity and secure funds for achieving respective outcomes are implicit in the respective objectives. Potential outcomes of public awareness programmes have compounding benefits to overlapping objectives. Therefore, except for the community outreach programmes specific to issues of HTC (*Sec. 2.6.3*), the public awareness components are addressed in this separate section. Besides general public awareness programmes conducted by various partners in the forms of publications and talks (*Sec. 1.5.2.3*), programmes with more clearly defined goals are necessary if awareness and knowledge are to be translated to actions and changes in values. Although potential target groups are mentioned in *Sec 1.5.2.2*, identification of desirable outcomes and effective communication tools for each target group was beyond the scope of the National Tiger Conservation Workshop in 2006 and thus specificactions were not discussed. Important target groups identified during the workshop were:

1) exotic meat restaurant patrons,
2) TCM practitioners/dispersers/consumers,
3) private zoos,
4) enforcement agencies,
5) rural community living near tigers,
6) Orang Asli,
7) school children, and
8) media.

For each target group, the following actions are necessary *(Sec 1.6.2.1)*.

i. Define a desirable outcome to be brought about by changes in their actions, attitudes, and values
ii. Identify the message to be conveyed
iii. Select the educational/communication strategy
iv. Identify and acquire necessary resources (skills, manpower and funds)
v. Conduct the programme
vi. Evaluate the effectiveness of the programme

Development and implementation of specific programmes will be further discussed and coordinated in the MYCAT framework either in a special meeting or workshop.

Table 15: Actions, implementing agencies, indicators, and timelines (Refer to Page viii for the list of acronyms)

		Leading Agency	Collaborating Agency	Indicator	Means of Verification	'08	'09	'10	'11	'12	'13	'14	'15
1	Secure Central Forest Spine with strictly protected priority areas in landscapes connected with corridors												
1.1	Priority areas important to tigers (i.e., Belum-Temengor Complex, Taman Negara and Endau-Rompin Complex) are strictly protected, expanded, or sustainably managed												
1.1.1	Identify potential for expansion of the targeted PAs and for new PAs	Management Authorities for Priority Areas (i.e. DWNP, PSPC & JNPC respectively)	NRE, UPEN, EPU, DTCP	Recommendations for targeted agencies	Proceedings of workshop; media; meeting minutes; correspondence	X	X						
1.1.2	Implement recommendations for expansion and creation of new PAs		State governments	Local Plans; EXCO decisions; notification of new PAs published in State gazettes	State gazette			X	X				
1.1.3	Ensure PAs have effective management plans for implementation		MYCAT	Published management plans	Management plans	X	X	X	X				
1.1.4	Ensure effective implementation of the management plans in PAs		MYCAT	Management effectiveness evaluated using RAPPAM or equivalent; revenues and expenditures for PAs.	RAPPAM reports; annual financial reports	X	X	X	X	X	X	X	X
1.2	Important tiger habitats outside priority areas are identified and effectively managed as ESA 1 or 2 at state and local level												
1.2.1	Identify important tiger habitats outside PAs	DWNP	WWF, MYCAT SO, NRE, DTCP, Land Office, UPEN, Local Authority, FDPM	Important tiger habitats outside PAs identified	Maps showing the areas; recommendations to various depts; proceedings	X	X	X	X				
1.2.2	Implement sustainable forest management in PRFs, with practical and scientifically acceptable wildlife monitoring procedures incorporated into the management	FDPM	DWNP, MTCC, concessions	Implementation of suitable conservation initiatives adopted by FDPM	Certificate from MTCC; checklist		X	X	X	X	X	X	X
1.2.3	Upgrade the conservation status or gazette important tiger habitats in state lands as PRFs, ESA 1 or 2 in line with the NPP	DTCP, FDPM, DWNP	Land Office, UPEN, MYCAT	ESAs identified in revised local plans/structure plans; notification of PRFs in State gazettes	Local plans/structure plans; State gazettes		X	X	X	X	X	X	X
1.2.4	Identify and/or secure important tiger habitats in private/alienated lands	DWNP,DTCP, UPEN	Land Office, JKPTG, MYCAT	Corridors and buffer zones implemented through purchase of private/land/conservation easements/restrictions to land use	State gazettes; reflected in local plans/structure plans; announcements; media; agreements with private land owners announcements; media		X	X	X	X	X	X	X

1.3	Critical areas for landscape connectivity are acknowledged, established and managed at state and local levels													
1.3.1	Engage relevant authorities in identifying specific linkages and implementation options	NRE, DTCP	WWF, Linking Landscapes Working Group	Prioritised sites and implementation options approved by relevant authorities	Meeting minutes; Cabinet announcement; media; proceedings	X	X							
1.3.2	Conduct relevant studies to select specific sites and implementation methods	DWNP	WWF, MYCAT SO, FDPM	Results of the studies	Reports; presentations; maps; meeting minutes	X	X	X						
1.3.3	Establish the respective linkages and implement effective management	NRE, EPU, UPEN	JKPTG, DWNP, FDPM, WWF, JKR, DoE, DID, DoA, relevant agencies	Infrastructure and/or ecologically sound land-use practices in place; guidelines/management plans in place; budget to implement the plans in place; increased socio-economic benefits to local community	Media; EIA reports; wildlife monitoring system; reports of tiger presence; guidelines/management plans with budget				X	X	X	X	X	X
1.X	Integrate above projects towards the 10th and 11th Malaysian Plan	DWNP		Projects discussed at meetings, budgeted and granted	Meeting minutes, reports, proposals, and budgets for the 10th and 11th MP	X	X	X			X	X	X	
		Leading Agency	Collaborating Agency	Indicator	Means of Verification	'08	'09	'10	'11	'12	'13	'14	'15	
2	Provide effective long-term protection of tigers and their prey													
2.1	Strengthening of wildlife legislation													
2.1.1	Determine the level of illegal trade in tigers and their prey in Malaysia through surveys of TCM shops and exotic meat restaurants and highlight the need for improved legislation and enforcement	DWNP	TSEA, MYCAT SO	Publication and dissemination of TSEA reports on trade of tigers and their prey in Malaysia	Reports; media pick-ups	X								
2.1.2	Complete the internal review of the PWA	NRE	DWNP	Notice of passing of amended legislation published in Federal Gazette	Federal Gazette	X								
2.1.3	Publicise the amendment made to the PWA	DWNP, MYCAT SO	Media, MNS, TSEA, WCS, WWF	Information in the public domain	Media pick-ups; MYCAT e-group; press releases		X							
2.2	Improved legislative or regulatory protection of key prey species													
2.2.1	Place a 3-year moratorium on issuance of hunting licence for sambar deer and barking deer	DWNP	MYCAT	No licences issued	DWNP statistics	X								

2.2.2	Assess the current status of the sambar deer, barking deer, bearded pig and wild pig based on existing information to justify the needs for better protection and identify the knowledge gap for conservation	DWNP, MYCAT SO	TSEA, WCS, WWF, JNPC	Better understanding of the prey species status	DWNP fact sheets; report	x							
2.2.3	Establish a baseline and monitor populations of these species in selected sites to assess the impact of the moratorium	DWNP	WCS, WWF	Population and occurrence study	Report; publication	x	x	x	x	x	x	x	x
2.2.4	Publicise the findings	DWNP, MYCAT SO	Media	Information in the public domain	Media pick-ups		x	x	x	x	x	x	x
2.2.5	Based on 2.2.3, review legal status of sambar deer, bearded pig and barking deer and change accordingly	DWNP	MYCAT	Species protection reviews	Amendment recommendations		x						
2.2.6	Publicise the changes in regulation/legislation	DWNP, MYCAT SO	Media	Information in the public domain	Media pick-ups		x	x	x	x	x	x	x
2.3	Marked improvement in focused and intelligence driven anti-poaching patrol of key forest sites and enforcement of wildlife and wildlife trade laws												
2.3.1	Identify and prioritise the needs for critical resource (skills, manpower, equipment, funds) for better law enforcement/patrol and strategise the ways to acquire them	NRE, JPA, DWNP	MYCAT, donors	Workshop to devise wildlife enforcement and anti-poaching strategy organised	Strategy published	x							
2.3.2	Establish a mechanism to monitor the work performance and effectiveness of the anti-poaching patrols and enforcement activities	DWNP		Mechanism such as activity/performance log established and updated monthly	Regular reports submitted to DWNP HQ	x	x	x	x	x	x	x	x
2.3.3	Increase intelligence-driven anti-poaching patrol at locations determined through coordination with DWNP	DWNP	Army, FDPM	Key sites continuously patrolled; increase in detection rates of snares and poachers; increase in areas covered in each state; increase in number of man-days patrolled	Monthly reports	x	x	x	x	x	x	x	x
2.3.4	Establish and coordinate community ranger patrol units for focused and intelligence-driven patrolling in key sites	JNPC, PSPC	MYCAT	Area patrolled; no. snares removed; no. poachers arrested	Monthly reports; Police reports	x	x	x	x	x	x	x	x
2.3.5	Increase the frequency of spot-checks and arrests on wildmeat restaurants, TCM shops, hunters, commercial dealers, middlemen, zoos and private	DWNP		Each state to double the number of spot-checks	Reports on enforcement activity	x	x	x	x	x	x	x	x

	owners												
2.3.6	Increase the number of successfully prosecuted cases	DWNP		Increasing success in prosecution of cases	Judgements from court; media pick-ups; annual reports	x	x	x	x	x	x	x	x
2.3.7	Revoke licences and/or no more issuance to offenders	DWNP		Increase in the no. licences revoked or rejection of applications for repeat offenders	State blacklist of offenders	x	x	x	x	x	x	x	x
2.3.8	Collaborate with relevant local authorities to revoke business licences of those who violate the wildlife legislation	DWNP, MYCAT SO	Local authorities	Positive response from the relevant local authorities/councils; business licences revoked	Meeting minutes; reports	x	x	x	x	x	x	x	x
2.3.9	Collaborate with FDPM for active enforcement at checkpoints at key logging access roads and spot-checks at logging concessions	DWNP, FDPM	WCS, WWF	Increase in no. spot-checks in PRFs	Monthly reports; enforcement log	x	x	x	x	x	x	x	x
2.3.10	Enhance the collaboration with ASEAN-WEN and CITES member countries	DWNP	TSEA, ASEAN-WEN, MYCAT SO	Regional workshop on trans-boundary wildlife enforcement	Proceedings; media pick-ups	x		x		x		x	
2.3.11	Enhance inter-agency enforcement task force	NRE	DWNP, FDPM, MTIB, Sabah Wildlife, Sarawak Forestry, Anti-smuggling Unit, Police, Customs, Immigration	Malaysian Wildlife Enforcement Network established	MOU or meeting minutes	x							
2.3.12	Enhance informant networks at local level	DWNP	MYCAT	Meetings and dialogues to work with local community leaders organised; the current reward system publicised	Reports	x	x	x	x	x	x	x	x
2.3.13	Enhance the existing incentives to the Customs, cargo staff, FDPM staff for good detection	DWNP		Agreed formula in place	Reports	x	x						
2.3.14	Enhance the capacity of enforcement/patrol teams at the Malaysia-Thai border and the Straits of Malacca	DWNP	TSEA, Army, Police, Marine Police	Capacity building training held	Training materials	x	x						
2.3.15	Enhance informant networks through effective training for enforcement staff	DWNP	TSEA, Police, Customs	Capacity building training held	Training materials	x	x						

	in building and managing informant networks												
2.3.16	Monitor illegal trade trends of tiger and prey species	DWNP	TSEA	Surveys conducted	Reports	X	X	X	X	X	X	X	X
2.X	Integrate above projects towards the 10th and 11th Malaysian Plan	DWNP		Projects discussed at meetings, budgeted and granted	Meeting minutes, reports, proposals, and budgets for the 10th and 11th MP	X	X	X			X	X	X
		Leading Agency	Collaborating Agency	Indicator	Means of Verification	'08	'09	'10	'11	'12	'13	'14	'15
3	Promote and practice ecologically sound land-use compatible with tiger conservation outside the priority areas												
3.1	Sustainable utilisation of land areas in current and potential HTC areas as well as forest reserves												
3.1.1	Update the existing monitoring system developed at DWNP HQ on HTC areas using GIS	DWNP	WWF	HTC maps produced; updated using GIS	Master map available to stakeholders; DWNP staff at state and district levels able to use the system to monitor HTC	X							
3.1.2	Develop a spatial model based on existing HTC sites to predict potential HTC sites	DWNP, WWF	IPTA	Map of potential HTC sites	Modelling and survey reports available to stakeholders	X	X	X	X	X	X	X	X
3.1.3	Develop Land-use Guidelines & Recommendations for existing/potential HTC areas	DTCP, WWF	DWNP, IPTA, EPU, FDPM	Guidelines produced	Local Plan, Structure Plan, revised NPP and other land-use plans for relevant areas incorporating the guidelines and recommendations		X	X					
3.1.4	Implement suitable wildlife-friendly initiatives in forestry sector	FDPM, DWNP, MTCC, WWF	FRIM	Practical and scientifically acceptable monitoring guidelines incorporated into forestry documents	State Forest Management Plans		X	X	X	X	X	X	X
3.2	Establishment of community-based Better Management Practices (BMPs) to mitigate HTC in affected areas												
3.2.1	Identify community-based BMPs for mitigation in HTC areas	DWNP	WWF, Land agencies, DVS, DoA	List of BMPs for Jeli, Kelantan identified	Reports	X							
3.2.2	Test, review and refine the BMPs in three pilot sites in Jeli, Kelantan to develop community-based HTC mitigation protocol	DWNP	WWF	Results at tested sites	Reports	X	X						
3.2.3	Implement the protocol	DWNP	WWF, relevant agencies	Reduction in HTC	Survey reports			X	X	X	X	X	X

3.3	Effective awareness programmes in HTC areas												
3.3.1	Carry out assessment for awareness programmes in HTC affected areas	DWNP	WWF, WCS	Appropriate awareness/outreach programme needs identified	Reports; statistics	X							
3.3.2	Enhance appropriate programme and materials	DWNP	WCS, WWF	Awareness programme manual and materials	Published manual	X	X						
3.3.3	Train personnel	DWNP	MNS, WCS, WWF	Relevant personnel trained to carry out the programme	Training workshop		X	X					
3.3.4	Implement the programme	DWNP	MNS, WCS, WWF	Programme implemented with positive feedback	Site visit; media pick-ups			X	X	X	X	X	X
3.4	A sustainable financing mechanism to mitigate HTC												
3.4.1	Conduct a feasibility study on sustainable financing mechanism for resolution of HTC	WWF		Potential mechanisms identified	Reports	X							
3.4.2	Develop a sustainable financing mechanism, modify and link to financial agencies	WWF	UPEN Kelantan, USM, DWNP, Financial agencies	Mechanism developed	Legal documentation of the developed mechanism	X	X						
3.4.3	Test out the mechanism in a pilot site	WWF	UPEN Kelantan, USM, DWNP, Financial agencies	Mechanism agreed and supported by stakeholders, financial agencies	Statistics	X	X						
3.4.4	Implement at other affected areas	WWF	Depends on the result of 3.4.2 and 3.4.3. Yet to be determined.	Reduced socio-economic losses among affected locals; sufficient funds to implement BMPs; new income generated	Survey; conflict incidence report; reports		X	X	X	X	X	X	X
3.X	Integrate above projects towards the 10th and 11th Malaysian Plan	DWNP		Projects discussed at meetings, budgeted and granted	Meeting minutes, reports, proposals, and budgets for the 10th and 11th MP	X	X	X			X	X	X
		Leading Agency	Collaborating Agency	Indicator	Means of Verification	'08	'09	'10	'11	'12	'13	'14	'15
4	Apply science to monitor the efficacy of conservation activities and to improve knowledge of tiger ecology												
4.1	Establishment of the *Malayan Tiger and Large Mammal Monitoring Guidelines* based on existing mechanisms in place within the DWNP and internationally accepted methods												
4.1.1	Introduce underlining principles and best practice for monitoring tiger and tiger prey populations to local researchers	WCS	DWNP, MNS, WWF	Training workshop conducted	Workshop programmes and materials	X							

4.1.2	Agree to use standardised methodology and grid system	DWNP	MNS, WCS, WWF, MYCAT SO	Meeting to discuss standardised method held	Meeting minutes endorsed by respective agencies	x							
4.1.3	Assess the applicability of best practice to the nationwide tiger monitoring exercise	DWNP	MNS, WCS, WWF, MYCAT SO	Results	Meeting minutes or proceedings	x							
4.1.4	Identify the resource needs (personnel, capacity, funds) for tiger monitoring	DWNP	MNS, WCS, WWF, MYCAT SO	Results	Meeting minutes or proceedings	x							
4.1.5	Determine the sampling sites and timeline	DWNP	MNS, WCS, WWF, MYCAT SO		Meeting minutes or proceedings	x							
4.1.6	Test the occupancy method, share the result, and modify the method if necessary	WCS	DWNP, MNS, WWF, MYCAT SO	Presentation; discussions	Reports; meeting minutes	x							
4.1.7	Based on the field-tested methods, draft guidelines	WCS	DWNP, MNS, WWF, MYCAT SO	Draft guidelines circulated for review and revised	Draft guidelines reviewed and finalised	x							
4.1.8	Endorse the guidelines	DWNP		guidelines established	Published guidelines	x							
4.2	Monitoring of the occupancy of tigers and their prey across landscapes and tiger densities in priority areas												
4.2.1	Conduct training	DWNP	WCS	Relevant personnel trained	List of trainees	x							
4.2.2	Fundraising for nationwide monitoring	MYCAT		The target amount raised	Grant agreements	x							
4.2.3	Conduct research	Respective researchers		Results	Reports; data		x	x	x	x	x	x	x
4.2.4	Share experience	Respective researchers	MYCAT	Information shared	MYCAT e-group; meeting minutes		x	x	x	x	x	x	x
4.2.5	Disseminate the results to scientific community	Respective researchers		Publications in peer-reviewed journals and popular magazines; presentations at conferences	Publications; proceedings			x	x	x	x	x	x
4.2.6	Disseminate the result to the general public	DWNP, respective researchers	MYCAT SO, media	Publications in popular magazines or newspapers; public presentations	Media pick-ups; seminar announcements			x	x	x	x	x	x
4.2.7	Modify the guidelines if necessary	DWNP, WCS	MYCAT SO, MNS, WWF	Modified guidelines circulated and accepted	Updated guidelines			x	x	x			
4.3	Improved planning, coordination and scientific integrity of research conducted on tiger ecology and conservation through development and implementation of the tiger section in the *Wildlife Research Plan*												
4.3.1	Identify and prioritise research topics regarding tiger ecology and	DWNP	MYCAT SO, MNS, TSEA, WCS,	Included in the draft *Wildlife Research Plan*	A section of the draft *Wildlife Research Plan*		x						

	conservation		WWF, universities, other researchers										
4.3.2	Identify the resource (personnel, capacity, funds) needs for priority research	DWNP	MYCAT SO, MNS, TSEA, WCS, WWF, universities, other researchers	Included in the draft *Wildlife Research Plan*	A section of the draft *Wildlife Research Plan*		x						
4.3.3	Develop and review the tiger section of the *Wildlife Research Plan*	DWNP	MYCAT SO, MNS, TSEA, WCS, WWF	Draft tiger section circulated for review and revised	Final draft of tiger section submitted to DWNP		x						
4.4	Enhance knowledge and information base on tiger ecology and conservation												
4.4.1	Request for Proposals according to the tiger section in the *Wildlife Research Plan*	DWNP	MYCAT SO	Tiger section in the *Wildlife Research Plan* and Request for Proposals	Available at DWNP website and from MYCAT SO			x	x	x	x	x	x
4.4.2	Peer review of research proposals	DWNP	MYCAT SO, scientific community	Proposals circulated for expert review	Comments and recommendations from the reviewers to DWNP and researchers			x	x	x	x	x	x
4.4.3	Approve research proposals involving animal handling or by foreign institutions	DWNP		Letters of approval	Copy of letters maintained by MYCAT SO	x	x	x	x	x	x	x	x
4.4.4	Conduct research	Respective researchers		Results	Reports; data	x	x	x	x	x	x	x	x
4.4.5	Share experience and results	Respective researchers	MYCAT	Information shared	MYCAT e-group; meeting minutes	x	x	x	x	x	x	x	x
4.4.6	Disseminate the results to scientific community	Respective researchers		Publications in peer-reviewed journals; presentations at conferences	Publications; proceedings		x	x	x	x	x	x	x
4.4.7	Disseminate the result to the general public	DWNP, respective researchers	MYCAT SO, media	Publications in popular magazines or newspapers; public presentations	Media pick-ups; seminar announcements		x	x	x	x	x	x	x
4.X	Integrate above projects towards the 10th and 11th Malaysian Plan	DWNP		Projects discussed at meetings, budgeted and granted	Meeting minutes, reports, proposals, and budgets for the 10th and 11th MP	x	x	x			x	x	x

2.7 Implementation of the Plan

The Plan thus far has presented:

- Natural history and conservation status of tigers in Malaysia
- The ultimate, shared vision to be achieved in this century
- The time- and space-dependent goals, primary objectives and main outcomes (i.e. the road map to success)
- Quantifiable target for the year 2020
- Specific actions with indicators, responsible agencies and timeframes for the next eight years

The adaptive approach that is needed to successfully implement the Plan relies wholly on the stakeholders collectively learning from experiences and identifying methods needed to improve the actions. This section describes this dynamic approach in more detail and explores the importance of accountability and stakeholder engagement in the learning process. This culminates in the presentation of a method to monitor the implementation of the Plan.

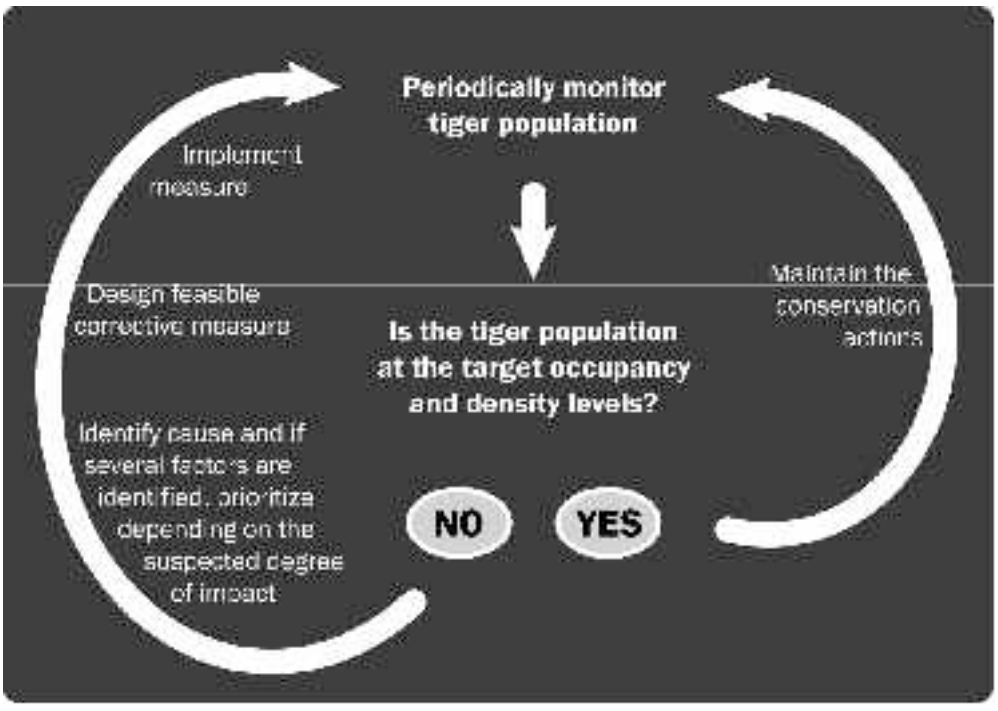
2.7.1 Adaptive Management

New knowledge and new solutions to complex problems faced by tigers are created by concerned and interested people coming together over a long period of time to try things out, share their experience, insights and understanding, and to make decisions on what to do in the future. Besides obvious resources necessary, successful implementation of the Plan, therefore, depends on effective feedback and learning (Fig. 9).

This Plan is seen as the basis for more proactive, enhanced actions for tiger conservation, achieved through learning processes, improvements and advances in information and knowledge. It is a collection of working models to be strengthened through stakeholder dialogues and to be tested in practise, constantly reflected on and revised upon.

Given the limited resources available for conservation and the alarming rates at which both tigers and their habitat are disappearing, the accountability of conservation actions is critical. Applying sound methods to measure the efficacy of conservation actions can lead to more efficient planning, allocation of resources and implementation. In order for real and mutual accountability and learning to take place, the core of the stakeholder engagement strategy must involve a two-way mechanism (dialogues) for exchanging views, clarifying expectations, addressing differences, building shared understanding, encouraging creative but practical solutions, and building trust. Furthermore, all this must be done in an environment of openness and

Fig. 9: A simplified schematic diagram of an adaptive management framework for tiger conservation (Modified from Gratwicke *et al.*, 2006).



honesty where personal or organisational differences are set aside in order to focus on the task at hand.

2.7.2 Accountability

The strength in plans of this nature lies in the power to demand accountability. Accountability defines the relationship between the parties involved, and the beneficiary of the Plan should necessarily be in the best position to assess the effective implementation of the Plan. In this case, the beneficiary is the tiger, and therefore, the primary accountability will be reflected in their population status, which will be measured using internationally accepted methodologies standardised to Malaysian application (*Sec. 2.5*).

Besides the primary accountability to the beneficiary of the Plan, there are two other lines of accountability.

i. Vertical Accountability: The implementing agencies are accountable to those who have legal authority and who can demand accountability because they control financial resources. For example, DWNP is accountable to NRE and, likewise, NGOs are accountable to their donors. The Malaysian Government is also accountable to the taxpayers collectively. On ethical grounds, the Plan, which is entrusted to save wild tigers in Malaysia, is ultimately accountable to the future generations of Malaysia as well as the global citizens at large, to whom the tiger in the wild may become an unknowable thing of the past.

ii. Horizontal Accountability: The Malaysian government is accountable to the implementation of this plan in its entirety, which is developed in parallel to the various national policies it has established, keeping in mind its commitment to the international community through the multilateral environmental agreements it has subscribed to, such as the Convention on Biological Diversity and CITES. Implementing agencies are accountable to one another by the binding pledge to work together towards the unified goal. Since the implementing agencies are committed to using sound science, the agencies are also accountable to skilled peers within the scientific community.

2.7.3 Stakeholder Engagement

"… vision, persistence, thinking at the right social and spatial scales, and constructive dialogue are keys to the tiger's future."

- Ullas Karanth

Important stakeholders for this Plan are generally:

- Primary stakeholders: those who implement the Plan directly for the purpose of tiger conservation or provide necessary resources or skills to the implementation of the Plan; or influence the course of effective implementation significantly. These include MYCAT partners, NRE, FDPM and donors.
- Secondary stakeholders: those who implement the Plan primarily for other goals that indirectly contribute to the goal of this Plan. These include the DTCP, Police, Army, Customs, as well as specific local communities involved in sustainable resource utilisation or HTC resolution work. In other words, all other organisations involved in the Plan outside the primary partners are secondary stakeholders.
- Tertiary stakeholders: those who are affected by, or indirectly influence the outcomes of the Plan. These include state governments and the general public.

At an activity level, these categories are not hard-and-fast as what makes a particular group fall into a particular category depends on the level of involvement of each organisation in a specific programme. For example, in a conflict-resolution programme, the affected community is, at least, the primary stakeholder and perhaps even a beneficiary of the desired outcome. Furthermore, the Forestry Department exerts considerable influence on how tigers survive in forest reserves. Even though their primary task in forest management, FDPM is therefore considered a primary stakeholder for the Plan.

While short-term, project-based, collaborations around narrow objectives might be established and managed quite easily, the success of longer-term partnerships depends on building mutual confidence and trust, which requires frequent dialogues among the partners. This is where the MYCAT platform plays a vital role. Frequent dialogues are an excellent basis for learning through the adaptive management approach. There are four types of dialogues involved in the implementation and monitoring of the Plan:

i. MYCAT dialogues – Besides day-to-day communications among the MYCAT partners, MYCAT Working Group members meet once every few months to keep each other updated on activities, and to discuss emerging issues and generally strengthen a mutually beneficial working relationship.

ii. Central stakeholder dialogues – More formal dialogues with the primary and secondary

stakeholders will be called by NRE every six months to review the Plan implementation, share lessons, resolve issues, and to make minor adjustments to planned actions.

iii. Local stakeholder dialogues – Dialogues with those local communities that are directly affected or local government agencies that are collaborating on specific projects will be done at the local level. The implementing lead agency will bring lessons learnt and unresolved issues from the local stakeholder dialogues to central dialogues to share with the rest of the stakeholders.

iv. Dialogues with the donor of each project/organisation are done by the respective grantee. In the case of the Malaysian Government, the donors are the Malaysian taxpayers and the public reporting is done in the form of an annual report, which is available in print and online.

2.7.4 Monitoring Mechanism

As the custodian of the Plan, DWNP is given the responsibility of implementing many actions. However the implementation of the full Plan is a responsibility shared by both primary and secondary stakeholders. Because the primary stakeholder involves one other agency in NRE, namely FDPM, and the secondary stakeholders involve many other agencies in NRE and in other Ministries, NRE will provide the inter-agency coordination and ultimately monitor the progress of the Plan implementation. Another key responsibility of NRE will be to link the implementation of the Plan with the implementation of other relevant Policies such as NPP, NPBD and NPE. The formal progress reporting will be conducted every six months during the central stakeholder meeting called by NRE *(Sec. 2.7.3 ii)*. For this purpose, MYCAT Secretariat's Office will act as Secretariat to the NRE Division of Conservation and Environmental Management.

Every sixth month of the implementation (tentatively June and December of every year), the MYCAT SO will call for a 6th-month progress report from the implementing lead agencies using a standardised log frame. MYCAT SO will compile the reports, ensure the conformity of the report to a standard style and submit it to NRE that chairs the bi-annual central stakeholder meeting.

The reports include the following information for each action:

- Status of progress (completed, in progress, not yet started)
- Indicator
- Constraints which led to the delayed or incomplete action
- Measures taken or proposed to overcome the constraints
- Request for change or support
- Recommendations and plans for next step

The progress of each action will be reviewed in the order it appears in the Action Plan Table (Table 15). Necessary decisions and adjustments to the Plan will be made to resolve challenges to implementation. The specific responsibilities of MYCAT SO, as the Secretariat to the NRE Division of Conservation and Environmental Management, in the monitoring of the Plan are:

- To establish a standardised reporting format
- To ensure that all the relevant agencies are informed of the monitoring process
- To call for 6-month progress reports from the leading agency for each action
- To compile the report in a standardised manner and submit it to NRE
- To facilitate communication among MYCAT partners and other stakeholders
- To publicise and communicate with the public the implementation of the Plan Towards the end of Phase I (2008-2015), the implementation and success of the Plan will be thoroughly reviewed and evaluated by an external conservation auditing team working with the MYCAT SO. The results from the evaluation will form the basis for a major stakeholder workshop on the work plan for Phase II (2016-2020).

2.7.5 Public Reporting

For the purposes of public accountability and transparency, the log frame used for monitoring and resolutions from the bi-annual central stakeholder meetings called by NRE will be made available through the MYCAT e-group or from MYCAT SO to anyone who requests the progress report. Additionally, annual the MYCAT newsletter, *MYCAT TRACKS,* will highlight the major progress and challenges in implementing the Plan and this will be made available in print and online.

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Melaka Zoo @ DWNP

Appendix 2: Programme of the Malayan Tiger Conservation Workshop 2006

7 Nov 2006
Opening speech Malaysia's vision for the Malayan Tiger
Dr Nadzri Yahya Deputy Undersecretary, Conservation and Environmental Management Division Ministry of Natural Resources and Environment
Introduction to the workshop Expectations and outputs
En Rasid Samsudin Director General, Department of Wildlife and National Parks
Malaysia in global tiger conservation efforts Significance of Malaysia and international funding mechanisms for tiger conservation efforts worldwide
Dr John Seidensticker Chairman, Save the Tiger Fund Council
Where we are and where we want to go? Focused action plan using a holistic and integrated approach
Dr Kae Kawanishi Secretariat, Malaysian Conservation Alliance for Tigers
Tiger Management Plan and priorities
Mr Kadir Hashim Principal Assistant Director, Biodiversity Conservation, Department of Wildlife and National Parks
Role of NGOs in tiger conservation
Ms Kanitha Krishnasamy Science Officer, Malaysian Nature Society
Capacity building, community outreach and awareness programmes
Dr Melvin Gumal Malaysia Programme Director, Wildlife Conservation Society-Malaysia
Panel Discussion 1: Implementation of National Physical Plan a. Implementation, enforcement and monitoring of National Physical Plan (NPP. 18 and 19)
Ms Siow Suan Neo Deputy Director, National Physical Plan Division, Department of Town and Country Planning
b. What it means to tigers, challenges and possible resolutions
Mr Brian Lee Tiger Project Leader, WWF-Malaysia
Panel Discussion 2: Combating the tiger trade a. Specific trade-related threats to tigers in Malaysia
Mr Chris R. Shepherd Senior Programme Officer, TRAFFIC Southeast Asia
b. Current mitigation measures, plans and recommendations for the future
Ms Misliah Mohd Basir Director, Law & Enforcement, Department of Wildlife and National Parks
Panel Discussion 3: Human-Tiger Conflict as a result of unsustainable rural development a. Current status, mitigation measures and recommendations for the future
Mr Salman Saaban Senior Assistant Director, Biodiversity Conservation Division, Department of Wildlife and National Parks
b. Resolutions from Human-wildlife Conflict Mitigation Workshop in July 2006
Mr Ahmad Zafir Abd Wahab Tiger Team Scientific Officer WWF-Malaysia

A NATIONAL TIGER ACTION PLAN FOR THE UNION OF MYANMAR

May 1st, 2003

Myanmar Forest Department,
Ministry of Forestry, Myanmar

Wildlife Conservation Society
International Program

A National tiger Action Plan For
The Union of Myanmar

Prepared by
Antony J. Lynam Ph.D
Associate Conservation Scientist "

May 2003

Cover illustration: The tiger *(Panthera tigris)* recorded by camera-trap in Htaung Pru Reserve Forest, Tanionthayi Division.

A GUIDE TO USING THIS DOCUMENT

This document is divided into three sections. An executive summary of findings and general recommendations and a National Action Plan with specific recommendations, a schedule for the implementation of these actions, and responsible agencies is provided in pages 8-13. This is **minimum reading** for decision makers. For readers with some time to appreciate the background and rationale for these actions, PARTS 1-5 of this document (pages 14-43) is **essential reading**. PART 6 (pages 44-62) provides details of the field program that was mounted to acquire the information that provides the foundation for the Action Plan, and is **optional reading**.

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LIST OF TABLES

APPENDICES

Errata National Tiger Action Plan for the Union of Myanmar

1. Inside cover. Cover illustration caption is from "Thayet Chaung Township, Dawei District, Tanintharyi Division."
2. Contents. Fig. 3 is on p.6, Figs 4-8 are on p.7. Table 1 is on pages VII-X.
3. p. IV. 1st para. Schedule for implementation is on pages VII-X, PARTS 1-5 is pages 1-12, and PART 6 is pages 23-35.
4. p. VIII Table 1. item 2. k) scheduled for 2004, item 2. l) scheduled for 2004. item 5. a) should read "including recommendations in 2., 3., 4., and below
5. p. IX. Table 1. Item 5. d) should read "soften"; item 7. should read "Monitoring the status of the tiger and prey population to assess the effectiveness of conservation efforts."
6. p. 3, 2nd para, 3rd to last sentence should read "...for a deposit of US$12."
7. p. 5, 1st para, remove "(see Essay Box 1)."
8. p. 9. 1st para, last sentence "25 CITES listed species.."
9. p. 32. 5th para. should read "...3 globally near-threatened species. 12 CITES Appendix I, 6 Appendix II and 7 Appendix III.
10. p. 34. Fig. 13 no. 1. should read "Thayet Chaung Township, Dawei District, Tanintharyi Division."
11. p. 42. Survey area for Saranati (SRMT) was 254 sq. mi. (650 km^2)
12. p. 40. Appendix I. Abbreviation for Thaungdut is (TD). Descriptions for sites 16 and 17 should be reversed.
13. p. 47-48. Appendix II. IUCN status for Wild pig is Not Threatened, not on CITES appendix. CITES status for Wild dog (App II), Malayan sunbear (App I), Yellow-throated marten (App III), Crab-eating mongoose (App III), Elephant, Gaur, Tapir, Serow (all App I), Pangolin (App II), *Rusa* spp. (App II), Black stork (App II).

PREFACE

The tiger represents many things to Myanmar people and to the Union of Myanmar and its natural wilderness. It is a national symbol for the country, a flagship for conservation, an indicator of intact and healthy forest ecosystems, and a keystone species upon which other biodiversity and the forest itself are dependent. Despite their importance, the status of Myanmar's the tiger population was uncertain for many years due to poaching for the trade in Traditional Chinese Medicine (TCM), hunting of their prey species, and forest clearance to meet human needs at the expense of wildlife. In the absence of detailed knowledge about where the tigers live and how they are threatened in those places, plans to conserve the species were thwarted.

In 1999, the Myanmar Forest Department commissioned a study to determine the current status and distribution of the tigers, and formulate an updated national strategy for their future management and conservation. This document" *A National The tiger Action Plan for the Union of Myanmar*" is the end product of a three-year program conducted jointly by the Myanmar Forest Department and the Wildlife Conservation Society with funding from the US National Fish and Wildlife Foundation and Exxon Mobile's "Save The tiger Fund", I am pleased to say that the program has gone well beyond my expectations. The Plan details what is needed to save Myanmar's the tigers from extinction and so provides a valuable prospectus for future conservation. It will become a part of the Myanmar forest policy for recovery of the species.

U Shwe Kyaw
Director-General
Forest Department
Ministry of Forestry

FOREWORD

It is with great pleasure that I introduce the National Tiger Action Plan to the government and the people of Myanmar. Upon first arriving in Myanmar in 1993, I remember how surprised I was by the intense feeling of "rightness" that overcame me. Having worked more than a decade in other parts of Asia I was feeling despair over the future of conservation in the region. I had grown tired of grappling with issues that never got resolved, despite my best efforts, and I was losing faith in the ability of people to realize how important wildlife and wild lands were to the quality and integrity of their lives. It seemed impossible to me at the time that any place I chose to work again would be different. But I was wrong. Myanmar was different.

I had first become interested in Myanmar because of its potential as one of the world's last strongholds for large mammal species such as the tigers, clouded leopards, and Asian elephants. And I hungered to go into the hinterlands of a country that contained the world's last great stands of teak trees, rugged, unexplored mountain ranges, and a diversity of wildlife almost unparalleled in the Asia-Pacific region. But what I had never anticipated was the intelligence, kindness, integrity, and diversity of the Myanmar people, and how seriously the Myanmar Forest Department and the Wildlife Division took their mandate to protect and conserve the country's remaining forests and wildlife.

I am pleased to have had the opportunity for the last ten years to work with staff of the Myanmar Forest Department. I feel honoured to have played a role in helping survey and designate some of the country's and the region's finest protected areas, such as Hkakabo Razi National Park and Hukaung Wildlife Sanctuary. But our work is only beginning. I was saddened to learn the results of the tiger surveys that were carried out by WCS and the Myanmar Forest Department. Yet I was heartened by the fact that there were still places of intact habitat where the tigers and other wildlife had a chance for the future if proper actions were taken.

This National Tiger Action Plan compiled by Dr. Antony Lynam and the Myanmar Forest Department is a landmark document. Nothing of this magnitude has been compiled for any country where the tigers still roam. But this document should not simply be viewed as a finished product to be placed on a shelf. It is a realistic plan of action that, if followed, could bring the tiger, a national treasure, back to Myanmar in numbers that will guarantee their future in the region for many generations to come. I am optimistic that the government and the people of Myanmar will do what needs to be done to save the tiger and the other spectacular wildlife species that wander their forests. And I hope that I and other WCS scientists will continue to have the opportunity to assist in any way possible towards this end.

I was correct about the feeling of" rightness" when I came to Myanmar in 1993. I hope I am also correct that in the years to come, Myanmar will point to its forests and wildlife with pride, and they will be held up as an example to other countries of what is possible when one cares about its natural heritage.

Alan Rabinowitz Ph.D
Director, Science and Exploration Program
Wildlife Conservation Society

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A vast number of people made this project possible. Firstly, the Minister of Forests, Director- Generals U Soe Tint, U Shwe Kyaw, and former D-G U Kyaw Tint, and U Khin Maung Zaw, Director of the Nature and Wildlife Conservation Division. Territorial staff of the Forest Department, the Local Commander of Taninthayi Division, and U Tun Paw Oo, Director of the Taninthayi Forest Department. U Aung Than wrote the first NTAP in 1996. In 1998 at the Saving the tiger Conference in Dallas, Texas, he and U Uga made the call for a revised NTAP. The field assessments were carried out by U Saw Htoo Tha Po, U Myint Aung, U Myint Maung, U Kyaw Thinn Latt, U Tin Mya Soe, U Sein Aung Min, U Thein Lwin, U Khin Maung Htay, U Tun Tun Lwin, U Moe Myint Aung, U Zaw Naing Tun, Daw Myint Myint Oo and Daw Khin Htay. U Kyaw Thinn Latt assisted with data management and analysis. U Saw Tun Khaing and U Than Myint coordinated with the Forest Department to initiate and guide the project. Drs Alan Rabinowitz, Joshua Ginsberg, Madhu Rao of the Wildlife Conservation Society provided advice on project design and implementation. They and Drs Tim O'Brien and Dale Miquelle (WCS) provided comments on this Plan. Workshops with WCS the tiger workers in New York (1999) and Thailand (2001) inspired some of the considerations for conservation action described in this report. Thanks to Dr Alan Rabinowitz for helping us see the big picture of the tiger conservation, and to Dr Ullas Karanth who showed us how the tigers can recover from the seemingly most impossible situations. Finally, the project was made possible with a generous grant from the "Save The tiger Fund", a joint project of the US National Fish and Wildlife Foundation and ExxonMobile Corporation, and from the Michael Cline Family Foundation. Initial funds for implementation of this conservation strategy are being made available by USFWS, the Nancy Abraham Conservation Fund and the "Save The tiger Fund ".

EXECUTIVE SUMMARY OF FINDINGS AND RECOMMENDATIONS

1. Background

A hundred years ago the tiger (*Panthera tigris*) occurred across Asia from eastern Turkey to the Russian Far East and south to the Indonesian archipelago. Myanmar is one of fourteen countries in Mainland Asia where the tigers persist today.

Reports and anecdotal information from surveyors, hunters, foresters, consultants and researchers attest to the former widespread occurrence of the tigers in Myanmar, except in higher elevation areas in the north. That the tigers existed over wide areas in the past was partly due to the existence of large expanses of intact habitat where human population density was low and disturbance to the tigers and their prey was minimal.

Recent attempts to quantify Myanmar's the tiger population were hampered because while rapid assessments for wildlife had been made in many areas, standardized survey methodologies for the tigers were not yet available.

While the tiger status remained uncertain, the trends for the tigers and their habitats are well understood. Widespread loss of habitat with changing land use patterns, and the uncontrolled hunting of the tiger prey, along with sport hunting, and commercial hunting for the tigers spurned by a recent demand for traditional medicines in Asia led to the demise of the tigers in the past. By the early part of the 20th Century thousands of the tigers had been reported killed in Myanmar.

Myanmar lost 25% of its forest cover, potential habitat for the tigers and other wildlife between the 1940's and 2000 (FAO, 2000). By 2002, 4.73% (31, 792 km2) of the country was either formally protected or proposed for protection. The tigers require large areas of contiguous habitat, usually 3,000- 15,000 km2 in size for long-term survival. While forest areas of this size exist in the country only three areas are currently protected. Nearly 80% of the protected areas are less than 1,000 km2, with 10 areas less than 100 km2.

2. Summary of activity and main findings

As a first step towards long-term future planning for the tigers in Myanmar, and to guide efforts to identify new areas for protection, a project to develop an updated National The tiger Action Plan was initiated in 1998. The primary objective of the program was to determine the tiger occurrence via direct field survey across potential the tiger habitats, and use this information to select areas for special protection for the tigers.

The tigers may serve as conservation " umbrellas". This is the concept that protecting places with the tigers effects the conservation of other wildlife and biodiversity elements with smaller ranges.

The Myanmar Forest Department and the Wildlife Conservation Society initiated the program with financial support from the" Save The tiger Fund, " a joint project of the US National Fish and Wildlife Foundation and Exxon Mobile Corporation.

A the tiger conservation and survey techniques training workshop was conducted for Forest Department and NGO junior staff at Alaungdaw Kathapa National Park, historically known for its the tigers. From the training, a team of seven participants was recruited to carry out field surveys, and conduct awareness work in communities adjacent to survey areas.

Using the results of a previous planning analysis for the tigers, and updated maps of forest cover, a set of 17 potential tiger areas were identified from large blocks of forest. Interviews of local people were done to determine likely places where the tigers existed in these forest complexes and guide the selection of survey locations.

Using a field technique first developed in India, and modified for use in Southeast Asia, a team of trained staff conducted presence-absence surveys for the tigers at each site. A field survey effort during 1999-2002 involving > 15,000 nights with camera-traps, and > 1,300 hours of sign searching across 5,500 km2 of potential the tiger habitat

revealed thefollowing results:

- The tiger occurred in less than a quarter of the potential areas;
- Based on the results of field surveys, the tigers have disappeared from five areas surveyed; Alaungdaw Kathapa, Thaungdut, Mahamyaing, Nankamu, Panlaung-Pyadalin:
- Based on the results of field surveys, the tigers have disappeared or occur at very low density in eight of the areas surveyed; Paletwa and Kaladan river catchment area, Sumprabum, Khaunglanphu, Paunglaung, Momeik-Mabain, Central Bago Yoma, Rakhine Elephant Range, Saramati Taung and adjacent areas;
- Based on reports from forestry officials, the tigers may occur at low density in two other areas that were not surveyed; Shan Yoma (Kayah-Kayin) and S. Kachin:
- Based on the results of field surveys, the tiger occur in Htamanthi Wildlife Sanctuary, Sagaing Division and surrounding areas. The population is small (<10individuals) and is threatened with extinction:
- Based on the results of field surveys, the tigers occur in a large intact forest landscape comprising Hukaung Valley and surrounding areas, in Kachin State. Moderate numbers (<50) of the tigers are thought to exist there:
- Based on the results of field surveys, the tigers occur in a large intact forest landscape in northern and southern Taninthayi Division. A relatively large (>50) population is thought to exist there. Together these areas represent the largest, intact habitats for the tigers in Mainland Southeast Asia:
- In all areas where they persist in Myanmar the tigers are threatened by poaching for commercial international trade, and poaching of prey for local consumption and local trade:

Based on information collected during the field survey program, probably no more than 150 the tigers now exist in the wild in Myanmar and the population is rapidly declining. The tiger might soon be on the verge of extinction in Myanmar if action is not taken immediately.

Recommendations for addressing conservation needs of the tigers

Although the situation is critical, the tiger populations may potentially be recovered if the Government makes an immediate and long-term plan of action.

The priority actions necessary in the short-term (2-5 years) for saving the tigers are;

- Establish protected areas, protected corridors and priority management areas in and around the Hukaung Valley, and in Taninthayi Division to protect wild the tigers and their habitat;
- Establish monitoring programs for the tiger and prey population in these places to assess the effectiveness of conservation efforts;
- Reduce killing of the tiger prey species and trade that has developed around those species. Train government staff in anti-poaching and anti-trafficking techniques and develop systems for patrolling these areas to ensure the preservation of these resources;
- Suppress all killing of the tigers and the illegal trade in the tiger products. Amend existing wildlife legislation to fall in line with international laws. Conduct wildlife conservation and awareness training for government personnel and recruit them to help identify and suppress wildlife trade;
- Define roles and responsibilities of field staff responsible for the tiger conservation;

The priority actions necessary for saving the tigers in the long-term (6-20 years) are;

- Improve public awareness and develop education curricula concerning the importance of the tiger conservation to increase support from local people;
- Stop further loss of the tiger habitat and to restore degraded habitat by practicing sustainable forest management;
- To conduct zoning of forest areas so as to avoid development and human intrusions inside the tiger critical habitats;
- Strengthen international cooperation to maintain connectivity of the tiger habitat across international boundaries possibly through the establishment of cooperative management of contiguous protected areas along borders.

TABLE 1: NATIONAL TIGER ACTION PLAN FOR MYANMAR

Action	Organisation delivering		Timeframe / to be completed by				
	Lead	Other possible relevant partners	2003	2004	2005	2006	2007
1. Suppressing of killing of tigers and the illegal trade in tiger products							
a) Amend the Protected Wildlife and Protected Areas Law to enable the enforcement of international laws within Myanmar. This would include articles prohibiting the sale or purchase of products suggesting or implying content of tiger bone, hair, organs, blood, teeth, claws or hide.	Myanmar Govt.		✓				
b) Impose heavy fines for offenders and use partial approach towards implementing international legislation.	Myanmar Govt.		✓				
c) Conduct wildlife conservation and awareness training for 100 government personnel, including military, customs, police, immigration and local administrative staff in Yangon, Mandalay, Myitkyina and other internal transit points for wildlife. This would include basic training in identifying wildlife protected by domestic and international legislation and knowing their protection status.	Myanmar Govt. relevant Ministries	WCS and other NGOs	✓				
d) Conduct wildlife conservation and awareness training for all staff in tiger sites and landscapes.	Myanmar Govt. & WCS		✓				
e) Recruit local government staff to help identify tigers in trade and encourage them to report their observations to relevant authorities.	Myanmar Govt. & Mandalay, Sagaing and Tanintharyi Division, Kachin and Shan States.	WCS and other NGOs	✓				
f) Create a Wildlife Investigations Unit to investigate and suppress crime against wildlife, including trade, trafficking, illegal killing and capture, habitat destruction, and other persecution. The unit will enforce domestic and international legislation. The unit would include staff of the Ministries of Home Affairs, Forestry and Tourism and would report directly to the Minister of Forestry.	Myanmar Govt.	WCS and other NGOs		✓			
g) Train and recruit government staff to join the Wildlife Investigations Unit. Form mobile units to suppress wildlife crime across the country.	Myanmar Govt.	WCS and other NGOs		✓			
2. Reducing killing of tiger prey species and associated trade							
a) Amend the Protected Wildlife and Protected Areas Law to enable the enforcement of international laws within Myanmar. Modify Chapter V, Article 15 to recognize the international classifications of wildlife species, and their associated protection status.	Myanmar Govt.	WCS	✓				
b) With the view to protecting tiger prey species, allow the commercial farming of only selected wildlife species only in facilities designated by the Forest Department.	Myanmar Govt.		✓				
c) Take action to stop all killing of prey species at places where tigers are currently or potentially found.		WCS and other NGOs					✓
d) Train government staff in Hukaung Valley and Htamanthi in anti-poaching and anti-trafficking techniques. Where possible involve local military personnel as instructors.	Myanmar Govt.		✓				
e) Recruit teams of EcoRangers whose sole responsibility is protection. Numbers of EcoRangers should at least 3 guards/100 km2 for effective management. Provide EcoRangers with necessary equipment and salary incentives to motivate them to combat poaching.	Myanmar Govt.	WCS		✓			
f) Develop systematic patrolling inside all protected areas using EcoRangers. Make patrolling a mandatory management activity with a monthly schedule and budget.	Myanmar Govt.			✓			

VII

Action	Organization delivering		Timeframe / to be completed by				
	Lead	Other possible relevant partners	2003	2004	2005	2006	2007
g) Update the Wildlife Law to include protection for wildlife outside protected areas, and empower government staff to enforce the legislation.	Myanmar Govt	WCS		✓			
h) Outside protected areas, study patterns of hunting and consumption of wildlife to determine its sustainability, especially for prey species.	WCS				✓		
i) In the List of Protected Animals (Ministry of Forestry, 1994) promote the following tiger prey species from Protected status to Completely Protected status: Wild buffalo (Bubalus bubalis)	Myanmar Govt.		✓				
j) In the List of Protected Animals (Ministry of Forestry, 1994), promote the following tiger prey species from Seasonally Protected status to Protected status; Hog deer (Axis porcinus) and barking deer (Muntiacus muntjak).	Myanmar Govt.		✓				
k) Wildlife conservation and awareness training for all wildlife offenders	Myanmar Govt	WCS	✓	✓			
l) Impose fines for wildlife offenders in tiger areas with proceeds towards supporting tiger conservation activities	Myanmar Govt						
3. Improving forestry management to stop further loss of tiger habitat and to restore degraded habitat							
a) The National Code of Forest Harvest Practice involves 30 year cutting cycles, and use of elephants for removal of logs reduce environmental damage over other practices. Apply this traditional method of forest harvest effectively in all concessions in the country.	Myanmar Govt.	WCS, FAO, UNDP			✓		
b) Ban the hunting of wildlife in forest harvest areas	Myanmar Govt.	WCS			✓		
c) Provide wildlife conservation awareness and education training to timber harvest staff.	WCS	Myanmar Govt.		✓			
d) Define Strict Conservation Zones for Hukaung Valley and Htamanthi where no human use of natural resources is allowed. Create buffer areas to allow restricted use by local people including extraction of non-timber forest products, fuel wood collection, and livestock grazing. Ban shifting cultivation and hunting of all kinds in the buffer area. Use EcoRanger patrol teams to enforce the restrictions.	Myanmar Govt.	WCS	✓				
4. Improving forestry management to reduce intrusions of local people into tiger habitat, and improve planning to avoid development in tiger critical areas							
a) Reclaim plantations and revoke all mining licences in Hukaung valley and Htamanthi Wildlife Sanctuaries.	Myanmar Govt.						✓
b) Consider the location of government camps and permanent settlements outside of these reserves.	Myanmar Govt.						✓
c) Ban the construction of roads in protected areas and forest reserves.	Myanmar Govt.			✓			
e) Close or limit access along logging roads in Tanintharyi Division to reduce the risk of collisions with tigers.	Myanmar Govt.				✓		
e) Include wildlife assessment in land development programs for Tanintharyi Division.	Myanmar Govt.	WCS	✓				
f) Develop education programs to improve awareness about wildlife for local people living in and around forest reserves in Tanintharyi Division.	WCS	Myanmar Govt.		✓			
5. Establishing protected areas, ecological corridors and priority management areas to protect wild tigers and their habitat							
a) Revise or create management plans for the Hukaung Valley and Htamanthi to include specific actions for conserving tigers, including recommendations in 6.2.2, 6.3.2, and 6.4.2, and below.	Myanmar Govt. & WCS		✓				

Action	Organisation delivering		Timeframe / to be completed by				
	Lead	Other possible relevant partners	2003	2004	2005	2006	2007
b) Expand Hkakaborazi Wildlife Sanctuary to increase its size to at least 3,000 sq. km to ensure long term survival of tigers	Myanmar Govt.	WCS		✓			
c) Create a dedicated tiger reserve including the Hukaung Valley and adjacent forest reserves. The reserve will serve to link tiger populations in India with those in Myanmar. Expand the eastern border of Hukaung Valley Wildlife Sanctuary to protect potential tiger habitat in the Sumprabum area.	Myanmar Govt.			✓			
d) Establish buffer, human use zones (buffers) that will confine the edges of Hukaung Valley and Hkakaborazi reserves reducing the risk of mortality for tigers.	Myanmar Govt.			✓			
e) Create new protected areas or special tiger management zones in the Tanintharyi Division, including the Lenya River, Greater and Lesser Tenintharyi River catchments. These sites will protect tigers and their habitats and allow limited human use of natural resources around the reserves in a manner complementary to tiger conservation.	Myanmar Govt.						✓
f) Use existing GIS capabilities in the FD to identify and demarcate special management zones and corridors for tigers.	Myanmar Govt. & WCS		✓				
5. Improving international cooperation and establish cooperative management of contiguous protected areas along borders to maintain connectivity of tiger habitat across international boundaries							
a) Conduct wildlife conservation and awareness training for FD government personnel, including military, customs, police, immigration and local administrative staff, stationed near or on country boundaries. This would include basic training in identifying wildlife listed in the Myanmar Protection of Wildlife and Protected Areas Law 1994, and knowing their protection status.	Myanmar Govt. & WCS		✓				
b) Hold 2 internal workshops involving local government officials to discuss transborder issues including trade, trafficking and wildlife, and develop plans to suppress the trade.	Myanmar Govt.	WCS	✓				
c) Recruit local government officials on both sides of the Thailand border to suppress transborder wildlife trade at Mawdaung-Prachuap Kiri Khan, Kaleinaung-Ban I Tong, Kawthaung-Ranong (especially Thai Hoy Island), Myawaddy-Mae Sot, Three Pagoda Pass, and Tachileik-Mae Sai, and prevent access by professional poachers from Thailand.	Myanmar Govt. Thailand Govt.	WCS		✓			
d) Create a tiger reserve in Tanintharyi Division opposite Thailand protected areas that support large populations of tigers, Western Forest Complex and Kaeng Krachan National Park.	Myanmar Govt.			✓			
e) If possible expand the reserve or create new reserves to form a corridor between these two Thai reserves.	Myanmar Govt.						✓
f) Develop a spatially explicit tiger conservation database for the Huai Kha Khaeng - Thung Yai Naresuan TCU (Level I TCU T3).	Myanmar Govt. & WCS, Thailand Govt.	WCS			✓		
g) Where possible coordinate antipoaching patrols and/or wildlife surveys on both sides of the Thailand-Myanmar border.	Myanmar Govt.				✓		
7. Monitoring the status of the tiger and prey population to assess the effectiveness of conservation effort							
For Hukaung Valley landscape:							
a. Identify critical habitats and core areas for tigers and prey across the landscape.	Myanmar Govt. WCS		✓				
b. Estimate numbers of female tigers within the landscape and ascertain that there is a reproductively viable population of tigers.	Myanmar Govt. WCS		✓				

Action	Organisation delivering		Timeframe / to be completed by				
	Lead	Other possible relevant partners	2003	2004	2005	2006	2007
c) Document the current threats, demographics, and range of human activities that must be taken into account if the proposed landscape is to be successful and sustainable in the long term	Myanmar Govt. & WCS		✓				
d) Create a GIS map and database to show current land use patterns, possible future land use trends, and tiger and prey source areas.	Myanmar Govt. & WCS		✓				
For Tanintharyi Division landscape							
e) Train local foresters how to identify tiger and prey via sign surveys, use of camera traps for wildlife survey, and methods for making observations and recording data.	WCS			✓			
f) Determine occupancy of habitats at accessible sites across the landscape, including Myaung Mya Bat and Lenya River areas, away from sites where tigers are known	Myanmar Govt. & WCS				✓		
g) Determine prey abundance using line transect sampling.	Myanmar Govt. & WCS				✓		
h) Determine tiger abundance using double sided camera trap sampling	Myanmar Govt. & WCS				✓		
For sites in Paletwa and Kolodan river catchment, Sumprabum, Khaunglanphu, Paunglaung, Momeik Mahain, Central Bago Yoma, Rakhine Elephant Range, Saramati Range area.							
i) Train local foresters how to identify tiger and prey via sign surveys	WCS		✓				
j) Determine occupancy of habitats at the sites using sign surveys.	Myanmar Govt. & WCS		✓				
k) Establish a logbook to record observations of tiger and prey, and encourage use of the logbook.	Myanmar Govt. & WCS		✓				
8. Improving public awareness of the importance of tiger conservation to increase support from local people							
a) Develop wildlife education programs to discourage hunting by local people in and near tiger reserves. Where possible recruit local people, especially ex-hunters to help implement these programs	WCS			✓			
b) Involve 50 local people in wildlife survey and research activities to make positive use of their local or indigenous knowledge.	WCS	Myanmar Govt.	✓				
c) Collaborate with authorities in charge of development projects to include wildlife conservation as a component of those projects and resolve any potential conflicts between the needs of people and wildlife.	Myanmar Govt & WCS		✓				
d) Produce a documentary about tiger conservation in Myanmar and broadcast it on National Television	WCS			✓			
e) Dub existing wildlife documentaries about Myanmar into local language and broadcast.	WCS		✓				
f) Adapt WCS education materials about tigers into Myanmar language and implement a special training program for school children at selected high schools in Yangon, and adjacent to tiger reserves.	WCS			✓			
9. Defining roles and responsibilities of personnel responsible for tiger conservation							
a) Provide special training for managers of tiger reserves in management techniques, including leadership skills, decision-making, planning, protection, use of information and technology, and personnel management.	WCS		✓				
b) Invite managers of tiger reserves to observe the day to day operations in selected tiger reserves in India and Thailand	WCS	Thailand India Govts.		✓			
c) Define roles for junior staff in Hukaung Valley and Htamanthi Wildlife Sanctuaries, and for Tanintharyi Division junior forestry staff and staff in other areas in conducting field monitoring of tigers and prey.	Myanmar Govt		✓				

PART 1

INTRODUCTION

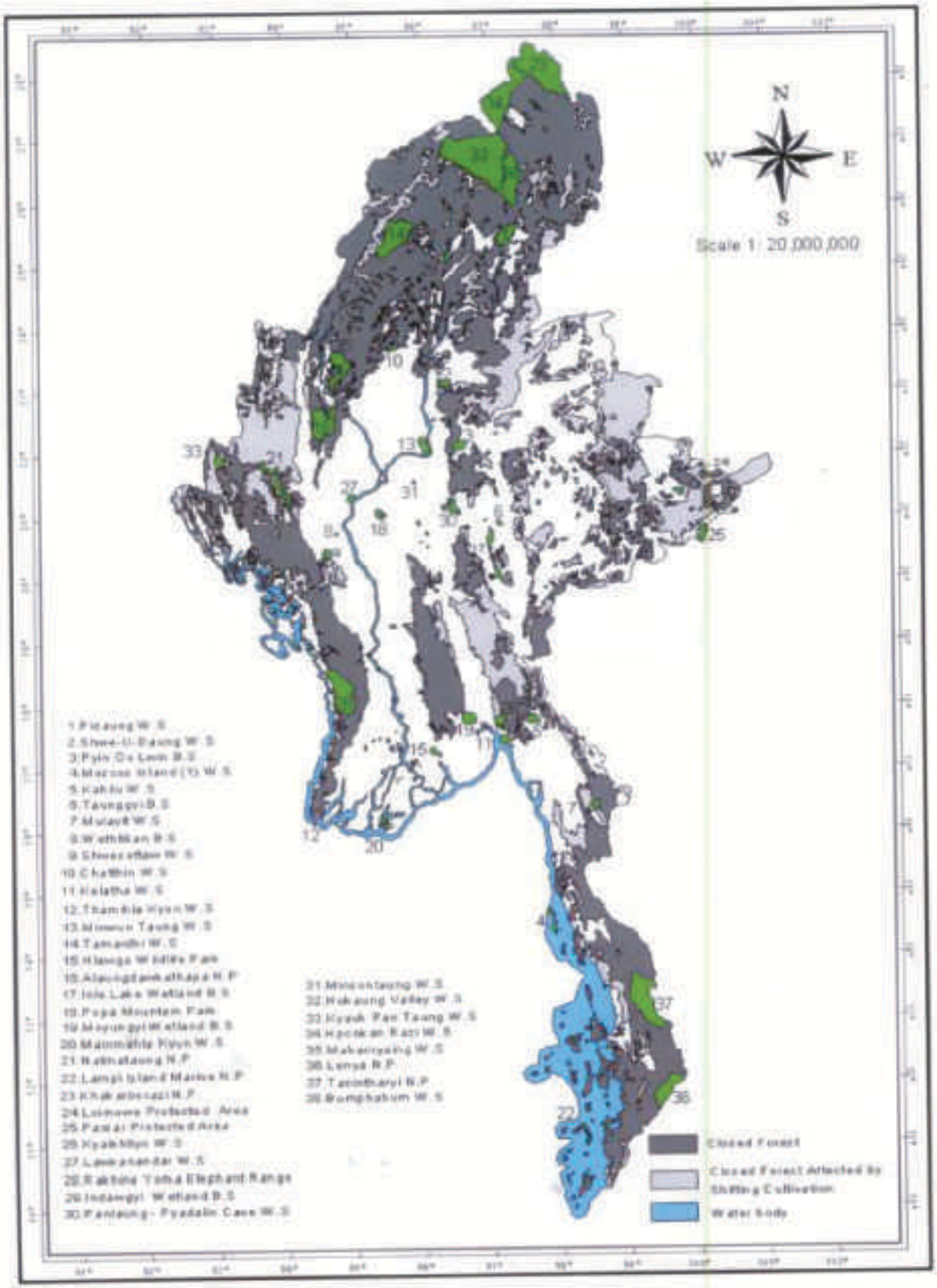
Myanmar is a high priority country for biodiversity conservation in Asia with extensive forested landscapes, high species diversity and endemism (Wikramanayake et al. 2001). This diversity ranges from rich alpine floras and tropical pine forests in the north, to dry dipterocarp and mixed deciduous forest in central dry zone, to tropical rainforests in the Peninsular. Coral reef ecosystems in the Myeik Archipelago are among the least disturbed in the region.

Unique to the region natural forests in Myanmar cover a third of the country, including large intact expanses with low human inhabitation (UNEP 1995). Prior to 1994 the country had <1% of lands in protected areas but by 2002 this had increased to just under 5% (Fig. 1), a 500% increase in size in less than a decade. While most reserves in the system are too small to support the tigers, later additions to the system include large expanses of forest and corridors between areas that are more than enough to support the tigers as well as other species with large area requirements.

Deforestation in neighbour countries brought about by unsustainable land-use practices has led to pressure on Myanmar's natural resources, especially in border areas in the far north and south which contain high biodiversity but are difficult to access and monitor. Logging, extraction of forest products, loss and fragmentation of forests and hunting have reduced wildlife populations and their habitats.

The remainder of this essential reading section includes a review of the pressing threats to the tigers in Myanmar (Part 2), a review of the history of conservation planning for the tigers (Part 3), a summary of the current status and distribution of the tigers in the country (Part 4), and a rationale for the National The tiger Action Plan (Part 5), with proposed solutions for addressing the threats, for recovering the tiger populations and guiding future conservation efforts in the country.

FIG. 1. FOREST COVER, EXISTING AND PROPOSED PROTECTED AREAS OF MYANMAR – 2002.



PART 2

THREATS TO THE TIGERS

Although the tiger is potentially found over a wide range of habitat and disturbance conditions, it is sensitive to a variety of human influences. The prospects for the tiger survival in places where they occur in Myanmar are affected by a number of key threats;

2.1 Hunting for commercial trade in the tiger products

The hunting of the tigers has a long history in Myanmar- (Pollok & Thom 1900). The tigers were traditionally considered pests and until 1931 the government provided licenses and rewards for killing them. This led to depopulation on a massive scale through sport hunting. For example, during a 4 year period from 1928- 1932,1,382 the tigers were reported killed in British Burma (Prater 1940), an order of magnitude larger number than the current the tiger population in Myanmar. The tigers were historically widespread in Myanmar (Fig. 2) although their densities were not uniform across intact habitat, possibly a result of variation in hunting pressures from place to place (Prater 1940). More recently, declining the tiger populations across the range combined with increasing prosperity of Asian countries, have led to an increasing demand for the tiger products for traditional Chinese medicines.

Various tribal groups hunted the tigers to supply the trade (Rabinowitz 1995) leading to their extirpation in some areas (Rabinowitz 1998). The sale of the tiger products was banned by CITES since 1975 but thrives in the black market, especially in some border areas where it is uncontrolled (Fig. 3a). Although it is difficult to measure the size of the trade, at least 10,000 kg of the tiger bone representing 500-1,000 the tigers was imported by East Asian countries between 1970 and 1993 (Hemley & Mills 1999). The tiger hunting continues in those areas that still contain the tiger (Fig 3b.). As the population declines every the tiger killed makes the harvest an increasingly unsustainable one. To demonstrate the efficiency of the trade, Myanmar shopkeepers on the Thai border claim they can provide a tiger within 3 days for a deposit of only 500 Baht. Direct hunting of the tigers threatens to drive the Myanmar population to extinction. Improved domestic legislation combined with monitoring of markets and law enforcement can contribute to reducing the trade in the tiger parts.

2.2 Prey depletion

Because it is dependent on a relatively large intake of food to support its metabolism, the tigers are sensitive to loss of prey through hunting (Karanth & Stith 1999). The erosion of available energy has a "bottom-up" effect on ecosystem structure (Seidensticker 2002). Myanmar's per capita income in 1998 was US$1,200, making it one of the poorest countries in the world. People living in and around forested areas traditionally hunted wildlife for subsistence. More recently local people hunt to supplement increasingly meager incomes from farming. This trend is widespread (Rabinowitz 1995) occurring in up to 70% of protected areas (Rao et al. 2002). Trade in the tiger prey species occurred near all the places where the National tiger Team conducted field surveys during 1999-2002. The illegal trade in wildlife is globally worth $7 billion a year, only less than the trade in arms and drugs (Kanwatanakid et al. 2000). Myanmar is a part of the trade in Asia with a network of markets and routes established to supply the demand in China and Thailand. Markets for the sale of wild, meat and trophies, of the tigers and prey species have existed along the Thai border at Tachileik, Myawady, Three Pagodas Pass and Maung Daung for a long time and continue to offer wildlife prohibited by CITES (Bradley-Martin & Redford 2000; Hill 1994; International 1999; Bennett and Rao 2002).

The volumes of wildlife in the trade fluctuate according to the security situation, and decreased following the cancellation of Thai logging concessions after 1993, and escalation of hostilities between KNU and the Myanmar government after 1996 (International 1999). There is some evidence to suggest that some of the Thai border wildlife trade may have moved to Yangon. As an example, several restaurants and shops in central Yangon offers a range of wild meat dishes, and tonics made from animal parts (A.J. Lynam personal observation). In contrast, wildlife trade is rampant and uncontrolled in Shan State, especially towns near the China border (Than 1998) (see Essay Box I; Fig. 4.). Prey and the tiger populations may be restored in the wild if they can be protected from hunting and wildlife trade (Madhusudan & Karanth 2002).

Fig. 2 Historical Records (Pre - 1999) of Tiger Occurence in Myanmar.

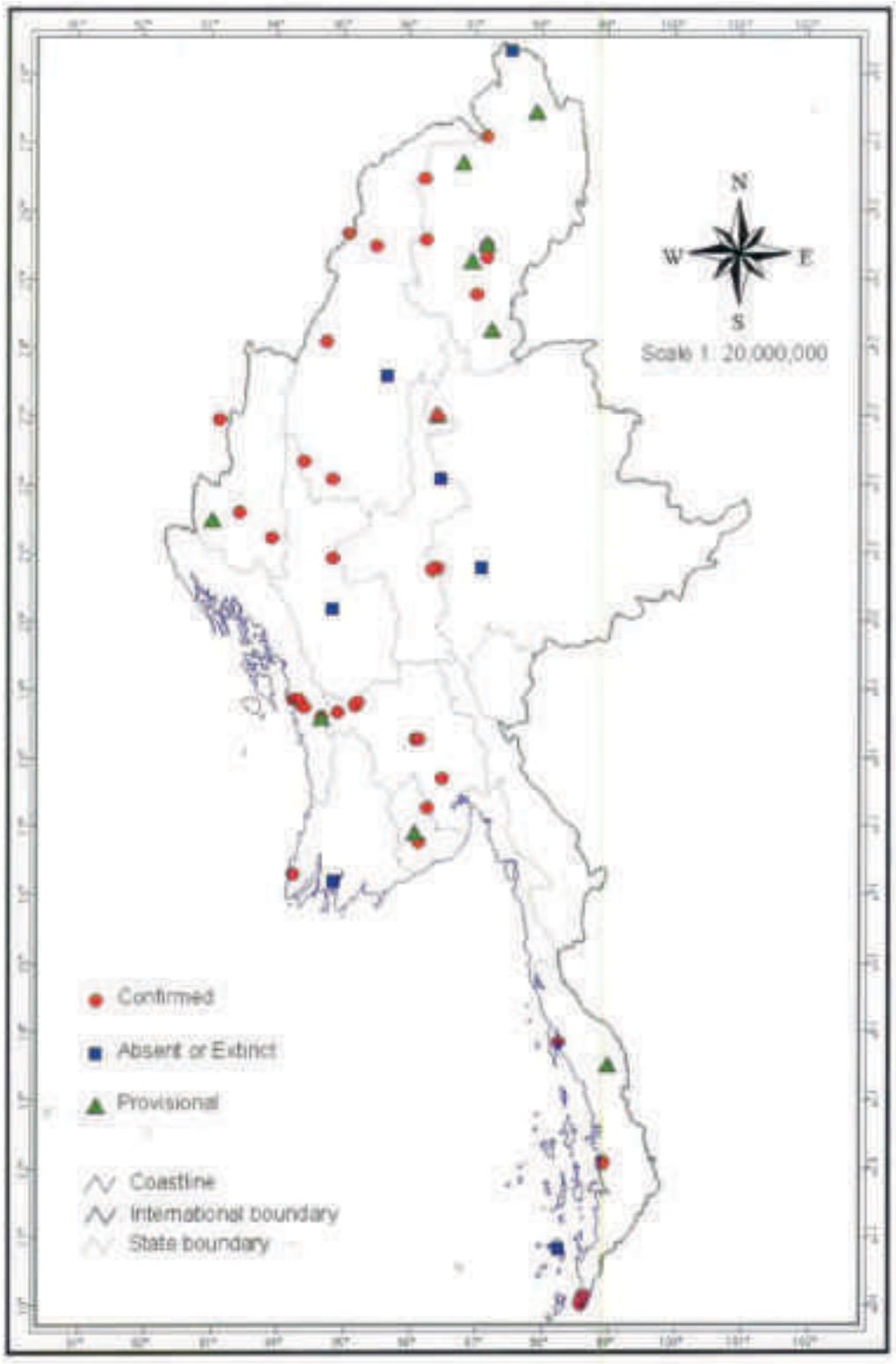


Fig. 3a. Tiger skin for sale in Tachileik market, Shan State.

Fig. 3B. Poacher recorded by camera-trap at Paunglaung Catchment, Mandalay Division. Poaching of tigers was the single most important factor causing the demise of tigers in Myanmar in the past.

2.3 Habitat loss, degradation and fragmentation -

Myanmar had an estimated 46.6% closed forest cover in 1990, with 37.4% remaining in 1997 (FAO 2000), one of the highest levels in the Asia - Pacific region. The net deforestation rate between 1989 and 2000 was 0.21% (Brunner et al. 2002), a fraction of the deforestation rate in Thailand during the same period. Deforestation is highly concentrated and is largely a result of logging in forest reserves (Rao et al. 2002)(Fig. 5). While forests are easily cut down they are only restored with great investments of time and resources (Elliott et al. 2000), usually beyond the capacity of forestry budgets. Except in parts of Shan State, where remaining forest resembles the highly fragmented situation in Thailand, large extensive tracts of closed forest characterize the Myanmar landscape providing good potential the tiger habitat (Fig. 1). Disturbance that degrades or destroys natural forests, including grazing by domestic animals, shifting and permanent cultivation, mining, permanent human settlements, and plantations occur in 90% of protected areas (Rao et al. 2002). These threats could be reduced by improved agricultural and animal husbandry practices, and improved land-use planning.

2.4 Harassment and displacement -

Rural development has progressed slowly in Myanmar so that dams, roads, pipelines, power lines, and settlements -infrastructure that disrupt wildlife populations by creating barriers to dispersal (Goosem 1997) -have had localized effects on the tiger populations. For example, roads occur in only 25% of Myanmar protected-areas (Rao et al. 2002) (Fig. 6) and most are non-paved and seasonal access only. However, roads whatever their condition provides improved access to forests for poachers. Because the tigers often use non-paved roads as movement corridors, this potentially increases the chances of encounter with humans. Aside from human infrastructure, the disturbance caused by local people entering forests to engage in the extraction of non-timber forest products (Fig. 7.) can have adverse affects on the tiger behaviour. Such disturbances occur in 85% of protected areas (Rao et al. 2002), and

Fig. 4. Wildlife for sale at Mongla market, Shan State.

Fig. 5. Logging reduces available habitat, and alters habitat quality for tigers and their prey.

Fig. 7. The extraction of rattan and other non-timber forest products is often done on a massive scale and affect habitat quality

probably reflect the incidence in non-protected forests, so the effect may be considerable. Improved land use planning and zoning in forest reserves can reduce the threat from internal fragmentation.

2.5 Genetic erosion -

A number of studies have shown that small populations are more likely to go extinct than large ones. One of the reasons is that at small size, survival rate or reproductive rate of a population is reduced because its members have difficulty finding mates, sex ratios are skewed, and they tend to breed with related individuals (Allee 1931). This results in a net loss of genetic variation, sometimes expressed by an increase in expression of deleterious mutations through homozygosity. Fitness is often reduced in the process. Despite this, many populations have persisted for long-periods of time with low levels of genetic variation e.g. cheetahs (Caro 2000). It is likely that genetic and demographic processes interact so that as populations decline it is increasingly harder to recover them (Gilpin & Soule 1986). The tigers in severely fragmented habitats in Myanmar would fall into this category. Maintaining natural corridors between forest patches inhabited by the tigers can reduce this threat.

2.6 Protected area management -

Myanmar is one of the least externally funded and internally protected tropical countries in Asia (Balmford & Long 1995) .As a result while

Fig. 6. Road construction opens up the forest facilitating access to poachers.

Fig. 8. Maynmar foresters undertaking basic wildlife tracing with the author, Alaungdaw Kathapa National Park, December 1998.

forests have been conserved for timber production for almost 150 years (Bryant 1997), and the earliest protected area was gazetted in 1918, legislation to protect both wildlife and their habitats was only introduced in 1994. Wildlife training for protected area staff was initiated in 1995 with only a third of staff having received training (Rao et al. 2002) (Fig. 8). Only since 1998 have protected areas been designed to protect entire landscapes and the ecological processes within. Consequently, many of the older protected areas e.g. Pidaung Wildlife Sanctuary, no longer support the tigers and other wildlife because of large-scale degradation and loss of habitat inside them. A recent review found that human activities incompatible with conservation occur in every protected area (Rao et al. 2002). Extraction of non-timber forest products occurred in 85% of the areas, hunting in up to 70%, while buffer zones for the protection of core forest zones were generally lacking. The combined effect is a loss of habitat quality for the tigers. Myanmar protected areas (Fig. 1.) currently do not provide adequate representation of the diversity of habitats inhabited by the tigers. Reserve managers need training to understand threats to wildlife, and how to best manage available resources to enable effective conservation of wildlife. In general, the roles and responsibilities of protected area staff need to be carefully defined so that available personnel cover important tasks.

2.7 Social perception -

Where the tiger populations have been decimated, their long-term recovery can be ensured only by a combination of political will and acceptance by people living in and around the tiger areas. If the tigers are worth more dead than alive to local people, then efforts to preserve the tigers in the human dominated landscape will fail. Awareness and education of the importance of the tigers can be improved through dedicated learning programs.

PART 3

BRIEF HISTORY OF CONSERVATION PLANNING, FOR THE TIGERS IN MYANMAR

Previous attempts to estimate the Myanmar the tiger population were based on habitat models. Using information on existing forest cover (Collins 1991), and assuming the tiger densities of 0.6-1.0 individuals/100 km2 from other places (Rabinowitz 1993a), a conservation plan estimated 600- 1,000 the tigers for Myanmar across 12 priority areas and other fragmented populations (Myanmar Forest Department 1996). A previous the tiger action plan recommended surveys to estimate population sizes in the priority areas, creation of the tiger reserves, strengthening of institutional capabilities to protect the tigers, a national policy and long-term action plan, increasing public awareness and cooperation with other the tiger range countries.

Uga and Than (1998) revising this plan considered the original population estimates as overestimates and suggested the true numbers might be in the range 250-500. They considered the tigers probably occurred in potential areas defined by The tiger Conservation nits (TCU's) (*sensu* Dinerstein et al. 1997). They defined a set of priority actions for the tigers including training of government staff, mapping of habitats, field assessments to identify critical the tiger populations inside and outside of protected areas, and actions to preserve these populations, including the tiger reserves and protection of corridors, and the formation of mobile education units to provide awareness. This set the stage for the development of a new updated The National Tiger Action Plan that was proposed to the Myanmar Government in June 1998 (WCS 1998).

A number of important actions were taken as part of the new project;

1. A special the tiger survey and conservation-training course was provided to 23 protected area and forestry staff at Alaungdaw Kathapa National Park, during December 1998.
2. A 7-member National Tiger Survey Team was selected from the training participants to be responsible for spearheading research and conducting the tiger surveys within Myanmar.
3. Priority areas for the tiger surveys were located and mapped.
4. Surveys to determine the tiger presence-absence and prey relative abundance were done in high priority areas, and threats to the tigers documented for these areas.
5. A tiger information database was created from current and historical data for use with designing the tiger conservation activities and decision-making.
6. Official meetings were held with Myanmar government officials, to present information on the tiger status in order to draft and produce a The National Tiger Action Plan for the Union of Myanmar.

PART 4

STATUS AND DISTRIBUTION OF THE TIGERS IN MYANMAR -2002

Direct field surveys for the tigers were done at 17 sites (Fig. 9; see also Appendix I for site descriptions). Although the survey efforts covered only 1.3% of areas with forest cover, these sites were places where the tigers were known historically, and where the most recent available evidence, including reports from foresters and local people, suggested the tigers might still be found. The surveys provided new and unique records of occurrence for 19 globally threatened species, 16 CITES listed species and 45 Myanmar protected species (Appendix II).

4.1 The tiger status and distribution -

The tigers were reported present at 88% of sites, but confirmed by direct survey in just 23% of sites (Table 2) .The rate at which the tigers were " caught " (detected) by camera-traps was just over 3,000 trap nights of sampling per photo-record. For example, if 30 camera-traps were placed in the field each for l00 days, one might expect on average 1 photorecord of the tiger from the survey effort. In comparison, using a similar survey design in Thailand (Lynam et al. 2001), the tigers were reported at all seven potential the tiger sites, and detected at 86% of the sites, for a capture rate of just over 200 trap-nights per photo-record. For example, of 20 camera-traps were placed for 10 nights, one might expect to get a single photo-record of the tiger. The survey effort required to find a tiger at the Myanmar sites was an order of magnitude higher than at the Thailand sites.

*All Thailand sites were in long-established protected areas

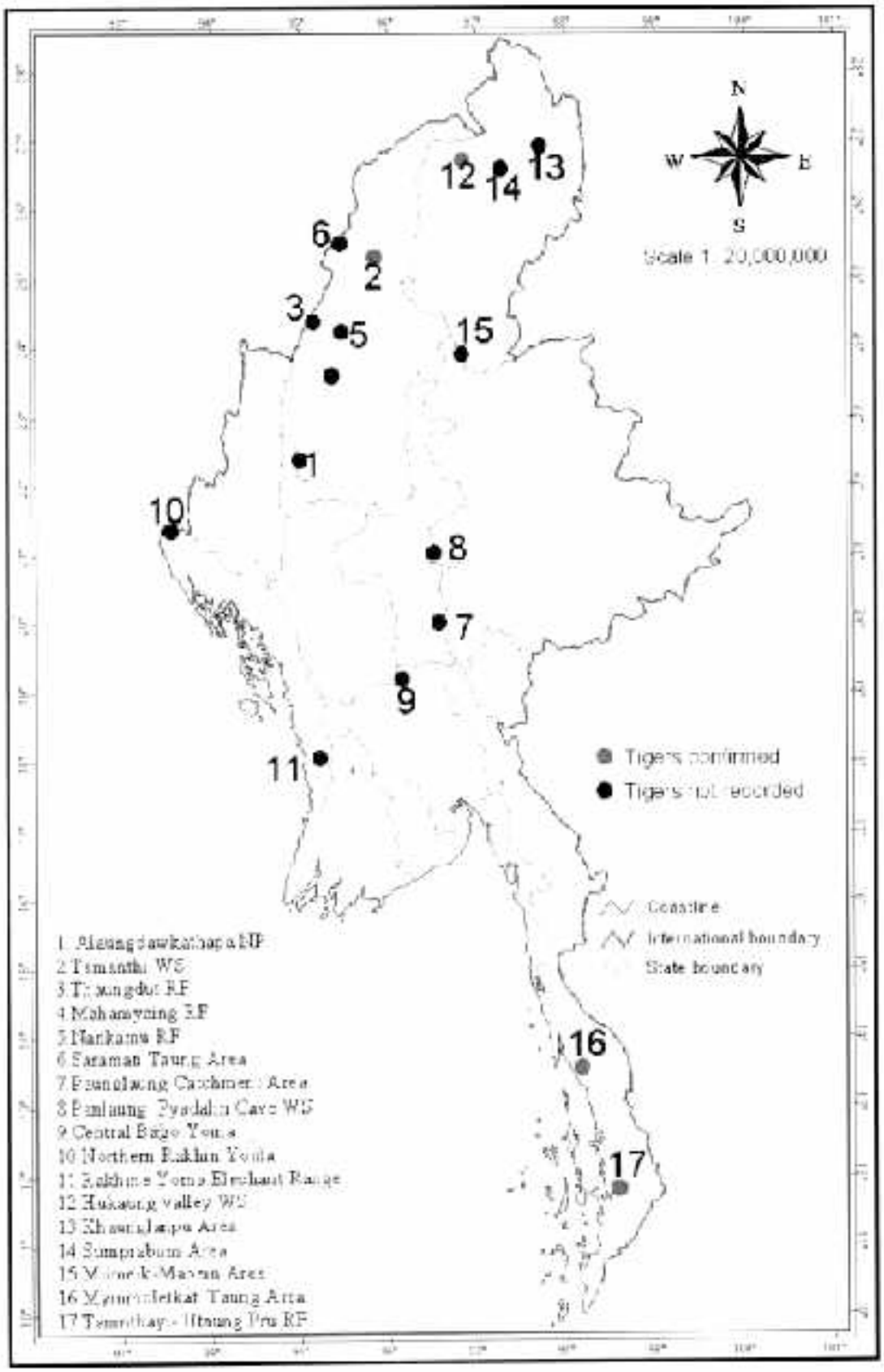
Several features of the data warrant further explanation. Firstly, the tigers were detected at a low proportion of sites where the tigers where they were reported. Some local people living in and near forest areas apparently perceive other animals in the forest as the tigers. For example in Alaungdaw Kathapa National Park, rangers mistook tracks of Golden cat and Asiatic leopard for the tiger, and because these two species were abundant near park headquarters, the rangers reported the tiger as common (Lynam et al. 1999) .As a result, a conservation agency mounted a campaign to"Save the tigers of Alaungdaw Kathapa ", when direct survey efforts across 25% of the park found no the tigers. A wider monitoring of habitats found no further evidence of the tigers suggesting that they are now extirpated from the Park. Clearly, some rangers and local people cannot resolve the tiger track and sign from other cat species, and need further training to be able to do so with some degree of confidence. Almost a third of the reports of the tigers were of direct sightings made after 1990 (Appendix III). The two extreme explanations are that all local people made mistakes in identifying the tigers e.g. they saw something else but reported the tiger, or that all local people actually saw the tigers when they reported seeing the tigers. The truth probably lies somewhere between the extremes. It is possible, at least for more disturbed sites, that the tigers are no longer resident but populations instead consist of transient individuals that hold no territory or defined home range (G. Schaller pers. comm., 2002). These transient individuals might cover relatively large areas in search of food and mates, returning to a place only after a lengthy period of time. This would explain their absence during the surveys but infrequent recent reports from locals.

Differences in survey technique or skill levels are unlikely to explain the differences between the tiger occurrence at Myanmar and Thailand sites. Training for field staff was standardized and given by the same trainer (A.J. Lynam). Sign surveys were conducted with the same degree of rigor and camera-trap

Table 2.Comparison of the tiger survey results in Myanmar and Thailand.

Results of survey	Myanmar (17 sites)	Thailand (7 sites)*
1. Reports of tigers (Sites)	88%	All
2. Tiger confirmed	23%	86%
3. Capture rate – tigers (Days per capture)	3,112	217
4. Capture rate – large mammals (“)	5	5
5. Species richness (large mammals)	16.4 ±1.3	15.2 ± 1.8
6. Human traffic (Walk pasts per 100 days)	2.3	3.4

Fig. 9. Survey For Tigers in Myanmar, 1999-2002.



locations chosen in the same ways by teams in the different countries. If the tigers were present they should have turned up in the surveys in Myanmar. However, if the tigers are absent or not continuously present at a site, then their probability of detection by any survey method would be less than one. Where the tigers occur at very low density e.g. <0.38the tigers/ l00 sq. km, a mammoth survey effort is required with camera-traps to detect the tigers (Carbone et al. 2001). That the tigers were found in only three of 17 areas surveyed, whereas other large mammals were detected at frequencies similar to the Thai reserves, suggests that the observations are real. The tigers were either absent or non-resident, or occurred at very low density at most of Myanmar survey sites, at the time of survey. Since the sites chosen were the best potential sites given all the information available prior to the surveys, the suggestion is that the tiger in Myanmar has suffered a range collapse and is in an advanced state of decline towards extinction.

Important to note is that the Thailand sites were all established protected areas with a history of protection. Only two Myanmar sites were protected areas, and the tigers were found in one of the areas. Protection at Thai sites, combined with a lower intensity of directed poaching for the tigers there explains why the tigers have persisted there better than at Myanmar sites. Despite the differences in occupancy patterns for the tigers, sites in both countries had similar richness and abundance of large mammals, suggesting similar availability of prey for the tigers. Therefore, Myanmar the sites have good potential for the recovery of the tiger populations.

4.2 The tiger population size -

It is impossible to know the true number of the tigers remaining in Myanmar and difficult to estimate numbers. Because of their rarity and cryptic behaviour, the tigers cannot be directly counted, and sampling is required to estimate numbers. However, it is impossible to sample every square mile of every potential habitat using camera-traps. Despite these limitations, The tiger Team attempted to estimate very roughly how many the tigers might be present across the suite of available habitats. They did this not by considering the extent of available habitat, assuming a density and a correction factor, and extrapolating the tigers numbers (Rabinowitz 1993; Uga and Than, 1998). Instead they used a subjective approach, by sitting down at a table. poring over maps, and field notebooks, considering information from sign surveys and locations of camera-trap captures, and the most reliable interview data, and arriving at a consensus among themselves. Given their expert knowledge - they know more about the recent natural history of the study sites than any other workers - they estimated the numbers in Table 3.These numbers are one estimate of the remaining the tiger population Myanmar. In the absence of independent verification, the numbers are educated "guesstimates". However, it is possible to independently estimate the tiger numbers for the Hukaung Valley using a modification of the approach of Rabinowitz (1993), and the estimate of the tiger density (0.91 "- 1.29 the tigers/l00 sq. km; see section 6.8.7). If one assumes a 50% reduction in the tiger density because of direct poaching of the tigers within the reserve (the most serious threat to the tigers in Myanmar), and an additional 20% reduction due to hunting, forest fires, smaller settlements and human access provided by the Ledo Road, the number of the tigers in the reserve (6,460 sq. km) is 18- 25. This estimate is strikingly similar to that derived by the consensus approach (15- 20; Table 3). While the estimates may have some validity, carefully designed mark -recapture studies will however be needed to determine the size of the tiger subpopulations in the areas in Table 3.

Table 3. Status of the tigers in Myanmar*

Tiger status	Sites (estimated numbers)
1. Tigers confirmed	1. Tigers confirmed Htamanthi (5); Hukaung Valley (15-20) and adjacent areas (15-20); Htaung Pru (5), Pe Chaung (5), other areas of N. and S. Taninthayi Division (55)
2. Tiger not recorded but possibly present in low numbers	Paletwa and Kaladan river catchment area (3-5), possibly present in 19W numbers Sumprabum (3-5), Khaunglanphu (1-2), .Paunglaung (2-4), Momeik-Mabain (2-3), Central Bago Yoma (2-3), Rakhine Elephant Range (1-2), Saramati Taung area (5-7), Shan Yoma (Kayah- Kayin)**(5-7), S. Kachin** (3-5)
3. Tigers not recorded and assumed absent	Alaungdaw Kathapa, Thaungdut, Mahamyaing, assumed absent' Nankamu, Panlaung-Pyadalin

* Numbers are estimates based on consensus approach of Myanmar The tiger Team surveyors.

* * Indicates areas that were not surveyed. Evidence for the tigers comes from unconfirmed reports from local people and foresters

PART 5

RATIONALE FOR A NATIONAL THE TIGER ACTION PLAN FOR MYANMAR

Potentially the tigers are recoverable to their former abundance across their range in Myanmar. In practice however, full recovery is unlikely. This section describes a Plan for recovering the tigers to a semblance of their former abundance in key parts of their range where they still exist, and restoring areas where the tigers have been lost so that natural recolonization might in future occur in those places. Broadly, the Plan will work towards increasing the tigers, prey and habitat, which are "measurable currencies" for the tiger conservation (Ginsberg 2001).

The Plan will be implemented over a 5-year period between 2003-2007. This will allow a number of targets to be achieved over spatial scales relevant to the tiger conservation (Ginsberg 2001);

- Site (an area containing at least several breeding female the tigers) e.g. Htamanthi Wildlife Sanctuary is a tiger site.
- Landscape (a larger area containing several populations of females and habitat connections between the populations) e.g. the Hukaung Valley, and forest reserves in Taninthayi Division are the tiger landscapes.
- The tiger Conservation Units (TCU's) (areas encompassing several landscapes) e.g. the Northern Triangle TCU (60) which contains Hukaung Valley, Huai Kha Khaeng'- Thung Yai Naresuan TCU (73) which includes Taninthayi Division.

The targets for the tiger conservation will vary according to timeframes and spatial scales but fit into the general framework given in Table 4. By the end of the implementation period, the short-term targets should be realized. An annual review of progress is suggested with a comprehensive review of progress towards achieving the short-term goals at the end of 2007. Success at reaching the short -term targets will set the stage for meeting the longer- term (10- 20 years) targets. Important to recognize is the fact that efforts to save the tigers in Myanmar are part of a larger global effort to save the species. The recovery of the tigers in Myanmar will contribute towards the larger goal of species recovery across the range.

The Plan addresses the key threats to achieving these goals for the tigers in Myanmar, described in section 3 (above); (a) Hunting for commercial trade in the tiger products, (b) Prey depletion, (c) Habitat loss, degradation and fragmentation, (d) Harassment and displacement, (e) Illegal trade in the tiger products, (f) Genetic erosion, (g) Protected Area management, (h) Social perception.

Specifically, implementation of the Plan will reduce the key threats by,

1. Suppressing all killing of the tigers, and the illegal trade in the tiger products.
2. Reducing killmg of the tiger prey species, suppress associated illegal trade.
3. Improving forestry management to stop further loss of the tiger habitat and to restore degraded habitat.
4. Improving forestry management to reduce intrusions of local people into the tiger habitat, and improve planning to avoid development in the tiger critical areas.
5. Establishing protected areas, ecological corridors and priority management areas to protect wild the tigers and their habitat.
6. Improving international cooperation and establish cooperative management of contiguous protected areas along borders to maintain connectivity of the tiger habitat across international boundaries.
7. Monitoring the status of the tiger and prey population to assess the effectiveness of conservation efforts.
8. Improving public awareness of the importance of the tiger conservation to increase support from local people
9. Defining roles and responsibilities of personnel responsible for the tiger conservation.

Specific issues and action items for achieving the targets of the tiger conservation in Myanmar are detailed as follows. For ease of reference the action items are also listed in Table 1 along with a proposed timetable for their implementation, and responsible agencies.

Table 4. Targets for the tiger conservation with various time and spatial scales (adapted from Ginsberg. 2001)

	Targets	
	Short Term (2 – 5 years)	Long Term (10 – 20 years)
SITE (An ear containing several breeding females) e.g. Htamanthi Wildlife Sanctuary, forest reserves in Taninthayi Division	• Maintain occupancy of tiger habitat • Define critical areas within sites • Stabilize present tiger populations • Prevent loss of tigers	• Maintain potentially breeding populations of tigers at maximum density • Maintain expanding population (at r>1) • Strictly protect core areas
LANDSCAPE (A larger area containing several populations of breeding females)e.g. Hukaung Valley, Taninthayi Division	• Maintain potential for dispersal between sites	• Maintain ecologically functioning viable tiger populations • No human intervention required to achieve stable/growing populations • Recolonization of empty habitat
TIGER CONSERVATION UNIT (An area containing several landscapes) e.g. the Northern Triangle TCU(60), Huai Kha Khaeng – Thung Yai Naresuan TCU(73)	• Maintain integrity of intact habitat • Maintain sufficient prey base • Maintain multiple landscapes including transboundary landscapes in each TCU • Coordinate establishing protected areas across boundaries • Promote tiger friendly conservation in each country in TCU	• Re-establish connections between sites and landscapes to ensure genetic exchange • Maintain heterogeneity of ecoregion

5.1 Suppressing all killing of the tigers and the illegal trade in the tiger products

5.1.1 Key issues

a) The trade in the tiger products is part of the illegal trade in wildlife worth an estimated US$7 billion annually (Bennett and Rao 2002).

b) Myanmar is one of the countries supplying the tiger trade and has a well-developed network involving poachers, middlemen and trafficking routes to move the tiger products from forest to market (Bennett and Rao 2002).

c) The hunting of the tigers to supply the trade has been the ultimate cause of extirpation of wild the tigers from multiple forest and nature reserves e.g. Alaungdaw Kathapa, and entire regions e.g. northern Myanmar (Rabinowitz 1998).

d) Knocking off the top predator can have destabilizing effects at lower trophic levels in tropical ecosystems (Seidensticker 2002).

e) The tiger populations that exist today are being decimated by hunting and face certain extirpation in the short-term if action is not taken (Kenney et al. 1995; Seidensticker et al. 1999).

5.1.2 Key actions

a) Amend the Protected Wildlife and Protected Areas Law (SLORC, 1994) to enable the enforcement of international laws within

Myanmar. This would include laws prohibiting the sale or purchase of products suggesting or implying content of the tiger bone, hair, organs, blood, teeth, claws or hide. Completion date: December, 2003

b) Impose heavy fines for offenders and use partial proceeds towards implementing international legislation. Completion date: December, 2003

c) Conduct wildlife conservation and awareness training for l00 government personnel, including military, customs, police, immigration and local administrative staff in Yangon, Mandalay, Myitkyina and other internal transit points for wildlife. This would include basic training in identifying wildlife protected by domestic and international legislation, and knowing their protection status. Completion date: December, 2003

d) Conduct wildlife conservation and awareness training for all protected area staff. Completion date: December, 2003

e) Recruit local government staff to help identify the tigers in trade and encourage them to report their observations to relevant authorities. Completion date: December, 2003

f) Create a Wildlife Investigations Unit to investigate and suppress crime against wildlife, including trade, trafficking, illegal killing and capture, habitat destruction, and other ersecution. The unit will enforce domestic and international legislation. The unit would include staff of the Ministries of Home Affairs, Forestry and Tourism and would report directly to the Minister of Forestry. Completion date: June, 2004

g) Train and recruit government staff to join the Wildlife Investigations Unit. Form mobile units to suppress wildlife crime across the country. Completion date: June, 2004

5.2 Reducing killing of the tiger prey species and associated trade.

5.2.1 Key issues

a) " The tigers cannot survive where they lack access to ungulate prey that is at least about half their own body mass because of mass-specific energy needs." (Seidensticker 2002)

b) Because tropical forests support ungulates at relatively low densities, the killing of prey has been the proximate cause of the decline in the tiger populations in Mainland Asia (Karanth and Sttith 1999).

c) Few if any ethnic communities rely on large mammals as a subsistence source of protein but trade in wild meat, horns, fur, hides and other products is part of a massive illegal trade in Myanmar, and is well developed in border areas where enforcement is difficult (Rabinowitz 1998; Martin and Redford 2000).

d) The commercial farming of wildlife provides a potential legal mechanism for the poaching of wild individuals to supply the trade and may contribute to the extirpation of some species.

e) Evidence suggesting that hunting can be sustainably managed exists for only a few tropical wildlife species but evidence that wildlife harvest is unsustainable exists for a vast number of species (Robinson and Redford 1994; Robinson, and Bennett 1999).

f) Protected areas are currently understaffed and ill equipped to prevent the loss of wildlife to poachers (Bennett and Rao 2002).

g) The presence of forest guards in sufficient numbers can mitigate against hunting of wildlife (Bruner et al. 2001).

h) Outside of protected areas, laws governing wildlife are difficult to enforce because staffing is low and capacity is low.

5.2.2 Key actions (in addition to those described above for the tigers but are generally relevant)

a) Amend the Protected Wildlife and Protected Areas Law (SLORC 1994) to enable the enforcement of international laws within Myanmar. Modify Chapter V, Article 15 to recognize the international classifications of wildlife species, and their associated protection status. Completion date: June 2003.

b) With the view to protecting the tiger prey species, allow the commercial farming of only selected wildlife species only in facilities designated by the Forest Department. Completion date: June 2003.

c) Allow the hunting of wildlife species only when scientific evidence proves it can be done sustainably. Completion date: June 2003.

d) Take action to stop all killing of prey species at places where the tigers are currently or potentially found. Completion date: December 2007.

e) Train all government staff at Hukaung Valley and Htamanthi, in anti-poaching and anti-trafficking techniques. Where possible involve local military personnel as instructors. Completion date: December 2003

f) Recruit teams of EcoRangers whose sole responsibility is protection. Numbers of EcoRangers should at least be 3 guards /100 sq.km for effective management. Provide EcoRangers with necessary equipment, and salary incentives to motivatethem to combat poaching. Completion date: June 2004.

g) Develop systematic patrolling inside all protected areas using EcoRangers. Make patrolling a mandatory management activity with a monthly schedule and budget. Completion date: December 2004.

h) Update the Wildlife Law to include protection for wildlife outside protected areas, and empower government staff to enforce legislation. Completion date: December 2004.

i) Outside protected areas, study patterns of hunting and consumption of wildlife to determine its sustainability, especially for prey species. Completion date: December 2005.

j) In the List of Protected Animals (Ministry of Forestry, 1994), promote the following the tiger prey specie from Protected status to Completely Protected status; Wild water buffalo (Bubalus bubalis). Completion date: June 2003.

k) In the List of Protected Animals (Ministry of Forestry, 1994), promote the following the tiger prey species from Seasonally Protected status to Protected status; Hog deer (*Axis porcinus*) and Common barking deer (*Muntiacus muntjak*). Completion date: June 2003.

l) Wildlife conservation and awareness training for all wildlife offenders. Completion date: June 2003.

m) Impose fines for wildlife offenders in the tiger areas with proceeds towards supporting the tiger conservation activities. Completion date: June 2004.

5.3 Improving forestry management to stop further loss of the tiger habitat and to restore degraded habitat

5.3.1 Key issues.

a) Extraction of non-timber forest products, fuel wood collection, shifting cultivation and livestock grazing disturbs the tigers, damage the tiger habitat, and depletes prey resources (Rao et al. 2002).

b) Clear cutting of plantations, and cutting of other economically valuable hardwoods may seriously compromise the tiger habitats (Rao et al. 2002).

c) There exist no economic incentives for conducting environmentally sound forest use practices.

5.3.2 Key actions

a) The National Code of Forest Harvest Practice involves 30-year cutting cycles, and use of elephants for removal of logs reduces environmental damage over other practices. Apply this traditional method of forest harvest effectively in all concessions in the country. Completion date: December 2005.

b) Ban the hunting of wildlife in forest harvest areas. Completion date: June 2004.

c) Provide wildlife conservation awareness education training to timber harvest staff. Completion date: December 2004.

d) Define Strict Conservation Zones for Hukaung Valley and Htamanthi where no human use of natural resources is allowed. Create buffer areas to allow restricted use by local people including extraction of non-timber forest products, fuel wood collection, and livestock grazing. Ban shifting cultivation and hunting of all kinds in the buffer area. Use EcoRanger patrol teams to enforce the restrictions. Completion date: December 2003.

5.4.1 Key issues

a) Plantations and mines open up forest areas (Rao et al. 2002), encourage markets that wipe out the tiger prey, and allow the tigers to be hunted more easily.

b) Permanent camps and settlements seriously compromise the tiger habitat (Rao et al. 2002)

c) Road construction internally fragments and damages the tiger habitat, facilitates intrusions by poachers, and opens up remote areas to wildlife trade (Bennett and Rao 2002; Rao et al. 2002).

5.4.2 Key actions

a) Reclaim plantations and revoke all mining licences in Hukaung Valley and Htamanthi Wildlife Sanctuaries. Completion date: December 2007.

b) Consider the location of government camps and permanent settlements outside of these reserves. Completion date: December 2007.

c) Ban construction of roads in protected areas and forest reserves. Completion date: December 2004.

d) Close or limit access along logging roads in Taninthayi Division to reduce the risk of collisions with the tigers. Completion date: December 2005.

e) Include wildlife assessment in land development programs for Taninthayi Division. Completion date: December 2003.

e) Develop education programs to improve awareness about wildlife for local peopleliving in and around forest reserves in Taninthayi Division. Completion date: December 2004.

5.5 Establishing protected areas, ecological corridors and priority management areas to protect wild the tigers and their habitat

5.5.1 Key issues.

a) The minimum area required to support a genetically viable population of large predators would be the area that supports 300 breeding females (Barbault & Sastrapradja 1995).
b) If female 'the tigers in Myanmar have home ranges the size of Nepali the tigers (10- 50 sq. km; (Smith 1987), the area required would be 3,000-15,000 sq. km.
c) Landscapes of this size exist in Myanmar but most are not yet protected for wildlife. The largest intact forest expanses in Myanmar are in Kachin State, Sagaing and Taninthayi Divisions.
d) The tigers may use forest reserves as movement corridors between the Hukaung Valley and Sumprabum, and poslibly as far east as Kaunglamphu; within Taninthayi Division, and across the Thai-Myanmar border, and; between northeastern Sagaing Division and western Kachin State.
e) There is a lack of landscape level planning and analysis for wildlife conservation in Myanmar (Rao et al. 2002).
f) Management plans for sites containing the tigers do not specifically define actions necessary to conserve the tigers.

5.5.2 Key actions

a) Revise or create management plans for the Hukaung Valley and Htamanthi to include specific actions for conserving the tigers, including recommendations in 5.2.2, 5.3.2, and 5.4.2, and below. Completion date: December 2003.
b) Expand Htamanthi Wildlife Sanctuary to increase its size to at least 3,000 sq. km to ensure long-term survival of the tigers. Completion date: December 2004.
c) Create a dedicated the tiger reserve including the Hukaung Valley and adjacent forest reserves. The reserve will serve to link the tiger populations in India with those in Myanmar. Expand the eastern border of Hukaung Valley Wildlife Sanctuary to protect potential the tiger habitat in the Sumprabum area. Completion date: June 2004.
d) Establish limited human use zones (buffers) that will "soften" the edges of Hukaung Valley and Htamanthi reserves reducing the risk of mortality for the tigers. Completion date: June 2004.
e) Create new protected areas or special the tiger management zones in the Taninthayi Division, including the Lenya River, Greater and Lesser Taninthayi River catchments. These sites will protect the tigersand their habitats and allow limited human use of natural resources around the reserves in a manner complementary to the tiger conservation. Completion date: December 2007.
f) Use existing GIS capabilities in the Forest Department to identify and demarcatespecial managementzonesand corridors for the tigers. Completion date: December2003.

5.6 Improving international cooperation and establish cooperative management of contiguous protected areas along borders to maintain connectivity of the tiger habitat across international boundaries

5.6.1 Key issues

a) Trade and trafficking in the tiger and other wildlife products is often associated with the trade in drugs and arms (Bennett and Rao 2002).
b) In Myanmar the trade is concentrated in areas with weak enforcement, especially along the border with China and Thailand (Bennett and Rao 2002). The trade is fuelled by the disparity in economies between neighbour countries, creating an underground economy and a drain on Myanmar's wildlife.
c) Local government officials in border areas are unaware of the Wildlife Law or the importance of wildlife, and sometimes supplement their incomes from wildlife trade.
d) Local militias effect law enforcement in order areas but National laws are only weakly enforced or not enforced at all.

5.6.2 Key actions

a) Conduct wildlife conservation and awareness training for l00 government personnel, including military, customs, police, immigration and local administrative staff, stationed near or on country borders. This would include basic training in identifying IUCN and CITES protected wildlife species. Completion date: December 2003.
b) Hold internal 2 workshops involving local government officials to discuss trans border issues including trade, trafficking and wildlife, and develop plans to suppress the trade. Completion date: December 2003.

c) Recruit local government officials on both sides of the Thailand border to suppress transborder wildlife trade at Mawdaung-Prachuap Kiri Khan, Kaleinaung-Ban I Tong, Kawthaung-Ranong (especially Tha Htay Island), Myawaddy-Mae Sot, Three Pagoda Pass, and Tachileik-Mae Sai, and prevent access by professional poachers from Thailand. Completion date: December 2004.
d) Create a the tiger reserve in Taninthayi Division opposite Thailand protected areas that support large populations of the tigers, Western Forest Complex and Kaeng Krachan National Park. Completion date: December 2004.
e) If possible expand the reserve or create new reserves to form a corridor between these two Thai. reserves. Completion date: December 2007.
f) Develop a spatially explicit the tiger conservation database for the Huai Kha Khaeng – Thung Yai Naresuan TCU (Level I TCU 73). Completion date: December 2005.
g) Where possible coordinate antipoaching patrols and/or wildlife surveys on both sides of the Thailand-Myanmar border. Completion date: December 2004.

5.7 Monitoring the status of the tiger and prey population to assess the effectiveness of conservation effort

5.7.1 Key issues

a) The success of the Plan will need to be assessed by monitoring the tiger and prey populations.
b) The Hukaung Valley landscape will be a target for an extensive monitoring program.
c) Landscapes not yet protected but containing the tigers e.g. Taninthayi Division, should be targets for medium intensity monitoring.
d) Sites where the tigers were not found but are suspected to occur (Table 3) should be targets for low intensity monitoring (Karanth and Nichols 2002).
e) Specific methods used for monitoring will depend on the level of knowledge available for the tigers (Karanth and Nichols 2002) (Table 5).

5.7.2 Key actions for Hukaung Valley;

a) Identify critical habitats and core areas for the tigers and prey across the landscape. Completion date: June 2003.
b) Estimate numbers of female the tigers within the landscape and ascertain that there is a reproductively viable population of the tigers. Completion date: December 2003.
c) Document the current threats, demographics, and range of human activities that must be taken into account if the proposed landscape is to be successful and sustainable in the long term. Completion date: June 2003.
d) Create a GIS map and database to show current land use patterns, possible future land use trends, and the tiger and prey source areas. Completion date: December 2003. For forest reserves in Taninthayi Division;
e) Train local foresters how to identify the tiger and prey via sign surveys, in use of camera- traps for wildlife survey, and methods for making observations and recording data. Completion date: December 2004.
f) Determine occupancy of habitats in accessible sites across the landscape, including Myintmoletkat and Lenya River areas, which away from sites where the tigers are known. Completion date: December 2005.
g) Determine prey abundance using line transect sampling. Completion date: December 2005.
h) Determine the tiger abundance using double-sided camera-trap sampling. Completion date: December 2005. For sites in Paletwa and Kaladan river catchment, Sumprabum, Khaunglanphu, Paunglaung, Momeik Mabain, Central Bago Yoma, Rakhine Elephant Range and Saramati Taung area;
i) Train local foresters how to identify the tiger and prey via sign surveys. Completion date: June 2003.
j) Determine occupancy of habitats at the sites using sign surveys. Completion date: December 2003.
k) Establish a logbook to record observations of the tiger and prey, and encourage use of the logbook. Completion date: December 2003.

5.8 Improving public awareness of the importance of the tiger conservation to increase support from local people

5.8.1 Key issues

a) Local government officials encourage local people to hunt the tigers and split profits from the sale of wildlife products.
b) Professional hunters and hill tribal people (Kachin, Lisu, Naga, Khanti Shan) who consume wildlife live in villages adjacent to the Hukaung Valley, and pose a threat to wildlife.
c) Little public information exists about wildlife in Myanmar.
d) Wildlife education essentially does not exist in schools.

5.8.2 Key actions

a) Develop wildlife education programs to scourage

hunting by local people in and near the tiger reserves. Where possible recruit local people, especially ex-hunters to help implement these programs. Completion date: December 2004.

b) Involve 50 local people in wildlife survey and research activities to make positive use of their local or indigenous knowledge. Completion date: December 2003.

c) Collaborate with authorities in charge of development projects to include wildlife conservation as a component of those projects and resolve any potential conflicts between the needs of people and wildlife. Completion date: December 2003.

d) Produce a documentary about the tiger conservation in Myanmar and broadcast it on National television. Completion date: June 2004.

e) Dub existing wildlife documentaries about Myanmar into Myanmar language and broadcast. Completion date: June 2003.

f) Adapt WCS education materials about the tigers into Myanmar language and implement a special training program for schoolchildren at selected high schools in Yangon, and adjacent to the tiger reserves. Completion date: June 2004.

5.9 Defining roles and responsibilities of personnel responsible for the tiger conservation

5.9.1 Key issues

a) Wildlife conservation is hampered by a lack of understanding of roles and responsibilities of government staff.

b) The efficiency of protected area management can be improved by defining tasksand expectations for staff.

c) Park managers need leadership training to be able to perform their jobs successfully, and to direct human resources to effect conservation.

5.9.2 Key actions.

a) Provide special training for managers of the tiger reserves in management techniques, including leadership skills, decision-making, planning, protection, use of information and technology, and personnel management. Completion date: December 2003.

b) Invite managers of the tiger reserves to observe the day-to-day operations in selected the tiger reserves in India and Thailand. Completion date: June 2004.

c) Define roles for junior staff in Hukaung Valley and Htamanthi Wildlife Sanctuaries, and for Taninthayi Division junior forestry staff, and staff and in other areas in conducting field monitoring of the tigers and prey. Completion date: December 2003.

Table 5. A guide to research methods for the tiger conservation

Knowledge Base	Goal	Technique
No information	Determine occupancy	Sign surveys for tigers'
	Determine occupancy but sign survey inappropriate	Camera trap surveys for tigers
	Potential carrying capacity (K) for tigers	Line transect for prey Dung surveys for prey
Tigers present	Determine Occupancy	Sign surveys for tigers
		Camera trap survey for tigers using single camera sets
	Determine tiger and prey abundance	Camera trap survey using single camera sets
		Line transect sampling for prey/dung
	Determine abundance of tigers	Camera trap survey for tigers using double camera sets
		DNA population estimation
	Determine K for tigers	Line transect sampling for prey/dung
Abundance/distribution data available	Habitat analysis	GIS to extend results of intensive habitat surveys
	Monitoring	Camera trap monitoring of tigers
		Calibrated sign surveys
	Ecological Studies	Radio telemetry
		Diet studies
		Demographic studies
		GIS

1 'for the tigers' implies that sampling is designed to maximize the probability of encountering the tigers

PART 6

HISTORICAL DATA, FIELD SURVEY METHODS AND DATA ANALYSIS

This section is optional reading for researchers and others interested in the historical distributions of the tigers, specific field methods used to collect information on current distributions, and data analysis techniques. All of this material provided the background for developing the Action Plan described in the previous section.

6.1 Past distributions of the tiger in Myanmar.

In order to provide a framework for understanding the current situation for the tigers, information on where the tigers used to occur and the factors that brought about their decline was considered. For the purposes of this report, historical records were considered as those pre-1999, when this study began. A number of sources were used to reconstruct former distributions of the tigers in Myanmar:

1. Published scientific papers.

Prior to 1999, few biological surveys had been attempted in the country. Milton and Estes (1963) conducted the first dedicated biological surveys in the early 1960's. They identified declining wildlife populations in areas such as Pidaung Wildlife Sanctuary. Then during the 1980's a series of wildlife assessments were done in the context of assessing areas for forest protection by UNDP/FAO (1985). These reports prescribed the formation of new protected areas as critical for the future conservation of wildlife. In the 1990's WCS made efforts to document and define new areas for inclusion in the protected area system.

2. *Hunter records*.

The majority of historical records come from published reports and books written by hunters. Game hunting was popular during the period of occupation by the British (pre-1948). These publications describe in detail the circumstances in which the tigers were shot, trapped, snared or otherwise encountered by humans.

3. *Survey reports*.

A number of reports by foresters and surveyors attest to the former occurrence of the tigers.

6.2 Quality and reliability of information.

A gazetteer was assembled from historical the tiger records. The information was categorized as follows;

(a) *Confirmed presence* -where there was no reasonable doubt the observation was of the tiger. These observations were from direct sightings, the tigers killed, or reports of attacks by the tigers on humans or livestock;

(b) *Provisional presence* -where there was a possibility that leopard or other species was in fact observed but was mistaken for the tiger. These were observations of tracks and sign, or reports from other sources e.g. villager reports.

(c) *Provisional absence* -where a lack of evidence of the tigers was reported. True absence over a given area can only be confirmed through monitoring over a period of time ranging from several months to several years (depending on the size of the area) but except for recent efforts at Alaungdaw Kathapa this has yet to be attempted at any of the study sites. Verbal reports were not considered as historical records due to the persistent problems with identifying large cats from track and sign (Duckworth & Hedges 1998; Lynam 1999) and because reports not written down at the time of observation invariably change in content and accuracy and become unreliable.

6.3 Characteristics of past distribution.

A total of fifty-eight observations provided an historical record of the tigers for the period 1903 – 1999 (see Fig. 2.; Appendix IV). The tigers were historically recorded from all areas but gaps in information exist for the delta area, the central east (Shan State) and the

far north. The absence of records probably reflects that the tiger was not reported rather than it never existed in these places. The tigers can survive in mangrove forests although the habitat is sub optimal (U. Karanth, pers.comm. 2002). Similarly, the absence of documented records from Shan State is due to the inaccessibility of the area rather than lack of the tigers. (Rabinowitz 1998) reported the tigers had disappeared from the far north but evidence from hunters suggests their existence there in the past.

6.4 Potential the tiger areas.

During the early 1990's with the advent of new techniques for assessing population viability through consideration of genetics, the focus on conserving the tigers shifted towards a small population paradigm (***sensu*** Caughley & Gunn, 1996). The idea was that the tigers were fast being driven towards extinction in the wild so that captive breeding and genetic management would be necessary to save them' (Tilson et al. 1995). There is no doubt that for some critically endangered species such as Guam rail, Black footed ferret and Arabian oryx, and the subpopulation of the tigers in southern China, species survival depended primarily on successful management in zoos. However, this approach ignored the fact that potentially viable populations of the tigers still existed across most of their range in the wild but that their status remained unknown (Rabinowitz 1999), so that effective conservation planning could not happen. In an attempt to refocus attention on the plight of wild the tigers, WWF and WCS attempted a geographic assessment of the extent and availability of habitat, and potential prey resources (Dinerstein et al. 1997). This analysis identified a series of potential areas – The tiger Conservation (TCU's) – in which the tigers could conceivably occur. For example, it was considered that the tigers might occur across large expenses of potential habitat. In Myanmar, four areas with the greatest potential for the tigers (Level I TCU's) are large and relatively intact forest transboundary forests in the west along the Myanmar – Bangladesh and Myanmar – India frontier; and forests in central Bago Yoma (Fig. 10). A series of much smaller, highly fragmented forest areas provide lower potential for the tigers. These are termed Level II and III areas. According to the analysis, forests in the far north, central east and delta areas had unknown occupancy for the tigers. These areas were considered priorities for immediate survey reflecting large gaps in historical information on the tiger occurrence.

Several characteristics of the potential the tiger habitats are worthy of mention. Firstly, despite the relative intactness and contiguity of forests in the level I category, the tigers may not be uniformly found across available habitat (Prater 1940; Rabinowitz 1995). Secondly, the Level I TCU's include areas of degraded or completely cleared habitats. The tigers if occurring there would likely be nonbreeding transient individuals (G. Schaller pers. Comm., 2002), a small percentage of the population that are prepared to risk movement across hostile areas in the landscape to cross between forest patches. Finally, the TCU analysis was a very useful exercise because it did two things; it refocused attention on the plight of wild the tiger populations, defined areas where information on the status of the wild populations was lacking.

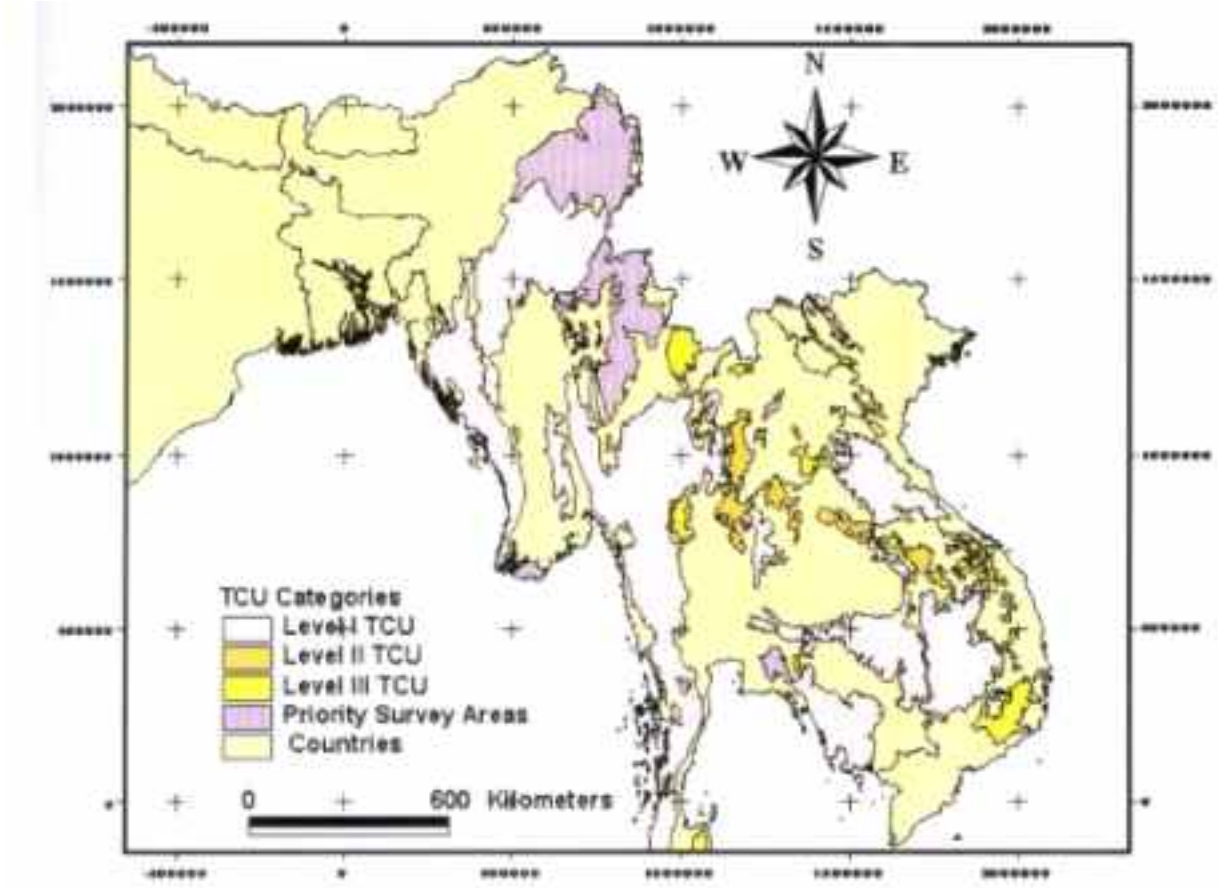
6.5 **Rationale for the tiger status survey program**.

Despite the past distributions and current potential areas for the tigers, areas of natural vegetation available for wildlife declined from 75% of land area to 50% in 50 years (Collins 1991; FAO 2000). Land use patterns changed after 1948 when traditional forest management regimes that regulated and systematized harvest were replaced with less regulated and in some cases opportunistic clearance. For example, while good management of natural forest occurs in most areas, foreign logging companies clear – cut or felled timber outside concessions in near the border during the period 1989 – 1993 (International 1999).

By the early 1990's hunting and illegal trade had reduced the tiger populations to an unknown subset of the potential areas. Some areas with apparently suitable habitat were devoid of the tigers (Rabinowitz 1999). Prior to the commencement of this project in 1999, the state of knowledge of the tigers amounted to reports of the tiger occurrence for a limited number of areas (Rabinowitz 1999). Hunting of the tigers has been going on for a very long time (Pollok & Thom 1900). More recently with reduced supply of the tigers and the tiger parts in the marketplace, demand has increased (Hemley & Mills 1999) with unmeasured effects on wild the tiger populations.

In order for effective conservation planning to take place, there was an urgent need to know where the tigers existed across the vast landscapes of Myanmar, and what was the condition of the tiger subpopulations. A field program was mounted to satisfy the following objectives:

Part 6: Historical Data, Field Survey Methods and Analysis
Fig. 10. Tiger Conservation Units (TCU's) for Myanmar and Neighbour countries



1. To train government field staff in the tiger assessment methods.
2. Using information on potential the tiger areas from historical records and local knowledge to determine the tiger presence-absence across these areas, and limits of the tiger distributions.
3. To define threats to the tigers and their habitats. 4. To redefine priority areas for future the tiger conservation.

6.6. Training and selection of The tiger Team members.

The capacity of field staff to conduct independent wildlife survey and research is generally poor in Asia and this had led to problems with interpreting basic information on species occurrence and abundance for protected areas (Duckworth & Hedges 1998). Park staffs are generally unfamiliar with animal tract and sign thus making reports of the tiger occurrence unreliable. As an example of this, at Alaungdaw Kathapa National Park, historically one of the better-known the tiger areas (UNDP/FAO 1982), park staff reported the tigers as common in 1998 but plaster casts of tracks purported to be of the tiger were on inspection found to be of Asiatic leopard and Golden Cat (Lynam et al. 1999). Part of the problem in Myanmar is a general one across Asia in that training of government staff has traditionally focused on production forest management and silviculture. Protected areas conservation is relatively new task for foresters and wildlife training is generally unavailable at the college or university level.

Wildlife training for Myanmar foresters began with a WCS program in 1995. The training based on a standard curriculum (Rabinowitz 1993b), provides instruction in techniques for observing and recording wildlife, and basic survey and analytical techniques. Since 1995, 270 protected area field staff, and local

NGO staff have received the WCS basic training Smithsonian Institution, and the California Academy of Sciences provided other specialist training in wildlife monitoring techniques to Forest Department staff.

As a starting point for the National The tiger Action Plan project, the Wildlife Conservation Society – Myanmar Programme in collaboration with the Myanmar Forestry Department provided a training course in the tiger survey techniques and conservation at Alaungdaw Kathapa National Park, from December 7 – 21st, 1998. The objectives of this training were,

1. To train junior forestry staff in basic techniques of map and compass, wildlife observation and data recording.
2. To provide specialized training in describing the tiger habitats, conservation and census techniques for the tigers and the tiger prey species.
3. To identify talented Forest Department staff for inclusion in a National The tiger Survey Team (NTST).

WCS staff from New York, Thailand and Myanmar conducted the training. Dr. Alan Babinowitz, Director of Science, Asia Programs, an expert on large carnivore conservation ecology, and the author, lectured to the trainees and directed a variety of classroom based and field based training activities. WCS Myanmar Country Progrmme Coordinator U Saw Tun Khaing and Research and Training Coordinator U Than Myint supported them. This was the first time this kind of training had been done in Myanmar, and the first time anywhere in Southeast Asia.

Twenty trainees and three observers attended the 14 – day training (Fig. 8.). Those staff came from twelve national parks and sanctuaries, the Institute of Forestry, and the Forest Resources and Environment Development Association (FREDA). The trainees were assessed on their participation in group assignments and a 4-day field project, and on their individual performance in class and practical assignments, a comprehensive exam, and overall level of participation in the training.

From the training a group of six talented young forestry professionals were selected to form the first roving the tiger field survey team to participate in field assessments for the tigers at selected forest sites across Myanmar.

6.7 Methodology.

The surveys were intended to determine presence – absence for the tigers, and relative abundance for prey species, so as to permit the evaluation of study areas for their potential for the tigers. The surveys were not intended to determine numbers of the tigers in the reserves.

The tigers, like other tropical mammals, are generally difficult to observe directly due to their rarity, cryptic behaviour, partial nocturnality and avoidance to humans (Griffiths & van Schaik 1993; Schaller 1967). A combination of indirect and direct survey methods was used to detect the tigers and other large mammals; potential prey species.

Field observations of the tigers can be categorized so as to facilitate interpretation of their ecological status. Four types of observations are given in Table 6. The tigers may be detected or not detected by a given survey technique. The detection of the tigers confirms presence but may or may not indicate a reproductive population. Where the tigers are not recorded, this could indicate problems with sampling, for example where the tigers are missed due to extreme rarity, or true absence.

Where the tigers occur at densities under 0.38 the tiger/`100 square kilometer, very large amounts of sampling with camera-traps (>1,000 trap nights) needs to be done in order to detect them (Carbone et al. 2001). In this study sampling of > 1,000 trap nights were not feasible so that the tigers might not be recorded at some low – density sites though they were present.

6.7.1. Choice of study areas –

Given the time frame of the project (3 years) it was not possible to investigate the tiger occurrence in all forest areas. Using information from historical records and potential the tiger areas, 17 sites with the highest probability of supporting the tigers were chosen for survey (Fig. 9). These areas represented a non – random subset of available landscape and habitat options for the tigers spanning the geographic extent of the country from approximately 11o – 27oN, and 93o – 99o30'E.

1. Alaungdaw Kathapa National Park (AKNP)
2. Htamanthi Wildlife Sanctuary (HTM)
3. Thaungdut Reserve Forest (TD)
4. Mahamyaing Reserve Forest (MHM)

Table 6. Interpretation of The tiger Population Status from Field Observations

Observation	Population Status	Interpretation
1a Tigers recorded	Reproductive population	Indicated by observations of pregnant females, juveniles and/or cubs
1b Tiger recorded	Present but not necessarily reproductive	Indicated by observations of adult male or non – pregnant adult female individuals
2a Tigers not recorded	Low density, ecological effective absence	Tiger may be present at low density but are not recorded due to sampling errors e.g. tigers not present in survey area. A tiger population may disrupted, sex ratios skewed, or individuals have difficulty finding mates so that reproduction is not possible (Allee effect)
2b Tigers nor recorded	True absence	Tigers are not recorded over a period of monitoring at a site.

5. Nankamu Reserve Forest (NKM)
6. Saramati Taung (SRMT)
7. Paunglaung Catchment (PGL)
8. Panlaung Pyadalin Cave Wildlife Sanctuary (PPDL)
9. Central Bago Yoma (BGY)
10. N. Rakhine (RN) or Paletwa and Kaladan river catchment
11. Rakhine Elephant Range (RER)
12. Hukaung Valley (HKV)
13. Khaunglanphu (KLP)
14. Sumprabum (SBP)
15. Momeik – Mabain (MB)
16. Myintmoletkat (MMLK)
17. S. Taninthayi (TNTY)

Descriptions of each site are given in Appendix I.

6.7.2. Interview surveys –

Interviews of people living in suspected the tiger areas are potentially useful because they draw upon local knowledge of wild accumulated over long periods of time, and may help determine the status and identify threats to the tigers and other mammals Rabinowitz 1993b). However, the reliability of information to be gained depends upon a number of factors, especially the correct interpretation of local information by the interviewer (Duckworth 1999), the manner and disposition of the interviewer, and how the interviewee preceives this. An interview protocol (Appendix V) was designed during the tiger – training course (Lynam et al. 1999) and this was used by Myanmar – speaking interviewers to gain indirect evidence on the tiger occurrence in the 17 potential areas. Direct survey was done in and around locations of the most recent reliable reports of the tigers from interviewees.

6.7.3 Track and sign –

Large mammals produce tracks, faeces, scrapes, scratches, kills and other sign so that under certain circumstances the substrates on wildlife trails, streambeds and ridges may indicate their recent presence (Wilson 1996). However, there is significant large cats (Duckworth & Hedges 1998; Kanchanasakha et al. 1998) so that the tiger may be confused with other species (Lynam et al. 1999). For these reasons sign was considered not sufficient for the identification to species level for cats, dogs, civets, deer muntjak, wild cattle, and otters. However, the abundance of sign was generally indicative of the level of mammal traffic in an area. Ungulate sign was additionally used to indicate possible areas of carnivore activity, and as such to help guide the placement of camera – traps for detecting the latter (below).

Standardized datasheets were used to record date, time of day, weather, location (latitude/longitude) type of sign, dimensions of track/sign, probable species/genus identity, age, substrate, and habitat type (Appendix VI). Locations where mammal sign was encountered were recorded with a Global Positioning System (GPS) device capable of resolving position information beneath tree canopies, accurate to + 100 m* (Garmin 12XL,Garmin Corporation, Kansas USA). Feline tracks with total

length 120 mm or pad width 7cm, and scat 3.5cm in diameter were considered to be indicative of the tigers (A.J. Lynam, A Rabinowitz & R.K. Laidlaw unpublished data; Cutter 1999; Duckworth & Hedges 1998). Where the size of a feline track was ambiguous because of the substrate or age of a track, the track was identified only as "large cat" meaning either the tiger or leopard. Other species were identified using a field guide to Thai mammal tracks (Green World Foundation 1999). An index of abundance "Encounter Rate (CR)" was estimated from sign surveys as ER = No. Sign detected/hr.

6.7.4. Camera – trapping

Remote Camera methods have been used successfully to photographically record wildlife in tropical Asian forests (Chapman 1927; Griffiths & van Schaik 1993). Although these devices are relatively expensive they offer a reliable method for inventory of species that are cryptic nocturnal or rare, including the tigers (Lynam et at. 2001). Passive infrared –based camera – traps (Camtrak South Inc., Georgia USA) (Fig. 11.) were used in all surveys.

To achieve the best possible resolution of species identity from photographs, camera – traps were secured to trees 0.4m above the ground, 3 – 5 from a wildlife trail. All camera – traps were set to allow continuous recording of wildlife movements day and night. Traps were left in place for at least 24 days to allow for adequate sampling of large mammals species richness (A.J. Lynam unpublished data) and atleast 1,000 trap nights to correctly determine the tiger presence or absence (Carbone et al. 2001). For example, the tigers were considered absent from a site if they were not recorded in any trap, with absence referring to the particular area was estimated by placing a buffer around the outermost locations of camera – traps with the length of the buffer equivalent to half the mean distance between camera – traps. A time delay of 3 or 6 minutes prevented entire rolls of film being taken by groups of animals lingering in front of the camera – trap. An index of abundance "Capture Rate" (CR) was estimated from camera trapping as CR = No. Photo records/100 camera – trap nights.

6.7.5. Survey design –

Two survey designs were employed for the tigers (Fig. 12.) In both cases, the primary intention was to gain information on

(1) the tiger presence –absence,
(2) the tiger and prey micro distribution and activity in each study area.

First, camera-traps were placed at random locations

Fig. 11. Infrared – based camera – traps were used to detect the tigers and prey species.

within 10 x 4 km sampling grids, in alternative 1 km2 grid blocks. This was termed the plot-based survey design (Lynam et al. 2001). The random locations were reached using Global Position System (GPS) receivers (Garmin 12XL, Garmin Corp. Kansas USA). Traps were established on trails or other suitable positions within 100m of random locations. Grids were located in areas where interviews suggested the tigers occurred, or where the tiger occurrence could not be determined, in the part of a study area least disturbed by humans. The tigers require a core area of undisturbed habitat for their survival (Schaller 1967) although this may be a small part of their entire home range (Miquelle et al. 1999). If the tigers are present in an area they are likely to at least frequent a core undisturbed area and should be detectable there. In the second design, camera-traps were deliberately placed along trails and roads where sign of the tigers, large cats or their prey species were recorded. This was termed the *trail*based survey design (Lynam et al. 2001). Sampling locations where capture probabilities for the tigers are highest (Karanth and Nichols 1998) increases the likelihood of their detection at a site.

Because the stripe patterns of the tigers are unique to an individual (Schaller 1967) but are different on left and right sides, camera-trap photographs of both sides of an animal must be used to distinguish it from other the tigers (Franklin et al. 1999) While specific methods are available for estimating the tiger density from double-sided camera-trap designs (Karanth 1995) this was not the purpose of this study. However, to gain information on the minimum number of the tigers known to be alive (MNKA) inside the survey area, pairs of camera-traps were placed on opposite sides of animal trails, staggered by 2-3 m at locations where field staff considered the tigers were likely using e.g. because of presence of sign of the tiger and/or large ungulates. These "checkpoint" arrangements were established to gain double-sided photographs of the tigers.

In summary, the surveys obtained four types of indices: (i) the tiger presence-absence, (ii) minimum numbers of the tigers known alive (MNKA); (iii) minimum ranges of individual the tigers from linking outermost points of locations where the tigers were captured in camera-traps or identifiable from tracks and sign; (iv) an index of abundance (traffic) of large mammal species, i.e. Capture Rate= No. Captures/100 trap nights

Fig. 12. The tiger survey design (see text for details)

6.7.6 Survey personnel.

At all sites surveys were done by Myanmar Forest Department staff in collaboration with WCS personnel (except in Taninthayi Division), and local forestry or other government staff. Local people were hired as porters to carry equipment and assist with field logistics. In security areas teams of military personnel joined the survey team. The size of the field survey teams was 3-7 key staff with 10-40 support staff. The average cost of each survey was US$ 3,600.

6.7.7. Survey effort, constraints and coverage.

In most cases, the survey areas were remote and difficult to access, and surveys required special permissions and clearances. Surveys were constrained by a number of factors including extremes of weather, topography, and security considerations. The particular sites where camera-trap surveys were done at MMLK and TNTY were *not* optimal sites, and were in fact selected by security personnel assisting the team. At each site, field staff attempted to obtain the maximum coverage of the area suspected in the tiger survey. All surveys were conducted on foot and consumed 26+ 5 days (range: 15-100) to reach the survey area, and 86+ 12

days (range: 10-207) to complete a survey from start to finish. Total survey coverage was 3,432 sq.mi (5,491 km2), or 202+ 29 sq.mi (range: 91-525 sq.mi). At Alaungdaw Kathapa and Htamanthi the areas covered by survey (244 and 329 sq.mi, respectively) were each one-quarter the size of the protected areas. Interviews of a total of 990 people, or 58+ 17 interviews (range: 5-276) per site were done to determine areas for direct survey. A total of 1,382 hrs, or 81 + 9 hrs (range: 32-171) per site were spent searching for track and sign of the tigers. Camera-traps were established in a total of 430 locations, or 25 + 3 locations per site (range: 0-45) to detect the tigers.

6.7.8. Data recording and storage-

Standardized data recording forms were employed to record all field data from surveys (Appendices VI-VIII). In the field, staff recorded information on camera-trap operation, measured a suite of microhabitat characteristics at survey locations, and records of track and sign taken along survey routes. All records of wildlife were spatially referenced in UTM grid format using GPS. Following camera-trap retrieval, films were developed at a laboratory in Yangon, and slides catalogued and scored, with records entered into a spreadsheet. Slides were scanned at low resolution and archived.

In order to manage the volume of information arising from the field program, to facilitate analyses of data, and to develop a clearinghouse of baseline information on the tiger and other wildlife for the 17 survey areas for use in future management efforts, an electronic database was developed for the project. This database, written in Microsoft Access by U Myint Thann, contains 15,021 records including all results of track and sign and cameratrap surveys, as well as measurements of microhabitat structure.

In addition to the Access database, a spatial database was developed using Arcview 3.1 software (ESRI Systems, Inc., Redlands, USA) with the assistance of the Myanmar Forest Department (FD) GIS Facility. The database includes information on forest cover and land use, locations of survey sites, drainages, topography, human settlements, roads and other human infrastructure. In the future, the two databases will be linked to allow quick retrieval of information from surveys directly from the spatial database. This GIS could serve as a template for a National Wildlife Database to which other information on biodiversity might be archived in the future.

6.8 Results

6.8.1. Camera-trap operation.

A total of 4,099 photo records were made by camera-traps including 3,341 records (88%) of wildlife, 358 records (9%) of humans, and 112 records (3%) of domestic animals (Appendix II). A total of 19 globally threatened species and 7 globally near- threatened species were recorded by camera-traps, and eight CITES Appendix I, three Appendix II, and five Appendix III species. Eighty-three percent were Myanmar protected species, with 40% totally protected species.

The mean failure rate per site was 17 + 3% (range: 1-33, N=15). Camera-traps failed to work for a variety of reasons ranging but were mostly a result of mechanical failure. Extremes of heat, cold and moisture may cause internal circuits and sensors to stop working in the field. Theft, and damage from animals, especially elephants, were secondary reasons for trap failure.

6.8.2. Species richness.

Camera-traps revealed a diverse assemblage of fauna at fifteen sites (Appendix II). Forty-two species of large mammals were recorded with an average 16.4 + 1.3 species (range: 6-22, N = 15) per site (Appendix IX). Six species were recorded at MB, the least rich site, while at four sites, AKNP, TMT, RN and SPB, 22 species were documented.

In addition, sixteen species of birds, small mammals and reptiles were recorded. However, these fauna were likely to be recorded as accidents of sampling in camera-traps so that the surveys were not representative of their richness.

6.8.3. Wildlife traffic.

Surveys indicated a range of levels of wildlife traffic across sites. Only large mammal species are considered here. From camera-traps, sites had a mean capture rate of 15.0 + 2.6 animals/100 trap nights (N = 17). MB had the lowest capture rates (5.7 animals/ 10 trap nights) with BGY and RN having the highest capture rates (36.2 and 34.2 animals/ 100 trap nights, respectively). From track and sign surveys, the mean encounter rate of wildlife sign was 4.1 + 0.5 signs/hr. PPDL had the lowest encounter rates (1.7 signs/hr) with NKM the highest (8.3 signs/hr).

6.8.4. Human traffic.

Levels of human traffic also varied across sites. From camera-traps, sites had a mean capture rate of 2.1 + 0.7 photorecords/100 trap nights (N = 17). TMT and SRMT had the lowest human traffic (0.15 and 0.18 photorecords/ 100 trap nights) with PPDL having the highest traffic (11 photorecords/100 trap nights, respectively). From track and sign surveys, mean human traffic was 0.3 + 0.05 signs/hr. TMT and RER had the lowest encounter rates (< 0.1 signs/hr) with TNTY the highest (0.7 signs/hr).

6.8.5. Occurrence of carnivores.

One or more of the large carnivores-the tiger, Asiatic leopard (*Panthera pardus*), Malayan sunbear (*Helarctos malayanus*) and Asiatic black bear (*Selenarctos thibetanus*) and Asian dhole (*Cuon alpinus*) were recorded by cameratraps at all 17 survey sites (Appendix IX). Sunbear occurred at all but two sites, SRMT and PPDL, making it the most frequently occurring large carnivore species. Dhole occurred at all but four sites, TMT, SRMT, PLG, and MB. Leopard occurred at just over half the sites. Asiatic black bear occurred at just under one-quarter of sites.

6.8.6. Occurrence of the tigers across study sites

Interviews. A total of 990 local people were questioned about the occurrence of the tigers and other wildlife at the 17 sites (Appendix III). These individuals were local villagers, hunters, and government officials living in or around forest areas. Two hundred and thirty eight (24%) individuals interviewed reported having either seen the tigers, encountered sign, or heard the tigers. One hundred and seven (45%) records were direct sightings. Eighty-seven (81%) of these eyewitness accounts were made after 1990. Direct survey. Signs of large cats (the tiger or leopard) were recorded at all survey sites. The tigers were confirmed by camera trapping at four of 17 sites, TMT, HKV, MMLK and TNTY (Appendix IX; Fig. 13.).

1. TMT: a single photo of a the tiger was recorded during October 1999 along with two sets of tracks during the trap retrieval exercise. After the survey team left the area, a tiger was reported killed by hunters from an area adjacent to the survey site.
2. HKV: Fresh sign was found on both sides of upper and lower Shipak Hka between Tarung Hka and Brangbram Hka, and at Numpraw Hka on 3rd February 2002, during the camera-trap set up exercise. Three photos of the tiger were recorded by camera-traps on 11.2.01, 10.3.01, and 11.3.01. The tigers are thought to be resident in the upper Brangbram Hka, upper Tanaing Hka, Maingkwan and surrounding area, and around Shingbweyang.
3. MMLK: Fresh tracks were found during the camera-setup (26.9.01-4.10.01) and retrieval exercises (7.11.01-14.11.01) and plaster cast records made. A single photo of a tiger was recorded from a camera trap unit set up on a trail on 10.10.01. Nine of 25 units failed to operate so more photo-records might have been made.
4. TNTY: a set of tracks was encountered during the camera-setup operation (17- 20.1.02) and a plaster cast made. Although no photo records were made local people reported a killing of a tigress on 17.1.02 at Kyachaung Village, 2 mi S of Manoron

6.8.7. The tiger density.

(Karanth & Nichols 2000) estimated the tiger density for multiple sites in India. One of their study sites-Bhadra-is similar in topography and vegetation to northern Myanmar forests. Using information from single sided captures, the tiger density was estimated for the Hukaung Valley, where captures of two individual the tigers were made. Using a mark-recapture approach (Karanth and Nichols 1998) and assuming a capture probability for the tigers (0.788) and a sampling buffer (2 km), densities were estimated for the tiger populations at HTM, HKV and MMLK (Table 7).

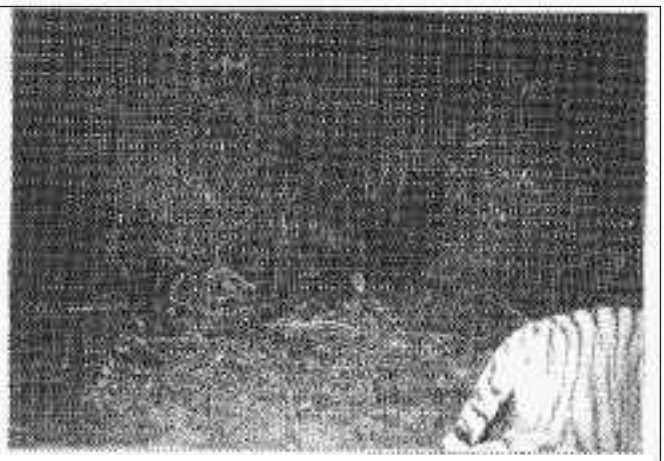
6.8.8. Occurrence of other large mammals.

Large (> 1 kg) herbivores were recorded from all survey sites (Appendix IX). Common muntjak (*Muntiacus muntjak*) was the most abundant species in camera-traps and was found at all sites. Wild cattle were recorded at all sites except SRMT, PPDL, and MMLK. Banteng (*Bos javanicus*), a globally threatened species was found at 3 sites, AKNP, MHM and BGY. Sambar (Cervus unicolor) was present at all sites except SRMT, PPDL, and MB. Serow (*Capricornis sumatraensis*) was recorded at just fewer than 50 % of sites.

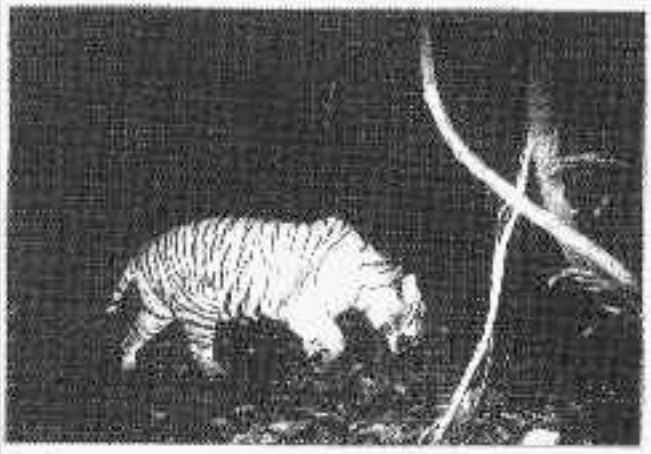
(Footnotes)*

As of 1 May 2000 the United States Department of Defence, the agency that controls GPS satellites, turned off Selective Availability (SA) or "scrambling" of GPS satellite signal information. Prior to this date the accuracy of GPS position fixes was limited to + 100 m. Most recreational GPS devices are now capable of real time position fixes accurate to + 20-25m.

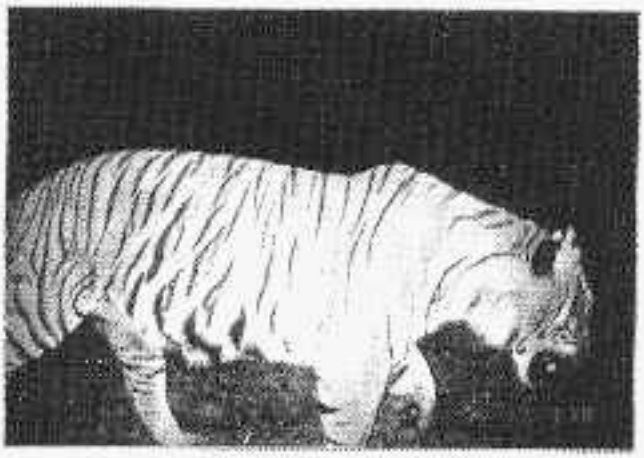
1. Tiger recorded by camera-trap at Htaung Pru Reserve Forest, Taninthyari Division, 10.10.01



2. Tiger recorded by camera-trap at HukaungValley, Kachin State, 10.3.01



3. Tiger recorded by camera-trap at Hukaung Vall, Kachin State, 11.2.01



4. Tiger recorded by camera-trap at Hukaung Valley, Kachin State, 11.3.01

Fig.13. Camera-trap photo records of the tiger from 17 survey sites in Myanmar, 1999-2002.

6.8.9. Human traffic within study sites.

amera-traps recorded suspected poachers at 8 (47%) of sites (Appendix IX) with villagers recorded at all but three sites, HKV, SPB, MB. Traps at AKNP recorded park rangers on patrol, while traps at MMLK and TNTY recorded military personnel on patrol.

Table 7. The tiger Densities at Some Rainforest and Evergreen Forests in Myanmar and other Southeast Asia Countries.

Country	Site	No. the tigers detected	Density est.* (thetigers/100 km2)	Min density	Max density
India	*Bhadra*	*7*	*3.42*	*2.58*	*4.26*
Thailand	Kaeng Krachan	4	2.82	1.96	3.67
Thailand	Hala	3	2.68	2.42	2.93
Thailand	Bala	2	1.79	1.50	2.07
Malaysia	*Temenggor*[1]	*2*	*1.78*	*0.94*	*2.63*
Indonesia	*Bukit Berisan*[2]	*9*	*1.60*	*1.2*	*3.2*
Myanmar	**Hukaung Valley**	**2**	**1.10****	**0.91**	**1.29**
Myanmar	**Myintmoletka**	**1**	**0.67****	**0.38**	**0.96**
Thailand	Phu Khieo	1	0.62**	0.35	0.88
Myanmar	**Htamanthi**	**1**	**0.49****	**0.28**	**0.70**
Thailand	Khao Yai	1	0.38**	0.22	0.54

* Single sided M-R estimates using Program CAPTURE
** No recaptures. Density (D) = No. the tigers (N)/ Area, where N = No. the tigers detected/p, and p=0.778 (from Badhra, India; Karanth and Nichols, 2000)

1 R. Laidlaw and DWNP (unpublished data)
2 O′ Brien et al. ms

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APPENDIX I. DESCRIPTIONS OF 17 MYANMAR THE TIGER SURVEY SITES

1. Alaungdaw Kathapa National Park (AKNP)

Location: Lies between 22o14″-22o29″N and 94o17′-94o36′E between the Chindwin River floodplain and Myittha River valley in Sagaing Province, approximately 100 mi (160 km) west of Mandalay.
Elevation: 100-3,440′ (30-1048m).

Survey area: Centred on Mindon Camp covering an area of 152 sq.mi (390 km2). **Description:** The area is dissected by a number of high elevation 2000-4000+′ (700-1219m) ridges that run in a north-south direction, and is drained by the Patolon and Taungdwin Rivers that flow northwards into the Chindwin River.′

Vegetation: Varies from Dry Upper Mixed Deciduous (DUMD) forest on the high ridges and slopes to Moist Upper Mixed Deciduous (MUMD) forest on lower slopes. Bamboos
are common in the under storey on lower slopes. Semi-Indaing forest, high Indaing forest or Pine forest occur in patches on the tops of some high ridges.

Access: Alaungdaw Kathapa is accessed from the east by road from Yinmarbin, and via a newly constructed road that links India with Mandalay and cuts through the northwest of the park. Walking distance from the nearest road was 1 day.

Rainfall: The area is subject to two monsoons, a southwest monsoon which brings most of the yearly rainfall between May and October, and heaviest between August and September. Mean annual rainfall is 588″ (1,507 mm). Water is available year round in the major drainages with smaller tributaries mostly drying up by the end of March.

Human impact and landuse: The park is surrounded almost completely by cultivated land but inside the park the only settlements are of park staff, mahouts and a monastery. Government camps and religious pilgrimages pose threats to wildlife. Other threats are hunting for wildlife trade, extraction of non-timber forest products, livestock grazing and fishing.

2. Thaungdut
Location: Lies between 24o17′-24o30′N and 94o30′-94o43′ E in the Homalin Township, Sagaing Division and includes with Kabaw Valley.

Elevation: 432-2,314′ (130-695 km2)

Survey area: Covers an area of 82 sq.mi. (210 km2) 10 mi (16 km) from Thuangdut village.

Description: The survey area is surrounded by Thaungdut Reserve Forest in the east, southeast and by Kabaw Valley in the north and northwest. The Nantanyit Chaung runs south to north between Minthamee Mountain 1,871′ (570m) and Nantanyit Mountain 3,545′ (1,080m) and enters the Chindwin River near Thaundut village. **Vegetation:** Varies from DUMD forest, MUMD forest, to Indaing forest. Bamboos such as Myin Wa, Tin Wa, Wa Bo, Wa Nipa, Theik Wa, Kya Khet Wa, as well as rattan are common.

Access: Thaungdut village is accessible by boat along the Chindwin River year-round. It takes about 2 days travel by boat from Monywa. From Thaungdut village the survey area can be accessed by elephant or on foot.

Rainfall: 74-99″ (188-251 mm) of rain per annum. **Human Impact and Landuse:** Timber extraction has occurred in the area for several years, with the Myanmar Timber Enterprise still extracting hard wood, mainly teak. Hunting, timber cutting, and intrusions by elephant workers and fishermen are threats to wildlife in this area. There were no signs of human settlements or cultivation in the area at the time of survey.

3. Htamanthi Wildlife Sanctuary (TMT)

Location: Lies between 25o16″-25o44′ N and 95o19″-95o46″ E. It is bounded to the N by Nampilin Chaung, to the E and SE by Pali Taung, Temein Taung, and New-ta-mein Taung 1,000″-2,000′ (304-609m) and the Uyu River, to the S by numerous streams, and to the W by the Chindwin River.

Elevation: 490-1,100′ (149-335m).
Survey area: Covers an area of 205 sq.mi (526 km2).

Description: Vegetation is primarily tropical evergreen forest with dense bamboo and rattan undergrowth. Mixed deciduous teak forest is also found on higher slopes in the eastern part of the sanctuary.

Access: The area is accessible by boat from Homalin, the nearest town, 57 mi. (91 km) and a 2 day journey away.

Rainfall: 136″ (3,491 mm) per annum. The area is drained by the Nampilin, Nam Emo, Nam Ezu, Nam Pagan and Nam Yanyin all of which flow W into the Chindwin River.

Human impact and landuse: No permanent human settlements exist inside the sanctuary but the area is used by Lisu hill tribes who hunt wildlife, and by local people who fish and extract non-timber forest products. Oil drilling occurs in the area. 4. Mahamyaing (MHM).

Location: Lies between 23o31″-23o43′N and 94o51″-94o57′E. The area includes parts of Lawthar, Pyaungtha, Maingwan, Mahamyaing and Nonsabai Reserve Forests.

Elevation: 226″-2,071′ (68-631m).

Survey area: 78 sq.mi. (200 km2)

Description: The landscape is characterized by evergreen, mixed deciduous and Indaing (Dipterocarp) forests. The area is drained in the W by the Kaedan Chaung which originates at Honan Taung Dan 2,017″ (614m) and flows into the Chindwin River. In the E the Pyaungthwe Chaung drains into the Mu River.

Access: Reached on foot from Aungchanthar Village, 20 mi. (32 km) away on the MonywaKhanti highway.

Rainfall: 46-69″ (117-175mm) per annum.

Human impact and landuse: Timber extraction from the surrounding areas has taken place since 1973. At present two private companies are extracting dipterocarp timber from part of the area. Numerous current and old settlements occur in the area. Cattle grazing is taking place. Oil drilling occurred in the past.

5. Nankamu (NKM)

Location: Lies between 24o03′-25o15′N and 94o57′-96o12′E between Paungbyin and Pinlebu Townships. It includes parts of Sanda, Kaingshe and Paungbyin Reserved Forests. In the N it is bounded by the catchment of Thetla Chaung, a tributary of the Chindwin River, to the E by Zibu Taungdan 2,319′-2,910′ (706-886m), a catchment of the Mu River, to the S by the Namkawin

and Kodan Chaung, tributaries of the Chindwin River. **Elevation:** 186-2,100′ (56-640m)

Survey area: 94 sq.mi. (243 km2).

Description: Vegetation is dominated by moist upper mixed deciduous forest, with evergreen forest and Indaing forest.

Access: The area is accessible by the newly constructed Pinlebu-Paungbyin Road. Paungbyin Town is 300 mi (482km) from Monywa. The base camp was 25 mi (40 km) from Paungbyin.

Rainfall: Averages 91″ (2,342 mm) per annum

Human impact and landuse: Teak extraction occurred in the area 15 years ago. Bamboo and mushroom collecting occurs along trails in the area.

6. Saramati (SRMT)

Location: Lies between 25o20′-25o43′N and 94o50′-95o40′E. To the N it is bounded by the Saramati Range, to the E by the Chindwin River and Laytin Ridge 5,790′ (1,764m), to the S by Lawpe Mountain 8,455′ (2,577m) and W by the Myanmar-India border.

Elevation: 410-12,553′ (124-3,826m)

Survey area: xx sq.mi. (xxx km2)

Description: Streams in the Saramati and Laytin catchments flow to the Nantalaik River, one of the principal tributaries of the Chindwin River. The survey area is contiguous with India's Shiloi Reserve Forest. Vegetation cover consists of evergreen, pine, moist hill evergreen and sub-tropical evergreen forest with bamboo under storey.

Access: The area is accessible by road from Layshi in the dry, or during the wet season on foot. Mt Saramati, in the N of the survey area is 40 mi (64 km) from Layshi, accessible only on foot.

Rainfall: Averages 91″ (2,342 mm) per annum

Human impact and landuse: Though sparsely populated, shifting cultivation occurs as high up as 7,000′ (2,133m) elevation.

7. Paunglaung Catchment (PLG)

Location: Lies between 19o52′N-20o17′N and 96o24′E-96o35′E in Pyinmana Township, Mandalay Division. It is bounded to the N by Yamethin Township, to the E by Pinlaung Township, to the S by Pyinmana Township, and to the W by Tatkan Township.

Elevation: 500-6,252′ (152-1,905m)

Survey area: 134 sq.mi. (343 km2)

Description: Riverine evergreen and moist upper mixed deciduous (MUMD) forest occur in the lowlands with dry upper mixed deciduous (DUMD), Indaing (dipterocarp), grassland and alpine forest at higher elevations. The entire catchment is 1,779 sq.mi. (4,608 sq.km). A rugged mountain range dissects the area.

Access: Two days walk from Taunggya to the centre of the study area across a 6,000′ (1,828m) mountain range.

Rainfall: 55-95″ (140-241 mm) per annum

Human impact and landuse: Numerous villages occur near the study area. Shifting cultivation occurs in the area, encroaching on the reserve forest. The area is sparsely populated owing to difficult access.

8. Panlaung Pyadalin Cave Wildlife Sanctuary

Location: Lies between 20o56'N-21o00'N and 96o16'-96o27'E in Ywa Ngan Township, Shan State, 21 miles (33km) from Kinda Dam and Hydro Power Project

Survey area: Covers an area of 61 sq.mi. (157 km2) in the Kinda Dam area and includes two reserve forest areas, Panlaung and Pyadalin.

Description: The area is bounded by the Kinda Dam in the north, Ywa Ngan Township in the east, Thazi township in the south and Wan Twin Township in the west, respectively.

Vegetation: Riverine evergreen forest, Moist deciduous forest, and Dry deciduous forest each with diverse bamboo communities, and rattan.

Access: Panlaung-Pyadalin is accessible by road from Kume village, Myittha Township, 1 hour by boat from the Kinda Dam, and one hour's walk.

Rainfall: No data available

Human Impact and Landuse: Temporary human settlements occur in the area. Bamboo collection for making chopsticks is practiced. Timber extraction, non-timber extraction, fishing, hunting and cultivation are threats to wildlife. Roads passing through the wildlife sanctuary are used for extracting timber and moving cattle.

9. Central Bago Yoma (BGY)

Location: Lies between 19o02'-19o15'N and 95o53'-96o59'E, and includes parts of Sabyin, West Swa and Kabaung Reserve Forests. It is bounded to the N and E by the Sabyin River, to the E by the Swa River, to the W by the Bago Yoma Range 1,865' (568m), and to the S by the Pyu Mountain 1,537' (468m) and the Kabaung River catchment.

Survey area: 130 sq.mi. (334 km2)

Elevation: 330"-1,885' (100-574m)

Description: The area is drained by the Sittaung River and its tributaries. Vegetation is characterized by DUMD forest, MUMD forest and evergreen forest. Bamboos are common in the under storey.

Access: The area can be reached by 3 days walk from Swa Dam, to the west of Swa Town on the Yangon-Mandalay highway about 200 mi. (320 km) from Yangon by road.

Rainfall: 126" (3,235 mm)

Human impact and landuse: Large scale extraction of teak and other hardwood, and other signs of human encroachment including bamboo and rattan collection, hunting and fishing was observed during the study period. No evidence of cultivation or permanent human settlement was observed in the study area.

10. Northern Rakhine (RN) (Paletwa and Kaladan river catchments)

Location: Lies between 21o05'-21o22'N and 92o21'-92o29'E is located between and contains the northern Kalapanzin River catchment, Saingdin Ridge and northern Mayu Range.

Survey area: 69 sq.mi. (177 km2)

Elevation: 710"-2,494' (216-760m)

Description: The area is bounded to the N by the Myanmar-Bangladesh border, with the Saingdin River to the E, the Obru and Pairwan Rivers to the S, and the Mayu Range in the W. Vegetation is characterized by sporadic evergreen forest in ravines with extensive Kayin bamboo patches. Forest covers approximately 40% of the survey area. Bamboo is more common in shifting cultivation areas at lower altitudes with dry evergreen forest at higher elevations. Due to logging and bamboo cutting, degraded secondary growth occurs on undulating slopes.

Access: The survey area is accessible by boat along the Mayu and Kalpanzin Rivers, and during the dry season by 6' wide paths cleared by the UN.

Rainfall: (no data available)

Human impact and landuse: A number of tribal settlements occur in areas fringing the forest. The lower Kalapanzin River valley is fertile and supports large villages (100-1,000 households) of Bengali people. Hunting, shifting cultivation and extraction of non-timber forest products all occur in the area.

11. Rakhine Elephant Range (RER)

Location: Lies between 18o01'-18o59'N and 94o36'-94o45' E on the western side of the Rakhine Yoma Range.

Survey area: 57 sq.mi. (146 km2)

Elevation: 252"-3,416' (77-1,041m)

Description: The area is dissected by a series of tall ridges running north to south range from 2000"-4000'. The area is drained by the Tandwe, Salu and Kyeintali Rivers that flow westwards into the Bay of Bengal. Vegetation includes semi-evergreen, mixed deciduous and secondary tropical moist forest, and bamboo brake.

Access: The study area was 3 days walk from Bogale Village, which is 48 mi. (77 km) from Gwa by road. Gwa Town is 180 mi (289 km) NW of Yangon by car.

Rainfall: (No data available)

Human impact and landuse: Thirty-three villages surrounding the Elephant Range consisting of Rakhine tribes (82%) and Chin tribes (18%). They farm rice and groundnut, practice shifting cultivation, and practice commercial hunting of wildlife.

12. Hukaung Valley (HKV)

Location: Lies between 26o36'-26o42'N and 96o34'-96o53'E in the newly declared Hukaung Valley Wildlife Sanctuary (2,493 sq. miles; 6,459 km2).

Survey area: 525 sq.mi. (840 km2)

Elevation: 193"-1,307' (59-398m)

Description: To the N an upland area 6,758' (2,060m) divides the Tarung-Tawan watershed and Gedu River catchment, with the Kumon Mountains to the E, the Nambyu and Nampyek River catchments in the S and the Tarung River and old Ledo Road to the W. Vegetation is predominantly dense lowland evergreen forest interspersed with meadows.

Access: The area lies 20 miles (32km) N of Tanaing and can be accessed during the wet season by boat and during the dry season by baggage elephant. The Ledo Road is paved for 90 miles (149 km) of its length providing year-round access from Myitkyina.
Rainfall: 91″ (2,339 mm)

Human impact and landuse: Apart from a 5 acre shifting cultivation area near Tawang River there were no permanent human settlements in the area.

13. Kaunglaungpu (KLP)

Location: The survey area is located in the Kran River and Phet River catchments between 26o44′-26o53′N and 97o53′-98o04′E.

Survey area: 127 sq. mi. (326 km2)

Elevation: 200′-9,080′ (61-2,767m)

Description: These rivers along with the Shinyan and Hteei Rivers drain the area. The area is covered in natural forest (40%) consisting of tropical evergreen, subtropical hill, warm and cool temperate rainforest and alpine. The remainder (60%) is secondary forest damaged by shifting cultivation in former times. These areas are dominated by bamboo, teat trees, phetwin, and old woody lianas. Extraction of some hard woods was taking place.

Access: This area is reached from Putao by road to Mabweza (63mi.; 101 km). The survey area is accessed by a 63 mi. (8 day) walk on foot passing Sunnochat Mountain.

Rainfall: (no data available)

Human impact and landuse: Intensive shifting cultivation has transformed natural forests into secondary forests. Threats to the tigers and prey include a new road built from the China border, timber extraction, non-timber forest product extraction, mining, subsistence hunting and wildlife trade with China.

14. Sumprabum (SPB)

Location: The survey area lies 9mi. (15km) east of the Kumaon Range and 10 mi. (17 km) W of Sumprabum at 26o29′-26o36′N and 97o21′-98o28′E.

Survey area: 130 sq.mi. (334 km2)

Elevation: 460′-4, 950′ (140-1,508m)

Description: It is bounded to the N by the Chaukan Pass and hills that receive snow in winter. The Hukaung Valley lies to the W, with Myitkyina Township to the S. The area is drained by the Hpungchan, Hpung-in and Mali Rivers in the east and northwest, and from the south by the Magyeng River. Vegetation is tropical evergreen, sub-tropical moist hill forest, and subtropical wet hill forest. Bamboos and rattan species occur in the under storey. Some swampland occurs in the area.

Access: The area is reached on foot from Sumprabum. Sumprabum is 131 miles (210 km) N by road from Myitkyina.

Rainfall: 91″ (2,339 mm)

Human impact and landuse: The area is sparsely populated (3.8 people/sq.mi.; 2.5/sq.km) with local people practicing shifting cultivation.

15. Momeik-Mabain (MB)

Location: The survey area is located between 23o45'-23o55'N and 96o43'-96o51' E and includes parts of Manpon, Nampa and Namme Reserve Forests.

Survey area: 133 sq.mi (340 km2)

Elevation: 426'-1,965' (130-599m)

Description: It is drained by the Maingthar and Namme River. Alluvial plains dominate the survey area with some rugged, rocky peaks including Parhoke Mountain 3,101' (945m), Wantu Mountain 3,003' (915m) and Kweanung Mountain 2,393' (729m). Vegetation comprises evergreen, MUMD and Indaing forest.

Access: From Mabain the study area is accessed by boat (18 mi.; 29 km), then by cart (12 mi.; 19 km), then on foot (18 mi.; 29 km). Mabain is 38 mi. (61 km) by ferry from Momeik. Momeik is 156 mi. (251 km) from Mandalay.

Rainfall: 52" (1,338 mm)

Human impact and landuse: Development of roads and infrastructure for gold mining has taken place since 1988 resulting in forest disturbance and pollution of natural drainages. Over 300 residents inhabit four goldmines in the forest. In the dry season, miners turn to bamboo and rattan cutting and resin tapping.

16. Myintmoletkat (MMLK)

Location: The survey area lies in the Htaung Pru Reserve Forest between 11o45'-11o38' N and 99o07'-99o03'E in Taninthayi and Bokpyin Townships, Myeik District.

Survey area: 120 mi. (310 km2)

Elevation: 110'-2,264' (33-690m)

Description: The eastern portion is drained by the Naukpyan, La Mu, Tabalat, and Ngawun Streams which flow into the Little Taninthayi River. To the west the Monoron Stream flows into the Lenyar River to the south. The area is partially low-lying with swamp and grassland that is annually flooded, interspersed with mixed evergreen-bamboo forest groves on higher ridges. The area lies on both sides of the new Taninthayi-Bokpyin highway, and is partially under cultivation for rice and areca palm with some shifting cultivation.

Access: By road from Myeik (58mi).

Rainfall: The area has two monsoons with a prolonged wet season from June-November, and annual rainfall of around 160" (4,127 mm).

Human impact and landuse: Base camp was situated 3 miles (5 km) S of Htaung Pru Village containing 15 households, with a further 38 households in adjacent Monoron Village.

17. S. Taninthayi (TNTY)

Location: The survey area lies in the Pe River Valley at 13o30' N and 98o38'E in Thayetchaung Township, Dawei District.

Survey area: 110 mi. (285 km2)

Elevation: 208'-2, 010' (63-612m)

Description: Pe River Valley is bounded to the N by the Mintha Reserve Forest, to the E by Myintmoletkat Mountain 6,801' (2,072m) to the S by the fork of the Pe and Plauk Rivers and on the W by Pe Mountain 2,720' (829m). Vegetation is characterized by a mosaic of riverine evergreen forest (30%) with sporadic secondary growth (30%) and shifting cultivation and orchard (40%). Areca palm and catechu plantations dominate the cultivated areas.

Access: The area is accessible from the Dawei-Myeik Highway, 53 mi. (85 km) south of Thayetchaung, and on foot 15 mi. (24 km) east of Pedat.

Rainfall: The area has two monsoons with a prolonged wet season from June-November, and annual rainfall of around 161" (4,127 mm).

Human impact and landuse: Due to the security situation, permanent settlements no longer exist in the area and farmers are permitted only weekly access to maintain and harvest their lands.

APPENDIX II. WILDLIFE RECORDED BY CAMERA-TRAP SURVEYS AT 17 SITES IN MYANMAR 1999-2002

Species	Scientific name	IUCN Status	CITES Status	Myanmar Status	No. records
The tiger	*Panthera tigris*	EN	App I	TP	5
Leopard	*Panthera pardus*	LR	App I	TP	92
Clouded Leopard	*Neofelis nebulosa*	VU	App I	TP	50
Golden cat	*Catopuma temminkii*	LR/VU	App I	TP	34
Marbled cat	*Pardofelis marmorata*	DD	App I	TP	15
Leopard cat	*Prionailurus bengalensis*	EN	App II	P	80
Wild dog	*Cuon alpinus*	VU	-	P	34
Small Indian civet	*Viverricula indica*	-	App III	TP	6
Large Indian civet	*Viverricula zibetha*	-	App III	P 1	35
Large spotted civet	*Viverricula megaspila*	-	-	P	1
Common palm civet	*Paradoxurus hermaphroditus*	VU	App III	P	14
Three-striped palm civet	*Arctogalidia trivirgata*	EN	-	P	1
Masked palm civet	*Paguma larvata*	-	App III	P	3
Spotted Linsang	*Prionodon pardicolor*	-	App I	TP	2
Banded Linsang	*Prionodon linsang*	-	App II	TP	5
Binturong	*Arctictis binturong*	VU	App III	P	15
Malayan sunbear	*Harlarctos malayanus*	DD	App II	TP	72
Himalayan black bear	*Ursus thibetanus*	VU	App I	P	17
Yellowthroated marten	*Martes flavigula*	-	-	P	16
Wild Pig	*Sus scrofa*	VU	App I	-	443
Hog badger	*Arctonyx collaris*	-	--	--	33
Myanma ferret badger	*Melogale personata*	-	-	-	1
Mongoose species	*Herpestes spp*	--	--	P	1

Crab-eating mongoose	*Herpestes urva*	-	-	P	22
Elephant	*Elephas maximus*	EN		TP	81
Gaur	*Bos gaurus*	VU		TP	265
Banteng	*Bos javanicus*	EN		TP	38
Tapir	*Tapirus indicus*	VU		TP	3
Sambar	*Cervus unicolor*	-		P 1	66
Serow	*Naemorhedus sumatraensis*	VU		TP	25
Common muntjak	*Muntiacus muntjak*	-		SP	847
Leaf deer	*Muntiacus putaoensis*	-		TP	2
Large mouse deer	*Tragulus napu*	EN		TP	9
Lesser mouse deer	*Tragulus javanicus*	-		TP	9
Malayan porcupine	*Hystrix brachyura*	VU		-	128
Brush-tailed porcupine	*Atherurus macrourus*	EN		-	32
Pangolin	*Manis javanica*	LR/NT		TP	2
Rhesus macaque	*Macaca mulatta*	LR/NT		P	97
Pig-tailed macaque	*Macaca nimestrina*	VU		P	59
Capped leaf monkey	-	-		-	2
Phayres langur	*Prebytis phayrei*	-		P	1
Dusky leaf	*Semnopithecus obscurus*	LR/NT	-	TP	1
monkey					
Squirrel	*Ratufa spp*	-		-	11
Other small	-	-		-	24
mammal species					
Blue Whistling Thrush	*Myiophoneus caeruleus*			SP	1
Green magpie	*Cissa chinensis*			P	1
Indian pied hornbill	*Anthracoceros albirostris*			TP	1
Jungle fowl	*Gallus gallus*			-	80
Laughingthrush species	*Garrulax spp*			P	1

Orange bellied	*Chloropsis hardwickii*			SP	17
leafbird Owl	*Strigiformes spp*			TP	2
Parrot	-			P	4
Pheasant species	-			TP	163
Black Stork	*Ciconia nigra*			-	2
Quail	*Coturnix spp*			-	2
Monitor lizard	*Varanus spp*			P	1
Tortoise	-				P 1
Green viper	*Trimeresurus spp*			P	1
Unidentified Human sign					165
Domestic elephant					10
Domestic buffalo					29
Domestic cow					46
Domestic dog					27
Villagers Suspected					242
poacher					61
Military Government					30
staff					25
				Total	**3811**

APPENDIX III. RESULTS OF INTERVIEW SURVEYS FOR THE TIGERS AT 17 SITES IN MYANMAR

Site	Direct observation (sighting)	Track and sign	Heard	Total observ.	Date of most recent direct observation
AKNP	**3**	5	9	17	1998
BGY	**2**	10	1	13	1998
HKV	**9**	10	0	19	2001
KLP	**6**	21	0	27	Oct 2000
MB	**16**	1	1	18	2001
MHM	**2**	5	0	7	Dec 1998
MMLK	**14**	6	0	20	Oct 2001
PLG	**9**	20	1	30	Apr 2000
PPDL	**6**	7	1	14	2000
RER	**6**	1	3	10	Jun 2000
RN	**7**	4	0	11	Jan 2000
SPB	**6**	10	0	16	1998
TD	**3**	3	1	7	2000
TMT	**4**	5	1	10	1996
TNTY	**14**	4	1	19	Feb 2002
Totals	**107**	**112**	**19**	**238**	

APPENDIX IV. HISTORICAL RECORDS OF TIGER IN MYANMAR - PRE-1999

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APPENDIX V. THE TIGER INTERVIEW PROTOCOL

1. How long have you been in this village?
2. What is your ethnicity?
3. Where do you get bamboo and wood to repair your house?
4. (If you get it from the forest) How far from your house to the forest?
5. How many times do you go into the forest per month?
6. Have you ever seen wild animals when you go inside the forest?

If yes,

Sr.	Animal (Prey)	Quantity		Forest		Human disturbance		Remark
		Many	Few	Unclassified	Reserved	Yes	No	

Sr.	Animal (Predator)	Quantity		Forest		Human disturbance		Remark
		Many	Few	Unclassified	Reserved	Yes	No	

1. Do you have any experience with predators attacking humans or livestock?

Sr.	(Predator)	Livestock						Time occur	Place occur	Remark
		Human	Buffalo	Cow	Goat	Pig	Others			

2. How do people use wild animal products in this area?

Sr.	Animal	Products				Usage		Marketsituation				Remark
		Meat	Bobne	Skin	Horn	Medicine	Food	Traditional	Place	User	Price	

3. What hunting methods do people use? What kinds of tools do they use for hunting?

Sr.	Prey	Hunting methods						Tool						
		Tracking	Smelling	Remnants	of	food	Info	Gun	Crossbow	Bow	Dogs	Snare	Trap	Digginghole

4. (If he/she does cultivation) How much land do you use? What kinds of crops do you plant? Do wild animals destroy your crops? If yes, what animals are they?

Sr.	Crops	Acres			Total acres	Animal that destroyed crops	Time occur		Remarks
		Paddy field	Shifting cultivation	Extended land			Day		

1. What kind of animals do you raise? How do you raise livestock?
(Free grazing/ farming) How far from village to grazing field? How many acres used for grazing/ (estimate)
2. Have you ever seen a the tiger?
(Yes-No Place……/ Time……../
Size…….)
Have you ever heard a roar of a the tiger?
3. Have you ever seen track, scratch, and faeces of the tiger?
If yes, how big is it?
(Showing a track of the tiger) Have you ever seen a track like this?
4. Have you ever seen a leopard? Size? Colour pattern?
5. What is your opinion about the usages of the tiger product medicine?
6. How many the tigers do you think live around this region?
7. Is there any the tiger product trade around this region?
8. What is your feeling and opinion about the tigers?
9. Please show animals you have seen from these pictures?
10. Please talk about the tigers that your parents and grandfather/mother have talked about?

General notes:

APPENDIX VI. TRACK AND SIGN FIELD RECORD FORM

Myanmar Tiger Survey *Wildlife Conservation Society, Myanmar Program*

Form No. 3
Track & Sign Data

Study Site: ....
Observation mode: ....
Observers: ....
....

Location: ....
Weather: ....
Forest type: ....
Compass bearing: ....

Date: ....
Time start: ....
Time finish: ....
Length of trail: ....

Time (hh:mm)	Distance (m)	Position GPS: Latitude N Deg	Min	Longitude E Deg	Min	Altitude	Way pt. No	Micro habitat A	B	C	Direction/location	Species name	Track/signs	Substrate	Age F/O	Measurement (mm) L	W	PW	Dia	Remarks
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:																				
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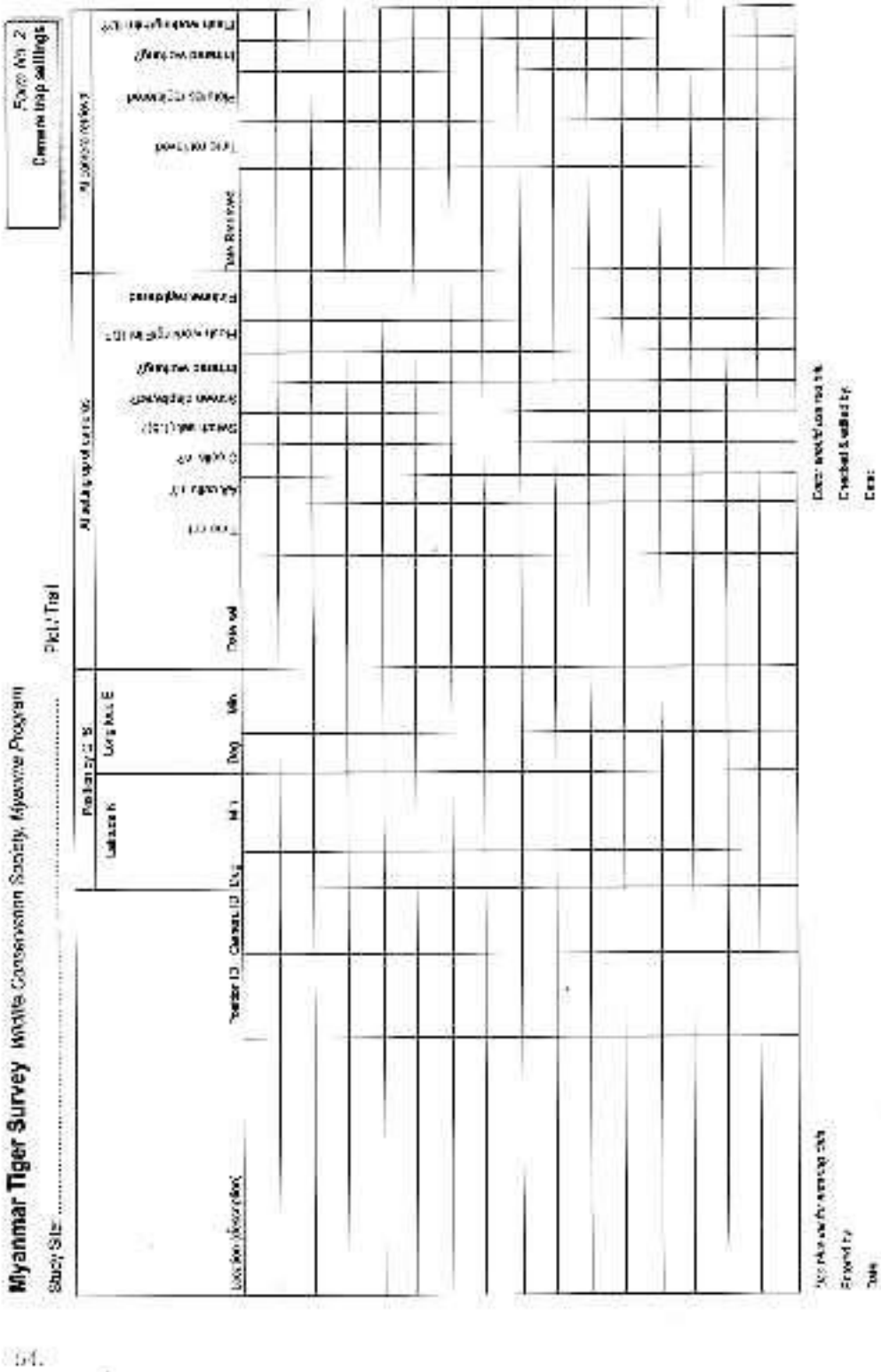
Use blue ink for recording data
Entered by:
Date:

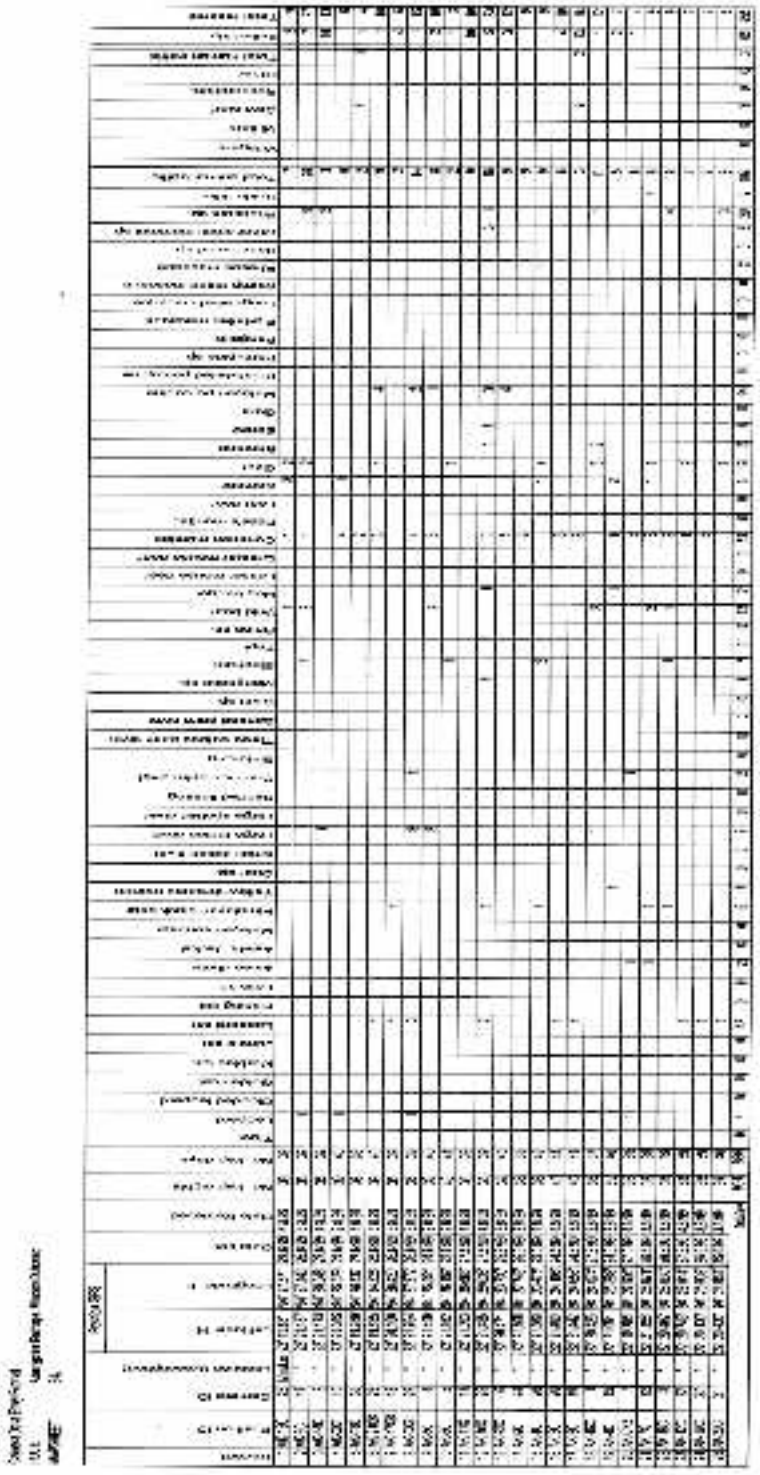
Editor should use red ink
Checked & edited by:
Date:

53

APPENDIX VII. CAMERA-TRAP FIELD USAGE FORM

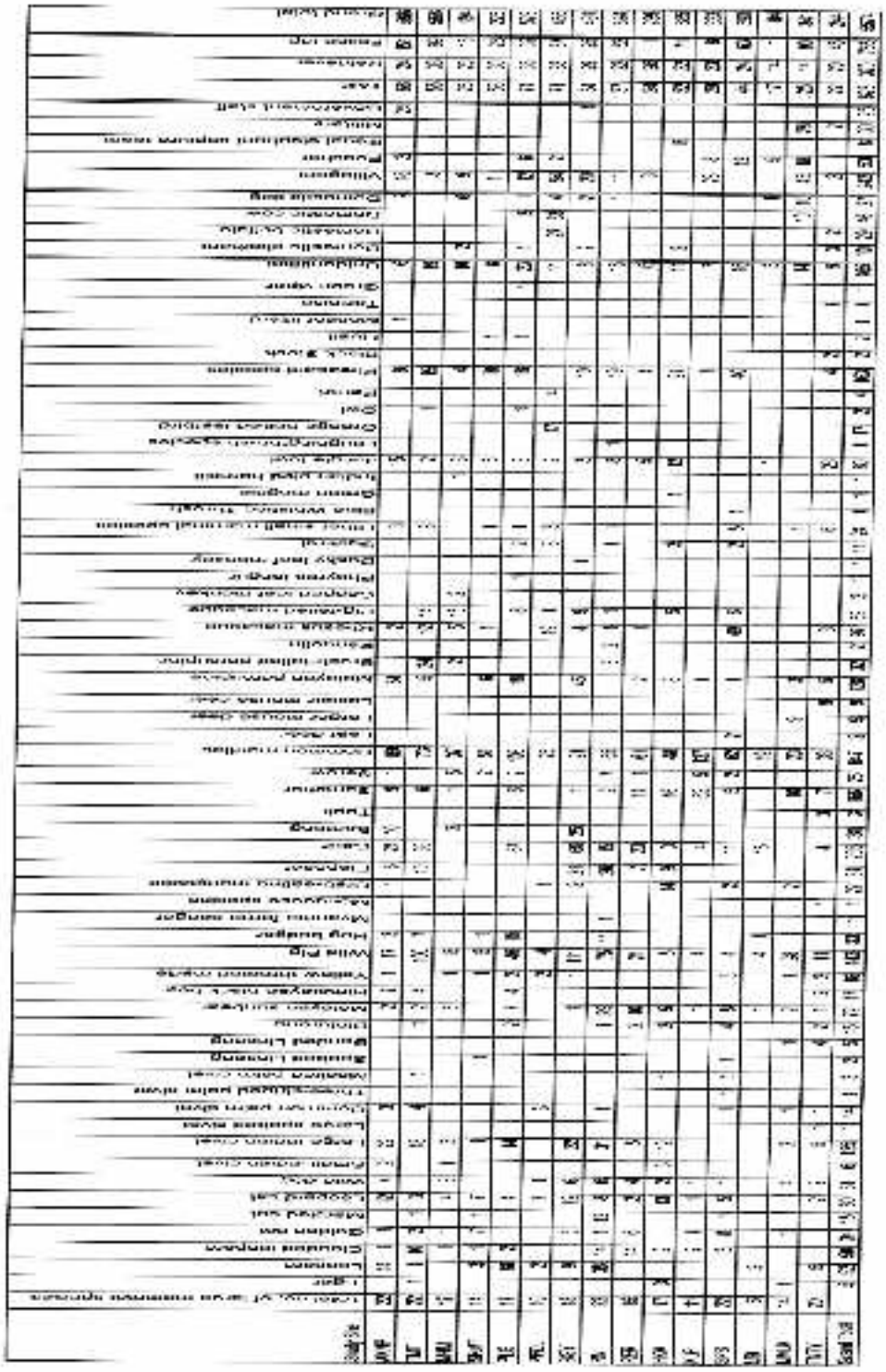


APPENDIX VIII. CAMERA-TRAP RECORD FORM

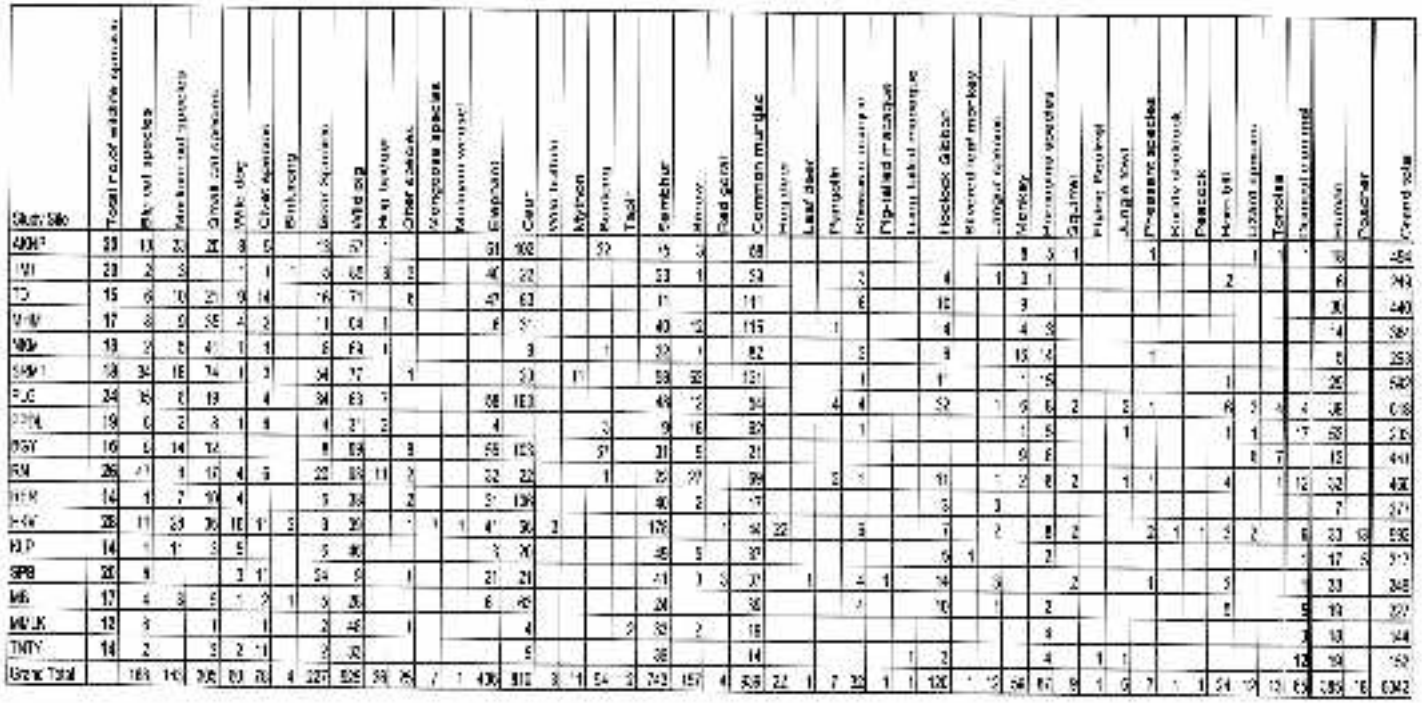


APPENDIX IX.

a. Detections of wildlife from camera-trap surveys at 17 sites in Myanmar, 1999-2002



b. Detections of wildlife from track and sign surveys at 17 sites in Myanmar, 1999-2002



Tiger Conservation Action Plan for Nepal
(2016-2020)

Government of Nepal
Ministry of Forests and Soil Conservation
Department of National Parks and Wildlife Conservation
Department of Forests
2016

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2016

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Foreword

Nepal is a biodiversity rich country in the world. Nepal is rich for tiger, rhino, and elephant which are also known as mega fauna are unique characteristics to lowland, terrestrial ecosystem. The Government of Nepal has been giving especial focus to conserve these flagship species through species conservation action plan.

Five protected areas namely Chitwan National Park, Bardia National Park, Banke National Park, Parsa Wildlife Reserve and Shuklaphanta Wildlife Reserve and nearby national forests are the major tiger habitats in Nepal. Besides, corridors and connectivity are playing important roles to pool the tiger genetic diversity in the Terai Arc Landscape (TAL). Department of National Parks and Wildlife Conservation is working on tiger conservation both at core and buffer zone areas and Department of Forests is working at outside the protected areas together with local communities and conservation partners. Tiger is an umbrella species and being a top carnivores to terrestrial ecosystem; we are working on tiger conservation following the holistic approach '*to save all just save one*'.

This tiger conservation action plan (2016-2020) is a practical tool to materialize the government conservation policies in the ground. Biodiversity conservation including tiger has multiple aspects and it requires joint efforts of stakeholders in terms of technical and financial resources both at local and national level. Realizing to this fact, this action plan is designed based on ongoing government policies and the St. Petersburg declaration of doubling the tiger number by 2022. The Ministry of Forests and Soil Conservation is fully committed to give especial priority to tiger conservation and create a conducive environment to work together with all conservation partners.

Finally, I would like to express my sincere thanks to both departments and the member of technical team for preparing this action plan. I am confident that successful implementation of this plan will contribute in biodiversity objectives and support to double the tiger population in Nepal.

Uday Chandra Thakur
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Foreword

The tiger (*Panthera tigris*) is an umbrella species of terrestrial ecosystem and is the largest among cats. They are apex predators, primarily preying on ungulates such as deer and bovid. Over the past 100 years, they have lost their historic range, and have been extirpated from southwest and central Asia and from large areas of Southeast and Eastern Asia. Recently, the population of the tigers is under threat due to poaching, loss of habitat and illegal trade. At present, it is confined in 13 tiger range countries including Nepal. The tiger has been classified as endangered by IUCN and protected under National Parks and Wildlife Conservation Act (1973), Nepal.

This tiger conservation action plan (2016-2020) focuses on improvement and restoration of tiger habitat through effective management of waterholes, grassland, corridors and connectivity. It aims to control poaching, illegal trade and resolve tiger human conflicts through effective law enforcement and engagement of local communities. Furthermore, it emphasizes on strengthening cooperation at national, regional and international levels to combat wildlife crime and tiger prey base monitoring.

Since Nepal has committed to double the number of tiger by year 2022, restoration and management of tiger habitat and corridors outside the protected areas are of utmost importance. Department of Forests will support effective implementation of this plan- manage tiger habitat, control poaching and illegal tiger trade outside the protected areas.

Finally, I would like to express my sincere thank to the technical team for preparing this action plan. I am confident that successful implementation of this plan will support to double the population of tiger.

Ganesh Jha.

Ganesh Jha
Officiating Director General
Department of Forests

Government of Nepal
Ministry of Forest and Soil Conservation
Department of National Parks & Wildlife Conservation

Acknowledgement

Nepal, as a tiger range country, has established five protected areas in the lowland of Nepal focusing on tiger conservation. Tropical and sub-tropical humid forests are the main tiger habitats in South Asia. In Nepal, Terai Arc Landscape (TAL), which is a main tiger habitat, is also known as the tiger landscape from Bagmati River in the east to Yamuna River of India in the west. Most of the tiger bearing protected areas of Nepal share the same habitat of tiger as they are situated in the border areas.

Tiger (*Panthera tigris*) is a top carnivores or apex predators to terrestrial ecosystem. The species is also known as umbrella species. Tiger are apex predators, primarily preying on ungulates such as deer and bovid. Over the past 100 years, they have lost their historic range, and have been extirpated from southwest and central Asia and from large areas of Southeast and Eastern Asia. Recently, the population of the tigers is under threat due to poaching, loss of habitat and illegal trade. At present, it is confined in 13 tiger range countries including Nepal. The tiger has been classified as endangered species by IUCN and protected under National Parks and Wildlife Conservation Act (1973), Nepal.

Nepal has established a long trend of tiger conservation action plan formulation and streamlines the conservation activities following the principle of *'to save all-just save one'*. This tiger conservation action plan (2016-2020) is prepared based on the St. Petersburg declaration of doubling the tiger number by 2022, forest policy 2015 and National Biodiversity Strategy and Action Plan (NBSAP-2014). The plan focuses on tiger habitat management mainly focusing on wetlands and grasslands, corridors and connectivity. In addition, it focuses on engaging of local communities, reducing human-tiger conflicts, managing of tiger prey-base and reducing the tiger crime both inside and outside the protected areas. Furthermore, this action plan emphasizes on strengthening cooperation at national, regional and international levels to combat tiger crime.

Finally, I would like to express my sincere thank to the technical team particularly Dr. Maheshwar Dhakal, Dr. Naresh Subedi, Dr. Kanchan Thapa and Mr. Laxman Paudel for drafting this action plan. I am confident that successful implementation of this plan will support to double the tiger population in Nepal.

Krishna Prasad Acharya
Director General

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Acronyms/Abbreviations

APO	Anti-Poaching Operation
APU	Anti-Poaching Unit
BaNP	Banke National Park
BNP	Bardia National Park
BZCFUG	Buffer Zone Community Forest User Group
BZUC	Buffer Zone User Committee
BZUG	Buffer Zone User Group
CBAPO	Community Based Anti-Poaching Operation
CBD	Convention on Biological Diversity
CBO	Community Based Organization
CF	Community Forest/Community Forestry
CFUG	Community Forest User Group
CHAL	Chitwan Annapurna Landscape
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CNP	Chitwan National Park
CTHs	Critical Tiger Habitats
DFO	District Forest Office/Officer
DNP	Dudhwa National Park
DNPWC	Department of National Parks and Wildlife Conservation
DoF	Department of Forests
EIA	Environmental Impact Assessment
GIS	Geographical Information System
GoN	Government of Nepal
GPS	Global Positioning System
GTF	Global Tiger Forum
GTRP	Global Tiger Recovery Program
HTC	Human Tiger Conflict
IAS	Invasive Alien Species
ITNC	International Trust for Nature Conservation
IUCN	International Union for Conservation of Nature and Natural Resources
Km^2	Square Kilometer
KWLS	Katerniaghat Wildlife Sanctuary
LEA	Law Enforcement Agencies
M	Meter
MoFSC	Ministry of Forests and Soil Conservation

MIST	Management Information System Technology
MoU	Memorandum of Understanding
NBSAP	National Biodiversity Strategy and Action Plan
NGO	Non-Governmental Organization
NPR	Nepali Rupees
NTCC	National Tiger Conservation Committee
NTNC	National Trust for Nature Conservation
NTRP	National Tiger Recovery Program
NWCCCC	National Wildlife Crime Control Coordination Committee
O&M	Organization and Management
PA	Protected Area
PWR	Parsa Wildlife Reserve
SAWEN	South Asia Wildlife Enforcement Network
SEA	Strategic Environmental Assessment
SWLS	Suhelwa Wildlife Sanctuary
SWR	Shuklaphanta Wildlife Reserve
TAL	Terai Arc Landscape
TBPA	Tiger Bearing Protected Area
TCM	Traditional Chinese Medicines
TCL	Tiger Conservation Landscape
TR	Tiger Reserve
TRC	Tiger Range Countries
USAID	United States Agency for International Development
VDC	Village Development Committee
WCCB	Wildlife Crime Control Bureau
WHC	World Heritage Convention
WII	Wildlife Institute of India
WWF	World Wide Fund for Nature
ZSL	Zoological Society of London

Executive Summary

The Tiger Conservation Action Plan for Nepal (2016-2020) aims to address the critical threats to tiger conservation by developing appropriate conservation strategies. Threats to tigers continue to rise with poaching, habitat loss, illegal wildlife trade, and human tiger conflict, while new threats such as wildlife disease and invasive species that can degrade habitat for tigers and prey are emerging, exacerbated by climate change. The action plan identifies strategic actions to address these threats by engaging a wide range of stakeholders, including local communities that will benefit through tiger conservation.

With the establishment of Banke National Park (BaNP) in 2010 and the 128 km^2 extension to Parsa Wildlife Reserve, the land base for tigers has been increased across the lowland area of the Tarai region. These additional tiger conservation areas are also important to protect other wildlife, and to sustain provisioning ecosystem services that benefit the people in the Tarai. However, expansions of protected areas have also led to some misunderstanding between the park authorities and local people because of constraints to the use of forest resources by the latter. Consequently, various management measures and awareness programs have been implemented to reconcile conservation goals with the needs of the local people, and to provide them with alternative resources and income generation streams.

With a 63% increase in the tiger population since 2009, Nepal's tiger conservation program has been deemed a success. To date, the areas of focus have been effective in protected areas management, building partnerships between park management and local communities and other key stakeholders, law enforcement, strengthening the regular patrolling system, and filling policy gaps. The Government of Nepal has given its enormous efforts through programs and policy, especially to Parsa Wildlife Reserve, Banke National Park, and Shuklaphanta Wildlife Reserve for habitat improvement of tigers and its prey, which is expected to contribute in doubling the tiger population, while stabilizing the populations in Bardia National Park and Chitwan National Park.

A goal of the Terai Arc Landscape is to manage Nepal's tigers as metapopulation, by maintaining connectivity among the protected areas, including the protected areas in India. This landscape approach to tiger conservation requires cooperation among various governmental and non-governmental organizations and local communities, as well as transboundary collaboration with stakeholders in India. Since the Tarai Arc Landscape was endorsed by the Government of Nepal in 2001, the Department of National Parks and Wildlife Conservation, together with the Department of Forests has been initiating various conservation and forest restoration activities across these five protected areas including their buffer zones, and the ecological corridors that facilitates dispersal of tigers and other megafauna.

This Action Plan is designed to continue on this successful trajectory to achieve the goal of doubling Nepal's tiger numbers (Tx2) by 2022 as of base year 2010. But, in addition to addressing the current threats, the plan will also provide actions to address several emerging threats through the following strategic actions:

- Improve and restore critical tiger habitats and corridors
- Manage grasslands and wetlands that are vital for tiger and its prey species
- Combat tiger crime through effective law enforcement
- Engage local communities in resolving human tiger conflicts
- Strengthen cooperation at national, transboundary, regional and international levels
- Strengthen tiger and prey-base monitoring and research

A business plan for the implementation of this Action Plan has been prepared. Respective departments under the Ministry of Forests and Soil Conservation (MoFSC) will be responsible for the implementation of this Action Plan. Much of this responsibility will lie within the Department of National Parks and Wildlife Conservation for the protected areas and buffer zones, and Department of Forests for outside protected areas.

The total indicative budget for the Action Plan for the period of five years is estimated at NRs 4, 05,475,300 (NRs 405 million). About 25.1% of the budget is estimated for research and monitoring, followed by grassland and wetland management (21.1%), conflict resolution and community engagement (17.9%), tiger crime control (17.7%), habitat restoration and improvement (16.5%) and transboundary cooperation (1.7%). The government's annual budget to DNPWC and DoF will be a major source of funding for tiger conservation. Ongoing support from various conservation partners like WWF Nepal, NTNC, ZSL Nepal and other relevant partners will provide key complementary funds and other resources.

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1 Chapter

1.0 Introduction

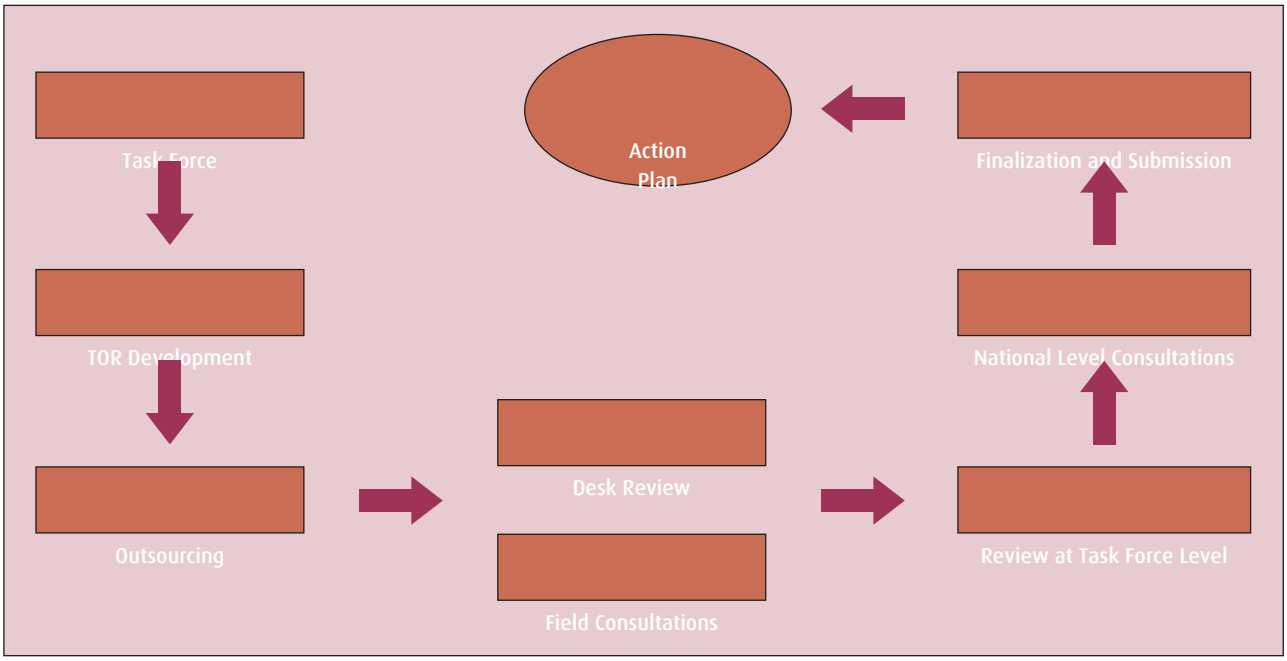
1.1 Relevance of the action plan revision

The tiger *(Panthera tigris)* is an apex species to terrestrial ecosystem and existed in a precarious state across its range. The species is listed as endangered in the International Union for Conservation of Nature (IUCN) Red List of threatened species and listed under Appendix-I by the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). The Government of Nepal has listed the tiger as a protected animal under the National Parks and Wildlife Conservation Act, 1973.

Nepal has a long history of tiger conservation since the inception of protected area systems in the country. The protected areas like Chitwan and Bardia National Parks were established focusing to tiger conservation. The tiger is a key priority species to tropical and sub-tropical ecosystem conservation in Nepal. The first Tiger Conservation Action Plan for Nepal was prepared in 1999 and was revised in 2007. The previous five-year Tiger Conservation Action Plan 2008-2012 was developed and implemented to accomplish the set objectives in conserving tigers in the country. During this time, the Government of Nepal developed a National Tiger Recovery Program (NTRP) in 2010 for five years. Based on the previous action plan and NTRP as well, this action plan has been reviewed and revised to address contemporary issues, threats, and challenges to tiger conservation in Nepal, and beyond. The main purpose of this action plan is to present a structured and holistic approach to achieve long-term conservation of the tiger in Nepal. This action plan is a guiding document to prescribe integrated and focused ground actions for tiger conservation in Nepal.

1.2 Revision process

A task force was formed comprising of experts from the Department of National Parks and Wildlife Conservation (DNPWC), Department of Forests (DoF), and major partner organizations; i.e., National Trust for Nature Conservation (NTNC), WWF Nepal (WWF), and ZSL Nepal etc. The main objective of the taskforce was to steer the action plan preparation process. The terms of reference were prepared to guide necessary preparatory works for plan formulation. A literature review and consultation workshops were carried out to collect the relevant information pertaining to tiger conservation. The first draft was reviewed by the task force members and then by the relevant experts. The comments and suggestions by the reviewers were received and incorporated to produce second draft plan which was then shared at a national consultation workshop. The special meeting was also organized for feedback from decision-makers. The feedback was then incorporated into the final document, which was then submitted to DNPWC for formal approval process (figure 1).



1.3 Scope of the action plan

This action plan will provide a guidance to the tiger bearing protected areas and nearby national and protected forests of Nepal for implementing recommended activities, help improvement of tiger conservation and in transboundary protected areas across the Terai Arc Landscape (TAL). This action plan contains background information on tiger conservation followed by a short review of the previous tiger action (2008-2012), implementation of NTRP (2010-2015) and concludes with a section highlighting issues, challenges, threat and opportunities to tiger conservation in Nepal. The next chapter deals with strategies and actions pertaining to tiger conservation for the period 2016 to 2020. The log frame and budget for the action plan is given at the end.

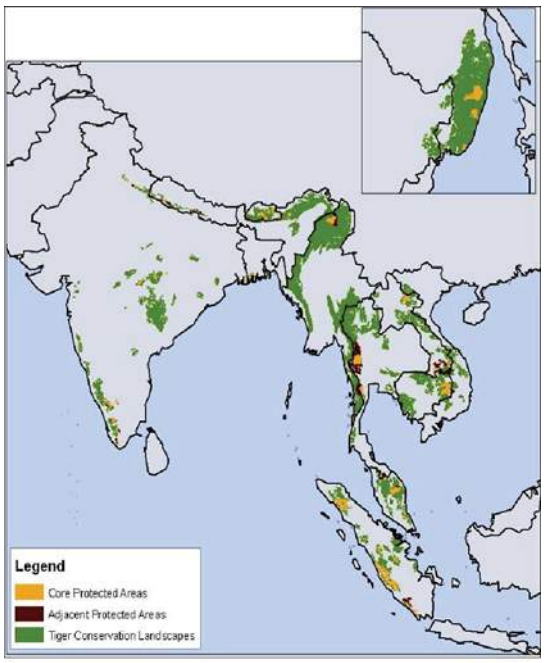
2 Chapter

2.0 Background

2.1 Global status and distribution

Historically, the tiger once existed as nine sub-species—Bengal tiger *(Panthera. tigiris tigris)*, Caspian tiger *(P. t. virgata)*, Amur tiger *(P. t. altaica)*, Javan tiger *(P. t. sondaica)*, South China tiger *(P. t. amoyensis)*, Bali tiger *(P. t. balica)*, Sumatran tiger *(P. t. sumatrae)*, and Indo-Chinese tiger *(P. t. corbetti)* and Malayan tiger *(P.t.jacksoni)*- distributed across Asia, from Persia to Indonesia, and north to the Russian Far east and Korea (Sanderson et al. 2006 and GTI 2010). But over the 100 years, tigers have disappeared from Southwest and Central Asia, from two Indonesian islands (Java and Bali), and from large areas of Southeast and Eastern Asia. Overall, tigers have lost over 93% of their historic range (Dinerstein et al. 2007, Sanderson et al. 2006). At present, suitable habitat for wild tigers covers about 1.2 million km^2 which has been categorized to isolated 76 Tiger Conservation Landscape TCLs across the 13 Tiger Range Countries (TRCs): Bangladesh, Bhutan, Cambodia, China, India, Indonesia, Lao PDR, Malaysia, Myanmar, Nepal, Russia, Thailand and Vietnam (Figure 2) (GTRP 2010).

Figure 2: Tiger Distribution across the Globe (Source: Global Tiger Recovery Plan 2012)



On the Indian subcontinent, where the largest remaining tiger population lives (Table 1), only 11% of the original habitat remains, but even these forests are being fragmented and are often degraded. Presently, the northern forests of Nepal-India-Bhutan-Myanmar, Western and Eastern Ghats, Sundarbans, and the tall grasslands and riparian forests of the Himalayan Terai set the foundation for tiger conservation across a diverse array of habitats in this bioregion (Sanderson et al. 2006).

Although there are no accurate estimates of the world's tiger population, the numbers are thought to have fallen by over 95% since the turn of the 20th Century. In 1998, the global tiger population was estimated to be 5,000 to 7,000 tigers (Seidensticker et al. 1999 cited in Chundawat et al., 2011). In 2009, during Kathmandu Global Tiger Workshop in Nepal, the global tiger population was estimated to be 3,200 tigers (Chundawat et al., 2011). It is clear that there have been substantial population declines of tiger population and decreased of their habitat, particularly in Southeast Asia (Dinerstein et al. 2007). As a wide-ranging, territorial top-predator, tigers require large spatial areas, and are sensitive to such changes in habitat. Thus, tiger conservation strategies require landscape-scale conservation approaches, where strategic tiger habitat outside protected areas are also conserved as corridors to link the populations in core areas in order to manage tigers as meta-populations (Wikramanayake et al. 2011).

Table 1: Status of tiger in range countries

SN	Country	Year 2010	Year 2015
1	India	1411	2246
2	Nepal	121	198
3	Bangladesh	440	106
4	Bhutan	75	103
5	China	45	45
6	Lao PDR	17	17
7	Myanmar	85	85
8	Thailand	200	200
9	Viet Nam	10	10
10	Cambodia	20	20
11	Indonesia	325	325
12	Malaysia	500	500
13	Russia	360	360
	Total Population	3609	4,215

Source: GTRP 2010; Dhakal et al. 2014 & Jhala et al. 2014

The Bengal Tiger *(Panthera tigris tigris)*, the most abundant sub-species, occurs in the Indian Subcontinent-Bangladesh, Bhutan, India, Nepal and western Myanmar which holds numbers around 3024 individuals. Among the total population of tiger in the world, India harbors the largest population, with about 2246 tigers, as indicated in 2014 census. This sub-species accounts for approximately 60% of all the subspecies remaining in the wild and has the best chance of long term survival in the wild (DNPWC/MoFSC/GoN 2007).

Box:1 Distribution of Tiger Sub-species and their status across the globe

1. Bengal tiger *(P. t. tigris)*: Indian sub-continent
2. Caspian tiger *(P. t. virgata)*: formerly in Turkey through central and west Asia (extinct)
3. Amur tiger *(P. t. altaica)*: Amur River region of Russia and China, and North Korea
4. Javan tiger *(P. t. sondaica)*: formerly in Java, Indonesia (extinct)
5. South China tiger *(P. t. amoyensis)*: South-central China
6. Bali tiger *(P. t. balica)*: formerly in Bali, Indonesia (extinct)
7. Sumatran tiger *(P. t. sumatrae)*: Sumatra, Indonesia
8. Indo-Chinese tiger *(P. t. corbetti)*: continental South-east Asia
9. Malayan tiger *(P. t. jacksoni)*: Malay Peninsula

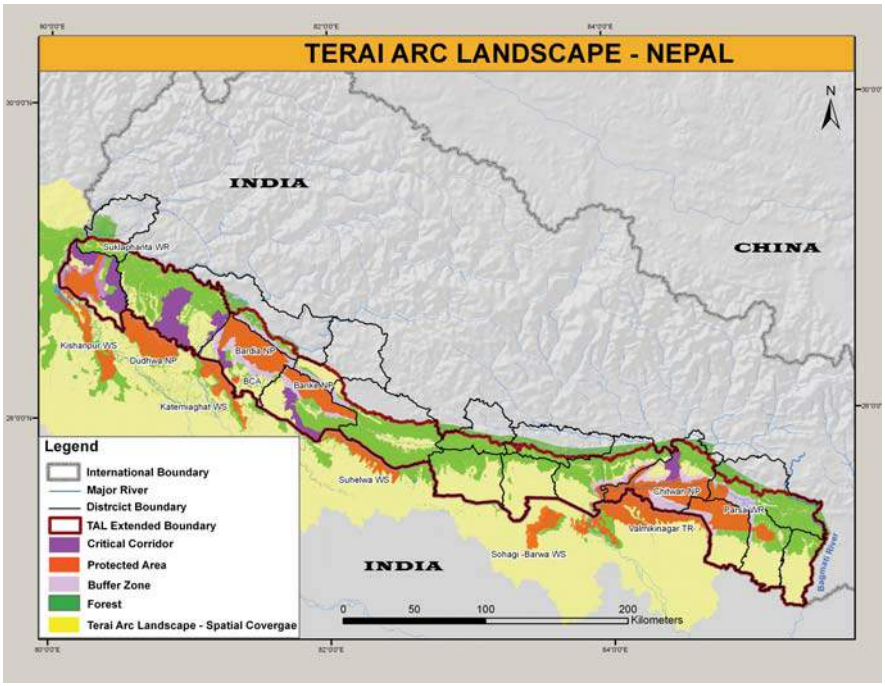
Source: Nowell and Jackson (1996)

Source: GTI, 2010

2.2 National Status and Distribution

Until the mid-twentieth century, Bengal tigers in Nepal were distributed along the contiguous lowland forests-Char Koshe Jhadi on the slopes of the Siwaliks, Bhabar and alluvial grasslands and riverine forests of Nepal (Smythies, 1942; James et. al., 1998 cited in Gurung et al. 2006). Anecdotal records confirm the presence of tigers in the Trijuga forest and Koshi Tappu Wildlife Reserve (KTWR) in the early days of 1970s; however, no signs have been recorded after mid-1970 (Gurung 2002), though it is yet to be verified by action research and ground trothing. In addition, tiger distribution has not been documented at elevations higher than the Siwalik Hills (approximately 1500m). Absence of tiger in Nepal's higher elevations may be due to: 1) the loss and fragmentation of habitats 2) high human density and its resulting pressure on the forest and 3) depletion of natural prey base. In the lowland areas, the majority of the habitats were converted to agricultural land or fragmented by the late 1960s due to a government settlement program following malaria eradication (Gurung, 1983 cited in Gurung et al. 2008). At present, the tiger distribution is more or less restricted to five protected areas of the TAL and adjoining forest areas (Figure 3) in three complexes; Chitwan-Parsa Complex (Barandabhar Corridor and Protected Forest, Chitwan National Park (CNP) and Parsa Wildlife Reserve (PWR)), Banke-Bardia Complex (Khata Corridor and Protected Forest, Bardia National Park (BNP) and Banke National Park (BaNP)) and Kailali-Kanchanpur Complex (Shuklaphanta Wildlife Reserve (SWR), Basanta corridor and Protected Forest, Laljhadi corridor and Protected Forest and Bramhadev Corridor). As forests in buffer zones and across TAL are restored, tigers have been reported to occupy 12 districts (Bara, Parsa, Chitwan, Makawanpur, Nawalparasi, Dang, Kapilvastu, Rautahat, Banke, Bardia, Kailali, Kanchanpur), out of the 14 TAL districts (Barber-Meyer et al. 2013, Karki 2011). The Dang and Kapilvastu districts were reported as tiger range districts based on the evidence of 2013 national census (Dhakal et al. 2014) as compared to 2009. Similarly Dhakal et al. 2014 reported the presence of tiger in the northern Barandabhar forest corridor (Protection Forest) in Chitwan-Parsa Complex. The result of tiger census 2013 and prevailing climate change effects inserted pressure to policy-makers and park managers to expand the TAL area considering possible wildlife refugia in the foothills of Siwaliks. The increasing trends of tiger numbers inside and outside the Protected Areas (Pas) in Nepal indicates that tiger population in Nepal is gradually recovering in some parts of their former range in response to conservation interventions, which is a step toward long term viability of tiger populations as an iconic and umbrella species. These recovering populations are re-colonizing in a rapidly expanding base of community managed forests (Gurung et al., 2006, Gurung, 2008) and buffer zone management activities.

Figure 3: TAL showing PAs and corridors



2.2.1 Policy, legislation and institutional reform

The tiger is listed as endangered in the International Union for Conservation of Nature (IUCN) Red List of threatened species and listed under Appendix-I by the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). The Government of Nepal has listed the tiger as a protected animal under the National Parks and Wildlife Conservation Act, 1973. Nepal Biodiversity Strategy and Action Plan (NBSAP) 2014-2020 emphasize priority actions in conserving endangered species including the tiger. Nepal has strong legal provisions to control wildlife crimes particularly for protected mammals. The NPWCA provisions 'a fine ranging from NPR 50,000 to NPR 1,00,000, or an imprisonment ranging from five years to 15, or both,' for offenders and accomplices convicted for illegal trade in tiger.

In 2010, Government of Nepal declared a new protected area, Banke National Park (BaNP), which is located in the low-lying areas of Mid-Western Region of Nepal, with a core area of 550 km^2 and 343 km^2 buffer zone. The BaNP is contiguous with Bardia National Park (BNP) to the west. The Kamdi forest corridor connects BaNP with Suhelwa Wildlife Sanctuary of India to the South. Four new VDCs, (Taranga, Hariharpur, Lekhparajul and Chhinchu) of Surkhet district, covering an area of 180 km^2 of habitat was added in the buffer zone of BNP in 2010. In 2016, 138 km^2 of extended habitat in the eastern side (i.e., towards the Halkhoria daha wetland) was included in the core area of Parsa Wildlife Reserve (PWR). These initiatives have immense contributions to increase the tiger population in Nepal.

The Government of Nepal amended the Wildlife Damage Relief Guideline in 2015 aiming to increase the relief amount, facilitate to deliver the relief amount on time, minimize human-wildlife conflicts including tigers, by providing relief support for human causalities, livestock depredation and property damages from wild animals. Since the enactment of this guideline, the relief amount has been increased from NPR 150,000 to NPR 300,000 and more recently to NPR 500,000 for human casualties. In addition to that, community based relief funds and special livelihood package programs to victims have already been initiated at protected area level. Considering that wildlife poaching and illegal trade are major threats in wildlife conservation, a National Anti-Poaching and Illegal Wildlife Trade Control Strategy for collaborative actions to control wildlife crime has been drafted and is in the process of being approved. The strategy addresses the three key aspects of species conservation; 1) patrolling, 2) information collections, and 3) operations. Similarly, the CITES bill is in the process of approval from parliament.

In June 2010, to curb illegal trade on wildlife species, Government of Nepal constituted a high-level National Tiger Conservation Committee (NTCC) under the chairmanship of the Right honorable Prime Minister to guide in policy and ensure multi-stakeholders' cooperation and proactive engagement of law enforcement agencies to conserve tigers in the country. The committee is comprised of several concerned government ministries, national tiger experts and representative from conservation organizations. The Government has also formed a National Wildlife Crime Control Coordination Committee (NWCCCC) under the chairmanship of the Hon. Minister of Forests and Soil Conservation. Similarly, a central level Wildlife Crime Control Bureau (WCCB) is coordinated by the Director General of the DNPWC. At district level, 22 WCCBs units comprising a wide range of concerned government and non-government authorities have been formed to effectively mobilize available expertise and resources to combat wildlife crime in the country. To fight against organized illegal wildlife trade at regional level, the South-Asia Wildlife Enforcement Network (SAWEN), with its secretariat in Nepal, was established in 2011. SAWEN takes concerted and coordinated actions in eight South Asian countries.

The Ministry of Forests and Soil Conservation signed a Memorandum of Understanding with China in 2010 to promote biodiversity conservation and curb the illegal wildlife trade and a resolution of transboundary cooperation with India is renewed on annual basis.

2.2.2 Tiger populations and habitat occupancy across TAL, Nepal

The tiger census of 1995/96 estimated a total of 93-97 breeding adult tigers in Nepal, with 48-49 in Chitwan NP, 30-32 in Bardia NP, and 15-16 in Shuklaphanta WR. In 1999/2000, the tiger population was estimated at 98 to 123 breeding adults (Table 3), indicating some growth. But in 2007, the population was estimated at 105-123 individuals, and the decrease in the population growth rate was attributed to high poaching (NTRP 2010).

However, the past tiger estimates were based largely on pugmark projection methods, which have been proven to be unreliable surveys (Karanth et al. 2003). But starting from 2009, the tiger estimates have been based on standardized, science-based methods that use systematic camera trapping and transect surveys. The surveys conducted from 2009 onwards show an increase in tiger numbers in all protected areas, for a total population increase from 121 in 2009 to 198 in 2013 (DNPWC 2010, Karki et al. 2013, Dhakal et al. 2014; Table 2).

Table 2: National Tiger Estimate from 1999/2000 to 2013/14

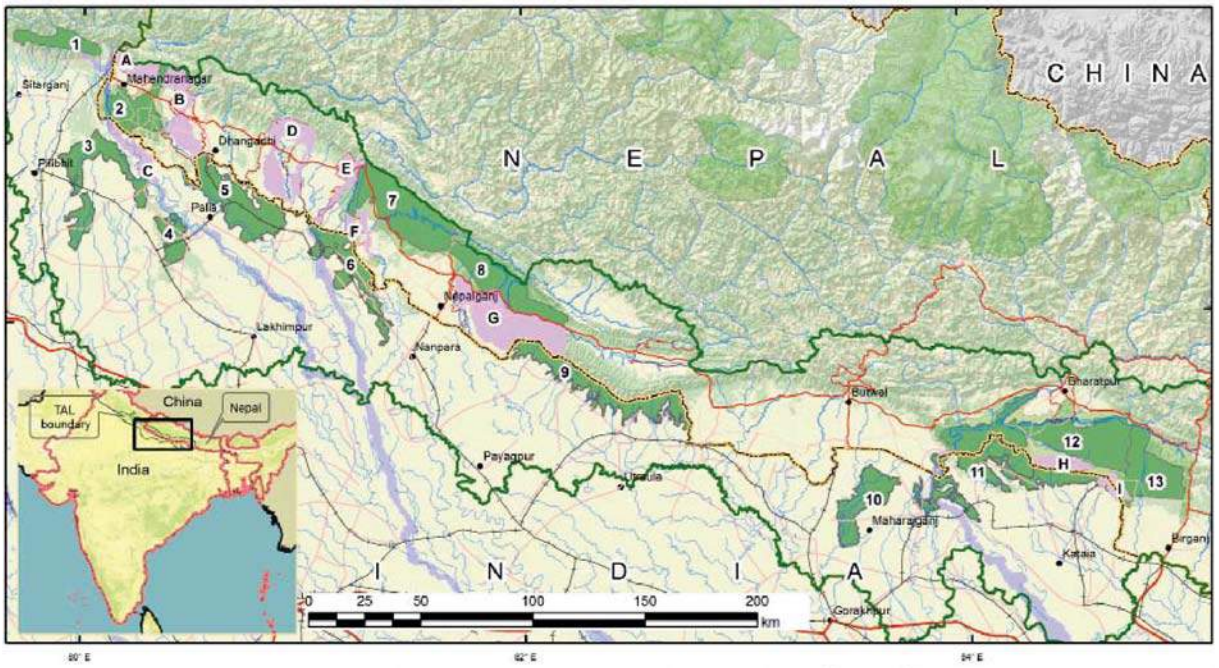
Location/PAs	1999/2000		2005		2009	2013
	Adult	Total	Adult	Total	Total	
CNP	56-60	-	56-60	173-209	91	120
Barandabhar PF	-	-	-	7		
BNP	32-40	111-139	32-40	111-139	18	50
SWR	16-23	56-80	16-23	56-80	8	17
BaNP						4
Kailali Trijuga, Jhapa Forest	5-7	-	5-7	20	-	-
PWR	-	-	-	-	4	7
Total	98-123	340-350		360-370	121	198

2.3. Meta-population Management in the Tarai Arc Landscape

The major strategies action for TAL is to manage the rare and endangered mammals as meta-populations through protecting, restoring and managing critical habitats. The tiger is a wide-ranging species that requires ecological and genetic connectivity and large spatial habitats. The TAL spans 600 km of international border, of which approximately 250 km is forested. These forests provide important opportunities for transboundary conservation of wildlife.

Nine corridors between Nepal and India have been identified in the TAL, namely; 1) Brahmadev-Boom (India), 2) Laljhadi, 3) Lagga-Bagga-Tatarganj (India), 4) Basanta, 5) Karnali, 6) Khata, 7) Kamdi, 8) Someshwor, and 9) Parsa - Valmiki (India) (Figure 4). These corridors are meant to facilitate ecological connectivity and tiger dispersal between protected areas. Conservation efforts to restore and manage some of these corridors have been successful, while some have not been as successful. The long term camera trap monitoring data provide evidence of tiger movement between BNP and Katerniaghat Wildlife Sanctuary through the Khata Corridor, SWR and Pilibhit Tiger Reserve through the Lagga-Bagga-Tararganj Corridor, and Chitwan National Park and Valmiki Tiger Reserve. Four tigers (three males and one female) were captured in the Khata corridor and in Katerniaghat wildlife sanctuary during the joint camera trapping survey, while two adult male tigers were found in SWR, Lagga-Bagga, and Tatarganj (North Kheri Forest Division) (Chanchani et al. 2014).

Figure 4: Corridors in TAL Nepal and India



Symbol	PA name	Symbol	PA name
1	Nandhaur WLS	8	Banke NP
2	Shuklaphanta WR	9	Suhelwa WLS
3	Pilibhit TR (Formerly FD	10	Sohagibarwa WLS
4	Kishanpur WLS	11	Valmiki TR
5	Dudhwa NP	12	Chitwan NP
6	Katerniaghat WLS	13	Parsa WR
7	Bardia NP		

Symbol	Corridor	Symbol	Corridor
A	Boom-Bhrahmadev	F	Khata
B	Laljhadi	G	Kamdi
C	Laggabagga-Tatargunj	H	Someshwor
D	Basanta	I	Parsa Valmiki
E	Karnali		

Legend

- TAL Protected Areas
- Corridors
- Rivers
- TAL boundary
- International boundary
- Major city/towns
- Railway
- Highway
- Metalled roads
- Other roads

The Chitwan-Valmiki forest complex has a shared boundary of approximately 100 km. In addition to the protected area complex, the large forest patch in the Churia's Someshwor hills of Chitwan NP is also functioning as a corridor and connectivity. The Churia forests holds tigers, even though at low density with just 2 tigers per 100 km^2 (Thapa and Kelly 2016). These forest corridors, in the buffer zone of Chitwan NP, link Chitwan with the north-eastern part of Valmiki TR (VTR) in India. The Someshwor hill forest (145.89 km^2) links with VTR to the south and with CNP along its east and west boundaries. The 2013 survey recorded three male and one female tigers that were found to be dispersing between Chitwan and Valmiki. In addition, there are sparse tiger signs in Kamdi, Laljhadi and Basanta corridor, indicating occasional use of these corridors by tigers. No evidence of presence/movement of tigers was recorded across the Boom-Brahmadev corridors in Shuklaphanta- Pilibhit corridor.

Local communities are engaged in conservation of these corridors. The livelihood improvement of the communities living around these corridors has provided incentives and motivated them to become conservation stewards. Furthermore, the supportive role of conservation partners at multiple aspect of tiger conservation is equally imperative to increase the tiger number in Nepal.

Chapter 3

3.0 Review of the Past Action Plan (2008-2012)

3.1 Implementation status

The previous action plan was implemented from 2008 to 2012. Similarly, the NTRP was also implemented from 2010 to 2015. The past conservation efforts have mixed conservation outcomes. Major activities of tiger conservation action plan (2008-2012) were implemented as per the plan. However, some of the activities are yet to be implemented in the following year. The major activities yet to be implemented are:

- Develop tiger and prey base genetic profiling by establishing forensic lab in Nepal
- Mainstream the buffer zone activities and reduce the pressure on forest resources
- Conduct research and monitoring on tiger diseases surveillances
- Make efficient and efficient law enforcement system mainly record keeping and reporting with timely publication
- Reduce duplication and overlapping among the tiger conservation activities
- Making standard operating procedures on natural tiger death and human tiger conflicts
- Play an active role to avoid the development infrastructure through tiger bearing protected areas
- Decentralize the relief amount to the ground level, increase the amount and deliver on time
- Regular assessment of prey base and their distribution
- Support to frontline staff and equipped them on regular basis
- Develop and design green smart infrastructure in and around the tiger bearing protected areas
- Revisit and reform institutional structure of buffer zone user committees and user groups

Photo credit: Sagar Giri

4 Chapter

4.0 Conservation efforts and major achievements

Among the tiger range countries, Nepal has achieved remarkable successes in tiger conservation over the past five years. The national tiger census results have shown a 63% increase in the tiger population between 2009 and 2013, indicating that Nepal is on track to achieve its national Tx2 goal by 2022. The Nepal's conservation strategies to achieve this goal includes engagement with local communities, livelihood improvements and enhancement programs, partnerships with state and non-state conservation actors, institutional reforms (from Community Based Anti-Poaching Units [CBAPU] to National Tiger Conservation Committee [NTCC]), and outreach (people to prime minister). These strategies have been producing positive results on the grounds, reflected in the 365 days of zero poaching with rhinos and reducing poaching of other wildlife as well. New initiatives such as the introduction of Real Time SMART patrolling have improved the success of park patrolling. Regular transboundary meetings with India and China and the establishment of the South Asia Wildlife Enforcement Network (SAWEN) have helped to coordinate trans-boundary law enforcement.

Expansion of protected areas and declaration of BaNP as a new protected area have increased available habitat for tigers, particularly by adding grasslands and wetlands as prime tiger habitats. In BNP, the community based anti-poaching operations are producing positive effects, and engages local communities in protection and management of corridors and forest areas. The expansion of buffer zones in the northern flank of BNP has provided much needed protection to the core area of BNP. Poaching has been controlled outside the protected areas bringing all the LEAs under the Wildlife Crime Control Bureau, with offices established in 22 districts. Provisions of relief mechanisms and livelihood alternatives for families affected by wildlife attacks have greatly helped to encourage and develop stewardship in conserving wildlife species that interact with local communities. All these activities and programmes have underscored the government's commitment to meet its tiger conservation goal

Photo credit: WWF Nepal

5 Chapter

5.0 Issues, Threats and Challenges

Major issues, threats and challenges in tiger conservation are as follows.

5.1. Issues

5.1.1 Issues related to habitat and dispersal corridors

- Habitat degradation triggered by invasion of alien invasive species, especially *Mikania micrantha* and *Lantana camera*.
- Habitat fragmentation and dissection of corridors due to uncoordinated linear infrastructure (such as roads, steep-sided irrigation canals, and high tension lines)
- Encroachment into forest corridors
- Excessive mining of boulders, gravel and sand, especially from rivers and riparian areas
- Fragmented connectivity between Chure and Dudhwa National Park along Basanta and Laljhadi-Mohana corridors in the south.
- Overgrazing by domestic livestock in corridor forests and peripheral areas of tiger bearing PAs (such as Shuklaphanta WR, Parsa WR and Banke NP)
- Drying up of wetlands, including ox-bow lakes
- Grassland shrinkage by woody perennials

5.1.2 Issues related to wildlife crime

- Inadequate network of law enforcement agencies at local, district and central levels
- Increasing trend of demand of tiger parts in the international black market
- Limited network of informants and intelligence generation
- Low fine penalties for offenders and lengthy law enforcement process
- Lack of reliable forensic laboratories
- Under-equipped anti-poaching units, informants and intelligence networks
- Inadequate resources available to park staff and WCCB units at district level
- Porous international borders with India and China
- Poor surveillance at the airports, border customs

5.1.3 Issues related to human-tiger conflicts

- Lengthy relief delivery process to wildlife victims
- Lack of livelihood support programmes to wildlife victims and their families
- Poisoning and retaliatory killing of tigers
- Livestock depredation
- Crop damage from tiger's prey species
- Encounter with tiger while using public right of ways in the core area that passes through the tiger habitat
- Human casualties from tiger

5.1.4 Issues related to national and transboundary cooperation

- Cross border poaching and illegal wildlife trade between Nepal and India, and Nepal and China,
- Inadequate consultative meetings at local level, mainly with China
- Inadequate intelligence and information sharing among neighboring countries
- Inadequate coordination and support between development agencies and conservation agencies especially for construction of mega-infrastructure projects.

5.1.5 Issues related to knowledge base

- Inadequate knowledge on tiger ecology, demographic patterns and population dynamics, particularly outside protected areas
- Lack of a systematic data management system
- Inadequate knowledge on anthropogenic impacts on tiger and their habitat
- Lack of reliable forensic facilities for individual tiger identification
- Limited information on population viability (PVA) and carrying capacity of tigers
- Limited national capacity on forensic science and wildlife disease

5.2. Threats and challenges

5.2.1 Habitat Loss and fragmentation

Historically, there was contiguous forest cover across the Tarai and Churia region of Nepal. The forest cover estimated at 60% in 1960s, shrank to 29% in the 1990s as Nepal lost 5,700 km^2 of natural forests during a span of 27 years, from 1964 and 1991. Over 3,800 km^2 of this land was converted into agricultural land. The latest forest resource assessment of Nepal shows that 76.70 % of core area and 23.30 % of buffer zone is covered by forests, which are prime habitat of tiger (DFRS 2015).

The high human population growth, especially from migration into the Tarai from the mountains, and subsequent encroachment into forests to create settlements and to expand agricultural lands has been the primary reasons for widespread habitat loss. Settlements and linear infrastructure projects (roads, railroads, irrigation canals, etc.) are routinely planned inside protected areas or corridors which are responsible for fragmentation and degradation of tiger habitat.

The East-West highway passes through or adjacent to all five tiger bearing PAs of Nepal has resulted in road kills of wildlife. The irrigation canal that goes through Bardia NP and Banke NP is also good example of linear infrastructure that prevents movement of wildlife even across the core areas. The Kathmandu-Nijgadh fast track has been planned to traverse through the Parsa buffer zone. Not only this, railway project was also planning to construct through the core area of Chitwan NP. But, rigorous dialogue, negotiation, and better planning between conservation and development agencies have now agreed to realign the railway track outside the core area of Chitwan NP. This represents an example of good planning to accommodate conservation and development, and should become a model to integrate green and grey infrastructure in conservation planning at landscape scales. However, the public right of ways from Kasara to Madi- Bankatta in Chitwan NP and from Bhurigaon to Telpani in Bardia NP will fragment these important core tiger habitat and should be similarly resolved.

In addition, lack of quality environmental impact assessment and implementation of impact mitigation measures has become serious issues over the balance between conservation and development.

5.2.2 Habitat Degradation

The quality tiger habitat is a part of healthy ecosystems in the lowland of Nepal. Loss and degradation of tiger habitat have resulted low prey availability in both inside and outside the PAs due to increased competition for food. Continued illegal hunting outside PAs is also contributing towards the depletion of natural prey-base. Inadequate large or medium-sized prey cannot support viable tiger populations (Karanth & Smith 1999). Insularization of core areas as a result of fragmentation limits the dispersal potential of new individuals into the habitat, posing the risk of inbreeding depression in the long run. Thus, habitat loss, degradation and

fragmentation limit the land base for tigers particularly in Tarai region. Over collection of fodder, grasses, firewood from the forests, grazing, forest fire, and alien invasive species are the major driving factors to degrade the tiger habitat. Similarly, floods, pollution and river cutting are other factors. These factors have directly affected to riverine ecosystems. Siltation of wetlands is another reason of tiger habitat degradation.

5.2.3 Invasive species

Major invasive alien plant species that adversely affect tiger habitats include *Mikania micrantha*, *Chromoleana odorata*, and *Lantana camera*. Mikania grows in marshy and riparian habitats of PWR and CNP, and are spreading rapidly to the west. This species has already been recorded in Kapilbastu district, and may reach Banke and Bardia. Mikania suppresses the growth of other native plant species on which tiger prey species depend. The spread of Mikania is exacerbated by disturbances, such as fire, annual flood, and human mediated dispersal (Swamy & Ramakrishnan 1988 cited in Subedi 2012). Lantana and Chromolaena have spread in all tiger-bearing protected areas. Lantana is a woody perennial that grows well on alluvial soils and aggressively invades open grasslands, but also does well in forest ecosystems. Chromolaena grows in almost all environments and suppresses the growth of native vegetation. Water hyacinth *(Eichornia crassipes)* is prevalent in all lowland lakes, including ox-bow lakes, and encourages siltation and drying up of wetlands. Other invasive species that have adverse impacts on tiger habitats include *Ageratum conyzoides, Ageratina adenophora* and *Parthenium hysterophorus*.

5.2.4 Human-tiger interface

Human-wildlife conflicts have become one of the major threats to tiger conservation. The trend of human casualties from tiger conflict in Nepal has increased from an average of 1.2 (±1.2) persons per year prior to 1998 to 7.2 (±6.9) persons per year from 1998 to 2006 (Gurung et al. 2008). Livestock depredation by tigers and human casualties due to accidental attacks and man eating behavior of an individual tiger are the major source of tiger-human conflict. The underlying causes of human-tiger conflict are habitat shrinkage, increasing human interface along the park boundaries, increasing pressures on park/ reserves for forest resources collection. Besides these, crop damage by the wild ungulates in the buffer zone has created the conflicts between park/ reserves and local communities. Use of buffer zone and core area for livestock grazing is becoming a conflicting issue between park and people in the recent days. Persistent human-tiger conflict creates negative attitudes among local communities towards conservation of tigers, unless appropriate mitigations are proactively implemented.

5.2.5 Diseases

Detailed information on wildlife disease is lacking in Nepal. Canine distemper is a fatal disease that can spread rapidly through a tiger population. The disease is caused by a single-stranded RNA paramyxo virus, which is a close relative of the viruses that cause measles in humans and rinderpest in cattle and other cloven-hoofed ungulates. Distemper or hard pad disease in canids also affects large felids, including the tiger.

5.2.6 Climate change impacts

Increasing climate variability is likely to result in extreme weather conditions, which includes prolonged drought conditions as well as increased floods and flashfloods. Water stress could become an issue for tigers and prey species in the dry season, possibly bringing wildlife into increasing conflict with people and livestock. Increased contact could transfer zoonotic diseases among wildlife, livestock, and people. Impacts of high flashfloods in wildlife habitats, especially in riparian areas have been experienced in the past, including in the Himalayan region. But the impacts can persist long after the flood waters receded, as grazing lawns are buried under sand depositions and water holes are filled with mud.

In the long-term, rising temperatures and changes in precipitation patterns and intensity due to climate change will have an impact on vegetation types and composition. This may result in major shifts or changes in wetlands, grasslands, and forest types and their species compositions (Thapa et al. 2016). More frequent and intense forest fires due to warmer ambient conditions and longer droughts could become major threats to wildlife species and their habitat. Forest fires may become more frequent and intense as temperatures rise, drought periods become longer, driving forests towards the tipping points of change.

5.2.7 Wildlife poaching and trafficking

Poaching of tigers and their prey, and trafficking of tiger body parts are a major threat to tiger conservation across all tiger range countries. Over the past 10 years, more than 1,000 tigers have been killed across the range, and their parts illegally traded to meet consumers demand (WWF 2012). Increased number and volume of seizures of tiger bones and skins across Nepal in recent years indicate that tiger poaching is still a critical threat to tigers in Nepal, despite the steps taken to arrest poaching and poachers. In 2015 alone, 15 tiger skins and 121 tiger bones are confiscated during 14 different detections. Reportedly, Nepal is both a source as well as transit country for illegal wildlife trade between India and China, and Kathmandu is a major transit point ("Staging Point") for the illegal trade in the region (EIA 2004). The porous border with India and China and extensive international airline connections with weak detection checks enable relatively easy trafficking of tiger and other wildlife parts through Nepal (Wright & Kumar, 1997).

5.2.8 Collaboration and coordination

Coordinated efforts of concerned stakeholders is key to achieving successful conservation at landscape scales, and has been a key contributory factor in Nepal's successes in tiger conservation. Strong, synergistic collaborations among government and conservation partners have developed with the formation of high-level coordination committees, both for funding and joint implementation of conservation programs in the country. Working with Nepal Police particularly with the CIB to control the illegal wildlife trade, strengthening the role of the Nepal Army in patrolling core protected areas, and taking proactive actions in the buffer zones to engage with communities and community based organizations in conservation are some of the collaborations that have contributed to the successes of tiger conservation in Nepal. However, better inter-sectoral collaboration and coordination is needed, especially with the development sectors to ensure that future development projects and plans do not impact on conservation priorities.

5.3 Opportunities

Tiger conservation is matter of national priority and pride for Nepal. Growing support and cooperation from local communities, youth, policy makers and conservation partners for tiger conservation has yielded satisfactory results in recovering critically depleted wildlife populations, including the tiger and rhinoceros. Tiger-based tourism has contributed to local economies. Similarly, national and international conservation organizations are continuously supporting and extending their cooperation for the long-term survival of tiger in Nepal. The wildlife enforcement agencies have contributed significantly to controlling poaching and illegal trafficking of wildlife parts; maintaining zero poaching of rhino which is obviously beneficial to tiger conservation as well. There is also equal opportunity to gain financial incentives through carbon trade from well managed forests and corridors.

5.4 Laws and Policy Frameworks

Main guiding documents that were consulted during the preparation of action plan include:

- National Parks and Wildlife Conservation Act 1973
- Forest Act 1993
- Environmental Protection Act 1995
- Forest Policy 2015
- National Biodiversity Strategy and Action Plan 2014-2020
- Wildlife Damage Relief Support Guideline, 2015
- Terai Arc Landscape Strategy and Action Plan 2015,
- Protected Area Management Plans and District Forest Plans
- National Tiger Recovery Plan (NTRP) 2010
- Global Tiger Recovery Plan (GTRP) 2010
- Protection Forest Management Plans

Chapter 6

6.1 Goal

Conserve tigers and their habitats through maintaining healthy ecosystems to contribute in doubling of tiger number by 2022 considering 2010 as base year.

6.2 Objectives

Objective 1: Improve and restore critical tiger habitats and corridors

Rationale

The increasing demand for land by an increasing human population for settlements and agriculture expansion and the large linear infrastructure developments are the major drivers of tiger habitat loss, degradation, and fragmentation at a landscape scale. Drying wetlands, alien invasion species, and forest succession in important grasslands also degrade important tiger habitat in the core areas, while over grazing by livestock and unsustainable forest resource use are degrading dispersal corridors (Thapa et al. 2013). Some linear infrastructure has also been planned inside protected areas and through important wildlife corridors without adequate consultations and coordination with conservation authorities. This infrastructure, if built, will fragment tiger habitat within the core areas and sever corridors threatening the long term survival of tigers in Nepal, and reversing over a decade of conservation investment and successes achieved. Thus, appropriate actions are necessary to re-plan and realign infrastructure to prevent fragmentation of core areas, with design-related mitigations, such as viaducts (wildlife underpasses) to maintain corridor functionality where infrastructure cannot be realigned.

Outputs

- Tiger habitat in the core areas, buffer zones and corridors are restored and reclaimed
- The national strategy on invasive species control and management developed and implemented
- An encroachment evacuation plan for corridors and buffer zones prepared and implemented

Actions

- Prepare land use map of protected areas and forest corridors focusing on wetlands and grasslands
- Declare identified corridors as eco-sensitive zones
- Monitor land use change using remote sensing and aerial drones wherever applicable
- Select, design and construct wildlife-friendly flyovers or underpasses (as appropriate) at strategic locations of biodiversity hubs for wildlife movement
- Connect major blocks of wildlife habitat through corridors for maintaining the ecological integrity
- Prioritize climate resilient patches of forest for conservation in the northern flanks of TAL
- Restore forest patches for enhancing connectivity in major corridors; Brahmadev, Laljhadi-Mohana, Basanta, Khata, and Kamdi
- Evacuate and restore the encroachments in corridors and other important tiger habitat

- Develop standard norms for green infrastructure development in tiger habitat
- Support livelihood improvement programme that enhance greenery in degraded corridors
- Advocate for social and environmental assessment at the plan, programme and policy level for development of mega projects before undertaking EIA at an individual project level
- Conduct feasibility study of potential tiger habitat across the TAL
- Construct water recharge pond and water harvesting dams in Churia and foothills to provide water for animals during dry seasons
- Initiate the carbon monitoring along with biodiversity

Objective 2: Manage grasslands and wetlands that are vital for tiger and its prey species

Rationale

Grasslands and wetlands are the main feeding areas for prey base species. There are limited grasslands to support herbivores in BNP, BaNP and PWR. The extents of grassland ecosystems are decreasing due succession and encroachment by woody perennials. Wetlands are drying due to prolonged droughts and silt deposition from rivers that originate and flow through degraded catchments, creating water scarcities during the hot, dry seasons. Climate change will act in synergy with the current proximate anthropogenic threats to exacerbate and accelerate the intensity of these threats. Invasion of protected areas and corridors by alien invasive species such as *Mikania, Lantana, Chromolaena,* and *Parthenium* suppress indigenous vegetation, including the food plants of browsing and grazing ungulates that form the prey base for tigers. Thus, active, climate change-integrated habitat management in protected areas and corridors is necessary to maintain viable metapopulation of tigers and its prey species.

Outputs

- Grasslands are managed and maintained using science informed management interventions
- Controlled impact of invasive alien species on habitats
- Critical wetlands that provide continued supplies of water during the hot-dry season are maintained and managed

Actions

- Identify, classify and map all critical grasslands and wetlands in all tiger-bearing PAs and critical forest corridors outside PAs after inventories of grasslands based on their species compositions, and assess their successional dynamics to inform management prescriptions
- Improve and manage key grassland habitat through prescribed management interventions
- Reintroduce wild water buffalo and Swamp Deer into CNP to maintain wetlands and grasslands (these animals are ecological engineers that can maintain wetlands through wallowing and grazing).
- Provide forest fire-fighting training and equipment support to staff and communities
- Identify fire-prone habitat in the TAL and take appropriate measures to reduce fire risk
- Control invasive species in protected areas, buffer zones, and corridors
- Restore degraded watersheds in the Chure hills, especially in PWR and BaNP
- Conduct periodic assessments of water quality in wetlands, water holes and rivers in tiger bearing habitat, especially to monitor for agricultural chemicals and industrial effluents
- Prepare site management plans for wetlands (prioritize Ramsar sites)
- Manage wetlands and waterholes to prevent them from silting and drying up in the dry season
- Engage communities to restore and manage wetlands in the corridors and other potential tiger habitats

Objective 3: Combat tiger crime through effective law enforcement

Rationale

Poaching and trafficking of tiger body parts are serious threats to tiger survival. The Government of Nepal (GoN) reformed institutional arrangement by creating an integrated security system, with a high level authority to conserve tiger in Nepal. The National Tiger Conservation Committee (NTCC) was formed under the chairmanship of Rt. Hon. Prime Minister of Nepal. Accordingly, the GoN constituted a *Wildlife Crime Control Coordination Committee* (WCCCC) under the chairmanship of the Hon. Minister for Forests and Soil Conservation. Likewise, in coordination of the Director General of the DNPWC, a *Central Level Wildlife Crime*

Control Bureau (WCCB) has been formed representing all national security organizations and experts to control wildlife crimes in Nepal. This Bureau has been supported by 22 district level WCCB units (Kathmandu-Lalitpur-Bhaktapur districts comprising of one cell) in 24 priority districts. Nepal Police has also formed a special branch called the Criminal Investigation Bureau (CIB) Pillar number 4 to combat wildlife crimes in Nepal. In totality, all enforcement agencies are coordinating and cooperating to halt the wildlife crimes in Nepal under the umbrella of DNPWC and this new institutional arrangement is working very well since its establishment.

Similarly, community based anti-poaching units at the grassroots level have been institutionalized, and over 4,500 local youths have been mobilized to deter wildlife crimes under the community based anti-poaching units (CBAPUs). The Nepal Army, with overall responsibility of protected area security, has evolved its capacity with an Android-based real time SMART Patrol system in all tiger bearing protected areas. This has tightened tiger security in and around protected areas. In this context, the tiger conservation action plan envisions to strengthen the current efforts and build the national capacity to combat against tiger and other wildlife poaching and illegal trade.

Outputs

- Enhanced capacities of local and national level law enforcement agencies to control wildlife crime.
- Strengthened cooperation and coordination among enforcement agencies and other stakeholders.
- Tiger poaching and trade of its parts in Nepal substantially reduced

Actions

- Implement android based Real-Time SMART patrolling system and other advanced technology as appropriate.
- Conduct training for protected areas staff and communities anti-poaching units on the use of new technology.
- Conduct sweeping, camping and long-range operations in protected areas.
- Improve the wildlife crime investigation process and enhance the evidence collection system through capacity building and training
- Conduct awareness-raising programs on anti-poaching and conservation related laws.
- Engage sniffer dogs in anti-poaching operations.
- Strengthen, build capacity and mobilize community based anti-poaching units in all PAs in TAL.
- Provide capacity building trainings to PA and DFO staff.
- Install closed circuit television (CCTV) in sensitive areas, as appropriate, and build capacity to operate and maintain these systems
- Strengthen informant networks, information gathering and communication networks for anti-poaching operation.
- Strengthen Wildlife Crime Control Bureaus in 2 districts (Makawanpur and Dang).
- Conduct interaction programs among park staff protection units and CBAPUs.
- Provide equipment and logistics support to maintain and improve anti-poaching operations
- Initiate the formation of anti-poaching units in Banke NP.
- Develop a national anti-poaching strategic plan, with sub-plans for each tiger-bearing PA and DFO
- Provide training on CITES implementation at all levels.
- Provide motorized wooden boats for Regular River patrolling.
- Establish a well-equipped Rapid Response Team to rescue stray and problem animals
- Introduce new technology to aid in tackling wildlife crime
- Install the hoarding boards and display material in the customs and airports.
- Provide the capacity building and sensitization training to the staff of customs and airports.

Objective 4: Engage local communities in resolving human tiger conflicts

Rationale

Human-wildlife conflict is one of the unavoidable challenges to tiger conservation in Nepal. As the tiger population increases with successful recovery efforts, the human-tiger conflict is expected to rise. Chitwan National Park holds the largest population of tigers in the TAL (Karki et al. 2013) and also has the highest rate of conflicts. Human casualties and injury have risen with an average of 1-4 injuries and 3-7 casualties reported in the period between 2009 and 2014 in Chitwan National Park alone. Therefore, long-term survival of tigers can only be assured with increased tolerance of local communities towards tigers. Increase the amount of relief support and efficient deliberation is always crucial to the co-existence between people and the nature.

Output

- Human-tiger conflict reduced and maintained below thresholds of tolerance of local communities to conflict.
- Central level fund established at NTNC and operationalized

Actions

- Organize campaign and interaction program to raise conservation awareness among youth.
- Prepare training curriculum and relevant materials for Nature Guides.
- Celebrate world tiger day on 29th July every year and take opportunity to promote tiger conservation awareness during other green day (Wildlife Week, Environment Day, World Rhino Day, Wetland Day, Biodiversity Day
- Organize observation tours for social activists for spreading tiger conservation message.
- Organize cross learning observation tours for community based anti-poaching units to transboundary parks in India.
- Provide problem animals management/handling techniques training to park staff and DFOs and prepare a manual on rescue and handling of stray tigers,
- Establish wildlife relief fund and continue support to sustain it.
- Construct trenches at strategic locations in BaNP (Balapur, Mahadeva, Dhakeri, Khadgawar, Chyama, Gotheri, Gaabar).
- Promote alternative and repellant cash crops in the buffer zones.
- Provide support for installing solar fence and their maintenance.
- Provide support for constructing temporary towers for crop protection.
- Provide the financial relief support to the victims of wildlife attack according to the Wildlife damage relief support guidelines approved by the government.
- Revise wildlife relief guidelines to make it simpler and user friendly.
- Initiate and develop online database for proper and systematic documentation of conflicts related incidences.
- Develop and implement strategic mitigation measures to reduce conflicts.
- Develop rescue and rehabilitation center for problem and orphan wild animals including tigers.
- Provide capacity building training to enhance staff's skill on negotiation, mediation and conflict resolutions.
- Initiate tri-monthly meeting of the relevant stakeholders to review progress on combating wildlife crime.

Objective 5: Strengthen cooperation at national, transboundary, regional and international levels

Rationale

The gradual increase in tiger number and distribution in Nepal reflects the firm commitment of the Government of Nepal on tiger conservation and the effective implementation of the programs. Conservation partners from local, national, regional and at international levels have been involved rigorously to accomplish this exemplary conservation initiative in the country. However, protected area management is not just about species management; it has become a holistic and multi-dimensional approach covering wildlife as well as human dimension. There is a need to establish close cooperation among the line agencies, organizations,

local bodies and research institutions for long-term conservation of tiger or wildlife in perpetuity. Department of Forest (DoF) is responsible for managing forests outside the protected areas where tiger shares its habitat. Therefore, close cooperation with DoF is essential for conserving wildlife and their habitats. Similarly, there are several other organizations whose support is necessary for curbing poaching and controlling illegal trade in wildlife and their products.

The high demand for tiger parts in international markets persistently poses severe threats to the survival of tigers in the wild. So Nepal is promoting transboundary cooperation with its neighboring countries, India and China for protection of wild animals on either side of the country and controlling illegal trade in wildlife and their products. Similarly, a regional and international collaboration is always necessary for effective conservation of tigers in the range states. Nepal is a signatory to international conventions and treaties such as CITES, CBD, UNESCO, Ramsar, and GTF. Nepal has had a series of coordination meetings with the counterparts in India and China both at central and field levels. Such meetings have become supplementary in wildlife conservation and controlling illegal trades in wildlife and their products.

Outputs

- Strengthened transboundary cooperation in tiger conservation
- Increased regional and international support and cooperation in tiger conservation
- Better intersectoral coordination and dialogue between development agencies and conservation sectors.

Actions

- Commence complementary transboundary efforts to combat illegal wildlife trade.
- Organize regular and periodic meetings and workshops at transboundary level
- Introduce innovative transboundary conservation interventions practiced elsewhere in the region.
- Conduct periodic meeting between the development sectors and conservation sectors to review the development plans and their impacts on wildlife habitat.
- Share the information and intelligence regarding transboundary issues of wildlife conservation.
- Conduct the intensive consultative and coordination meetings, presentations between the development agencies and conservation agencies while planning and implementing the mega development projects.

Objective 6: Strengthen tiger and prey-base monitoring and research

Rationale

Nepal has been a pioneer nation to initiate scientific research on tiger, with several projects initiated as early as during the 1970's and 80's and continuing through the years (e.g., Smith 1993; Smith et al. 1987a,b,c,d, 1989; Sunquist 1981; Tamang 1982; Barlow et al. 2009; Gurung 2008; Karki 2011; Stoen 1994; Stoen & Wegge 1996; Eliasen 2003; Wegge et al. 2004, 2009; Froyland 1998; Pokhrel 2002; Regmi 2000; DNPWC 2005, 2008; DNPWC & KMTNC 2003; Karki et al. 2013; Dhakal et al. 2014). The findings from these projects have provided a foundation to build a conservation and management strategy for tigers, their habitats and prey species in Nepal. However, research should be continued to gather information to answer questions on the impacts of emerging issues such climate changes, ecological and genetic consequences of population isolation increasing anthropogenic pressures, and natural dynamics of insularised and limiting habitat as a part of the long term tiger conservation strategy. Such research will pave the pathway for long term conservation of the tiger in Nepal and elsewhere.

Outputs

- Incorporated scientific research findings in formulating tiger conservation strategies
- Recognized tiger conservation efforts of Nepal at national, regional and international fora

Actions

- Design a common standard to measure the extent of human wildlife/tiger conflict in Nepal
- Conduct studies on the scale, extent and local variations in the intensity of human wildlife conflict (tiger and ungulates) to help in identify and design effective mitigation measures
- Establish permanent experimental plots (control and treatment) plots to gather information pertaining to grassland management, carbon and biodiversity monitoring

- Establish research Stations at Chitwan-Parsa Complex, Banke-Bardia Complex and Kailali-Kanchanpur Complex
- Continue long term monitoring of tiger prey base using approved protocol
- Continue long term monitoring of tiger by camera trapping following approved protocol
- Monitor problem tigers, equipped with satellite telemetry
- Undertake an assessment of tiger population viability and carrying capacity in TAL
- Enhance the forensic capacity at national level
- Undertake research on invasive species control
- Initiate long term study programs to understand vegetation dynamics in response to specific management practices, altered hydrological regimes and climate change impacts
- Initiate serum banking of opportunistic capture for disease surveillance
- Commence study of tourism impact on biological diversity in TAL
- Conduct an economic valuation of tiger bearing protected areas
- Provide training focusing on database development and management
- Support rangers for certificate courses at Wildlife Institute of India (WII), India
- Support Assistant/Conservation Officers for Diploma in Wildlife Management at WII
- Conduct conflict management training
- Provide training on wildlife health, wildlife rescue and restraining methods for Veterinary staff
- Establish monitoring plots and transect lines in forests and grasslands
- Undertake intensive research on transboundary movement of tigers and the use of corridors, buffer zones and human land-use areas through satellite radio telemetry
- Conduct and monitor management effectiveness of the site where restoration, relocation or other notable management interventions have occurred
- Support studies on impacts of land use change, infrastructure and other development on tiger and prey base populations
- Establish long-term monitoring programs to understand vegetation dynamics in TAL in response to specific management practices, altered hydrological regimes, and climate change impacts
- Undertake detailed studies on ungulate-habitat relationships and the feeding ecology of ungulates
- Develop studies on the socio-economic and cultural drivers of human-nature interactions in the TAL

Chapter 7

7.0 Business Plan

7.1 Institutional arrangements

The action plan will be implemented by the respective departments of the Ministry of Forests and Soil Conservation. The Department of National Parks and Wildlife Conservation will be responsible for implementing the activities in the protected areas including buffer zone where as Department of Forests will be responsible for implementing the activities outside protected areas including dispersal corridors. Protection of tiger bearing protected areas is the responsibility of the Nepal Army which has been deputed in the respective PAs. The Armed Forest Guards and community organizations will have the responsibility to protect government managed forests and community forests.

7.2 Human resources, capacity development and infrastructure

A new organogram (organization and management structure) of DNPWC was recently approved by the Government. The recruitment process of new staff has been initiated through the Public Service Commission. This will allow recruitment of an additional 488 staff in DNPWC and five tiger bearing protected areas (Table 3). Understaffing has significantly hampered effective conservation and management of PAs but as the approved positions are fulfilled, the management capacity is expected to improve to a greater extent. The new staff will require capacity enhancement training to tackle with challenges in tiger conservation. The DNPWC will primarily search for, and conduct training opportunities in areas such as tiger and prey base monitoring techniques, radio collaring, genetic studies, database and knowledge management, anti-poaching, control of problematic and man-eating tigers, tiger ecology, SMART patrolling system as well as other new technology and also community mobilization in buffer zone. Similarly, trainings in tiger and prey base monitoring, anti-poaching, corridor restoration and ecological research will be provided to DoF staff. Both DNPWC and DoF will manage an effective incentive package such as exposure, training, higher studies, rewards, proper job placement etc. and encourage their staff to undertake tiger conservation activities with high morale. Basic infrastructure such as road and communication networks, staff quarters and office buildings and other required facilities to increase effectiveness in conservation and management of tigers will be constructed and maintained as per the requirement. Besides, continued support from conservation organizations such as NTNC, WWF, ZSL, IUCN and other dedicated conservation partner organization is highly anticipated.

The Nepal army is deputed to the protection of tiger bearing protected areas for certain periods. Only few of the officials and staff may have the experience of working in protected areas. Thus, phase-wise training and information has to be provided to the commanders and post in-charges, and to the soldiers about the terrain, wildlife behaviors, poaching control, wildlife conservation policies and laws and so on. Specific engagement of designated focal persons from the Nepal Army has to be updated with the functioning of real time SMART patrolling and anti-poaching operations including community based actions on a regular basis.

Similarly, buffer zone and community forest officials and other local communities will be provided various skill enhancement training for sustaining their livelihoods sot that positive attitude towards tiger conservation will be expected to increase.

Table 3: Staff positions at Tiger Bearing Protected Areas including DNPWC (in thousand NRs.)

	Existing positions	Additional Approved positions	Total positions
Department of National Parks and Wildlife Conservation	49	18	67
Chitwan National Park	270	106	376
Bardia National Park	125	99	224
Shuklaphanta Wildlife Reserve	73	54	127
Parsa Wildlife Reserve	75	58	133
Banke National Park	0	153	153
Total	592	488	1,080

Source: DNPWC, 2015

7.3 Governance

The Ministry of Forests and Soil Conservation and respective departments will ensure the "Right Person at Right Place" in the placement of staff. Concerned departments and their field offices are responsible for implementation of the action plan effectively. Also, it is expected to maintain transparency and accountability in deliberation of programs and financial transactions. The funding from the development partners will be made public through annual and periodic reports. Regular supervision, monitoring, and providing guidance in implementation of the plan will be done by respective authorities. The annual audit from the government auditor general will be performed accordingly. The periodic progress reports and other publications will also be made public periodically.

7.4 Coordination

The effective coordination among relevant stakeholders will be maintained through the existing government system and a mechanism set for the implementation of a particular program or project. The concerned departments and field offices will have the primary responsibility to coordinate with concerned stakeholders at central and field levels respectively. The WCCB at center and WCCBs at districts could be the most appropriate institutions for maintaining two-way communication and coordination.

7.5 Financial resources

Indicative budget

A total of NRs 4, 05,475,300 (Nrs 405 million) has been estimated to implement the action plan for 5 years. About 25.1% of the budget is estimated for research and monitoring, followed by prey base management (21.1%), conflict resolution and community engagement (17.9%), tiger crime control (17.7%), corridor and connectivity improvement (16.5%) and transboundary cooperation (1.7%) (Table 4).

Table 4: Summary of the objective wise budget details (in thousand NRs.)

SN	Objectives	Total Budget (NRs)	Year 1	Year 2	Year 3	Year 4	Year 5
1	Improve and restore core habitats and corridors	66,857.5	10,625	16,087.5	12,218.75	12,770	15,156.25
2	Grassland and wetland management for tigers prey	85,465.3	13,715	17,616.5	16,347.25	19,392.8	18,393.75
3	Tiger crime control	71,940	12,925	13,282.5	13,886.25	15,690	16,156.25
4	Conflict Resolution and Community Engagement	72,770	13,800	13,585	14,605	16,560	14,220
5	Transboundary Cooperation	6,840	1,200	1,320	1,380	1,440	1,500
6	Research & monitoring	1,01,602.5	13,325	34,567.5	15,273.75	24,030	14,406.25
	Total	4,05,475.3	65,590	96,459	73,711	89,882.8	79,832.5

7.6 Sustainable Financing

Of the total estimated budget required to implement the action plan, large share of the budget will be managed from government sources if the government budget is channelized in proportion to the revenue generated (Table 5). Thus, the government annual budget to DNPWC and DoF will be a major source of financing. In addition to the government budget, ongoing projects, such as WWF supported TAL, support from conservation organizations such as NTNC WWF, ZSL, IUCN, and ITNC, etc. are expected to make significant contributions. DNPWC itself and/ or with conservation partners will prepare and solicit proposals to the other international conservation organizations for funding. From all these sources Tiger Conservation Fund will be established for sustainable tiger conservation works.

Table 5: Revenue Generation in Tiger Bearing Protected Areas (in thousand NRs.)

Institutions/FY	2066/067	2067/068	2068/069	2069/70	2070/71
DNPWC	10,634.295	12,052.331	49,469.000	47,058.365	47,311.951
CNP	6,017.691	83,145.930	99,607.068	2,10,516.031	2,46,913.401
BNP	8,245.898	10,648.950	32,427.494	30,679.284	21,933.347
BaNP		830.291	1,742.086	6,909.644	17,469.754
SWR	1,412.302	3,258.988	3,680.777	4,394.904	3,533.682
PWR	14,046.683	46,870.322	4,571.405	15,057.103	2,020.375
Total	9,53,56.869	1,56,806.812	1,91,497.830	3,14,615.331	3,39,182.511
Million USD	0.954	1.568	1.915	3.146	3.392

7.7 Conservation Partner Organizations

NTNC, WWF Nepal, ZSL Nepal and other relevant partners identified by the Government of Nepal will be encouraged to support the respective departments for the implementation of the action plan.

7.8 Monitoring and Evaluation

Each TBPA and DFO will review the implementation status of the tiger conservative activities outlined in the action plan in their respective areas at least once a year. Each PA will incorporate the progress in the respective annual report and share to concerned authorities. DNPWC and DoF will regularly monitor the activities in their respective areas. The joint monitoring of TAL program will also oversee the progress of the tiger conservation activities and evaluate it periodically.

7.9 Review of the Action Plan

Review of the action plan will be done by DNPWC with the support of DoF and conservation partners. The mid-term review of the plan will be conducted to evaluate its implementation status and recommends for necessary changes where required. The final evaluation will be carried out towards the end of the plan period. The updated tiger conservation action plan will be prepared based on the recommendations of terminal evaluation accordingly.

Photo credit: WWF Nepal

Chapter 8

8. Logical Framework

Narrative Summary	Objectively Verifiable Indicators (OVI)	Means of Verification (MOV)	Risk/ Assumption
Goal			
Conserve tigers and their habitats through maintaining healthy ecosystems to contribute in doubling the tiger number by 2022 considering 2010 as base year	- Number of tigers increased against 2010 baseline	National census report	
Objectives			
Improve and restore critical tiger habitats and corridors	- Status of tiger occupancy in TAL (Psi) - Area of critical habitat restored (google maps)	Census report and annual monitoring report	
Manage grasslands and wetlands for Prey base	- Area of critical habitat (grassland and wetlands) restored - Increase number of ungulates per km^2 - Use of restored and managed habitat by target species	Census report	It is assumed that management of critical habitat follows the prescribed management interventions focused on target species
Combat tiger crime through effective law enforcement	- No of poaching incidents & illegal tiger trade seizures and arrests - Poaching attempts prevented based on information provided. - Cases admitted in courts per poaching incident	Annual report-DNPWC	Government agencies will be supportive in reducing the poaching and undertake necessary relevant actions
Engage local communities in resolving human tiger conflicts	- No of human casualties due to tiger in TAL	Annual report-DNPWC	The HTC prevention mechanisms will mean that even despite an increase in tiger numbers; this will have minimal impact to HTC events. Quick relief support reduces retaliatory killing of tigers The support will improve the community tolerance for tigers

Narrative Summary	Objectively Verifiable Indicators (OVI)	Means of Verification (MOV)	Risk/ Assumption
Strengthen cooperation at national, transboundary, regional and international levels	- Number and nature of actions taken towards transboundary cooperation at all the levels	Meeting minutes, Annual reports, Transboundary meeting report	Governments of Nepal, India and China continue to regard tiger conservation as priority
Strengthen tiger and prey-base monitoring and research	- Information on ecology, status on tiger is available - Information on ecology, status, habitat on tigers prey species available	PAs annual reports, Published journal and conference papers PAs annual reports	
Output 1			
Restored and reclaimed degraded tiger habitat in the protected areas and corridors	- Area of critical habitat restored (google maps)	- PAs and PFs annual reports	
Developed and implemented national strategy on invasive species control and management	- No of intervention/actions implemented based on the approved strategy document	Strategy document	
Prepared and implemented encroachment evacuation and management plans for corridors and buffer zones	- Relevant action taken by managers based on approved plans	Management plan, Meeting minutes, Annual reports of PAs	
Output 2			
Managed and maintained grasslands and wetlands using science based management interventions	- Area of critical grassland restored and use of habitat by herbivore	Survey reports, PAs annual report	
Controlled impact of IAS on habitat	- % of area impacted by IAS and compared against the baseline	Baseline report, PAs annual report	
Managed critical wetlands that provide water in dry season	- % of wetland area covered by water in dry season and habitat use by wildlife	PAs annual report	
Output 3			
Enhanced capacities of local and national level law enforcement agencies to control wildlife crime	- Training and exposure visit provided to control wildlife crime	National Crime control report, SAWEN report	
Strengthened cooperation and coordination among enforcement agencies and other stakeholders	- Number and nature of coordination action among law enforcement agencies taken	WCCBs report	
Reduced tiger poaching substantially in Nepal	- No of cases of tiger poaching against 2015 baseline	Tiger poaching record	
Output 4			
Harmonized co-existence between tiger and human	- No of cases of human-tiger conflict records	Relief support records of MFSC	
Output 5			
Strengthened transboundary cooperation on tiger conservation	- Number and nature of action taken through transboundary cooperation	Transboundary meeting minute and reports	
Increased regional and international support and cooperation on tiger conservation	- Number and nature of action taken through cooperation at regional and international level	Reports	
Output 6			
Incorporated scientific research findings in formulating tiger conservation strategies and plans	- No of research projects and publications	Research publications, Project Implementation plan	
Recognized tiger conservation efforts of Nepal at national, regional and international fora	- Number of partnerships with bilateral, multi-lateral and academic institutions for technical and financial cooperation for tiger conservation in TAL – Nepal	MOU documents, Paper presentations in international seminars, COP	

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नेपाल सरकार २०७२ वन्यजन्तुबाट हुने क्षतिको राहत सहयोग निर्देशिका २०६९ (पहिलो संशोधन २०७२), वन तथा भू-संरक्षण मन्त्रालय, सिहदरबार, काठमाण्डौ, नेपाल

नेपाल सरकार २०७१ वन नीति २०७१, वन तथा भू-संरक्षण मन्त्रालय, सिहदरबार, काठमाण्डौ, नेपाल

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Tiger Conservation Action Plan for Nepal (2016-2020) has been prepared in collaboration with WWF Nepal.

STRATEGY FOR CONSERVATION OF THE AUMER TIGER IN THE RUSSIAN FEDERATION

Ministry of Natural Resources and Environment
of the Russian Federation

STRATEGY FOR CONSERVATION OF THE AMUR TIGER IN THE RUSSIAN FEDERATION

Ministry of Natural Resources and Environment of the Russian Federation

Strategy for conservation of the Amur Tiger in the Russian Federation approved by the Ministry of Natural Resources and Environment (order No. 25- p of 2 July 2010)

The Strategy has been formulated in line with the recommendations given in the Strategy for Conservation of Rare and Endangered Animal, Plant and Fungi Species that was approved by the Russian Ministry of Natural Resources, Order No. 323 of 6th April 2004.

The Strategy was developed by a working group that comprised V. Rozhnov (Chairman), T. Aramileva, V. Gaponov, Y. Darman, Y. Zhuravlev, A. Kostyria, V. Krever, V. Lukarevsky, S. Naydenko, D. Pikunov, I. Seryodkin, J. A. Hernandez-Blanco and V. Yudin.

During the preparation of the Strategy, a number of recommendations that were suggested by Y. Alekseenko, V. Aramilev, S. Aramilev, T. Arzhanova, S. Bereznyuk, Y. Dunishenko, P. Fomenko, M. Hotte, O. Krever, S. Christie, A. Kulikov, D. Miquelle, V. Solkin and A. Vrisch were taken into account.

The draft of the Strategy was approved by the participants of the International Science and Practice Conference The Amur Tiger in North-East Asia: Conservation Issues in the 21st Century that took place in Vladivostok on 15th-17th March 2010 and the Mammal Section of the Commission on Rare and Endangered Animal, Plant and Fungi Species of the Ministry of Natural Resources and Environment (order No. 11 of 7 June 2010).

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Ministry of Natural Resources and Environment of the Russian Federation

Severtsov Institute of Ecology and Evolution

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CONTENTS

INTRODUCTION

The Amur tiger (Panthera tigris altaica) is the world's northernmost subspecies of tiger. It is the largest cat species in Asia and, at one time, was widely distributed throughout the continent. Most of the other tiger subspecies are endangered, but thanks to measures taken during the second half of the 20th Century, particularly from 1993 to 2003, the Amur tiger is not threatened with imminent extinction.

Nevertheless, continued habitat degradation caused by human activity, together with poaching and the illegal trade in tiger parts and derivatives, are grounds for serious concern for the destiny of the subspecies. Approximately 95% of the entire Amur tiger population lives within the Russian Far East, in particular in the Primorsky Region and the southern part of Khabarovsk Region. Russia, therefore, shoulders the main responsibility for conserving this large predator species.

The tiger is at the peak of the food web, a key element of which is the coniferous/ broadleaf forest that is found in the southern part of the Russian Far East. Preserving viable populations of the Amur tiger in its natural habitat is integrally linked to the conservation of complete natural forest ecosystems that are in themselves essential to the survival of mankind itself.

The need to protect the Amur tiger in the Russian Far East is provided for in current legislation. The Amur tiger is listed in the Red Data Book of the Russian Federation. Its protection is enshrined by a number of federal laws (eg. Law On Environmental Protection, Law On Wildlife and Law On Specially Protected Natural Areas) and also by international agreements (ie. Convention on Biological Diversity (CBD) and Convention on International Trade in Endangered Species, (CITES)). The Russian Federation is party to both of these international conventions. In addition, tiger conservation measures are listed in, amongst other documents, the Decree of the Government of the Russian Federation On the Conservation of the Amur Tiger and Other Rare and Endangered Wildlife Species within Primorsky and Khabarovsk Regions, No. 795 of 7 August 1995, and the Ministry of Natural Resources' Conservation Strategy for Rare and Endangered Species of Animals, Plants and Fungi, No. 323 of 6 April 2004.

The first Amur Tiger Conservation Strategy for Russia was approved by the Ministry of Environmental Protection and Natural Resources more than 14 years ago on 24 June 1996. It was aimed at summarizing half-a-century's experience in protection and research, formulating key principles and outlining a comprehensive set of activities for the long-term conservation of the tiger. The implementation of the above-mentioned strategy from 1997 to 2008 resulted in the retention of the general trend in the Amur tiger population. This was similar to the mid-1990s when the number of animals was generally stable, but experiencing a gradual growth in number and expansion in the tiger's range. At present, the tiger occurs over a large part of the forested areas of Primorsky and southern Khabarovsk Regions. The peripheral areas of tiger habitat on the left bank of the Amur River, which includes the Lesser Hingan and the area of land to the north-north-west and upriver to the Zeya Reservoir, began to recover. Nowadays, two to three tigers are encountered each year in the Jewish Autonomous and Amur Regions.

Compared to the situation that existed in the 1990s, the status of the Amur tiger population has changed in several ways. Relatively fl at areas with little forest cover that were developed for agriculture have been lost from the tiger's range, the Sikhote-Alin and Eastern Manchurian mountains have effectively become separated from one another and the overall tiger population is declining. The socioeconomic situation within Russia has also changed. Together, these changes all lead to the necessity for developing an updated conservation strategy for the Amur tiger in Russia.

In this updated version of the strategy, special attention is being paid to the following areas:

- extending the set of activities that will effectively protect the Amur tiger, its habitat and its main prey species (the set of activities is not limited to just the protection of the tiger itself)
- reducing the degradation of Amur tiger habitat by introducing best practices and improving forest and wildlife management
- strengthening civil and criminal penalties for poaching and the illegal possession of and trade in Amur tiger parts
- providing incentives to encourage small businesses within local communities that support tiger conservation
- improving population monitoring systems for the Amur tiger.

In order to secure the long-term conservation of the Amur tiger, therefore, special measures are required to ensure the well-being of the tiger population and to take into consideration the increasing level of human impacts on ecosystems in the Russian Far East.

1. GOAL AND OBJECTIVES OF THE STRATEGY

1.1 Overall goal of the Strategy

The overall goal of this new strategic document is to identify mechanisms which help to conserve a viable population of Amur tigers within the Russian Federation that numbers no less than 500 individual animals and which possesses the maximum genetic diversity possible.

1.2 Principal objectives of the Strategy

To achieve the goal of this Strategy, the principal objectives are:

- to conserve the existing Amur tiger population
- to identify mechanisms which conserve the Amur tiger population whilst taking into account the growingimpact of humans on the ecosystem
- to minimize the negative impacts of humans on the Amur tiger population.

2. SYSTEMATICS OF THE AMUR TIGER

2.1 Russian, English and systematic nomenclature

Amur or Ussuri Tiger, Siberian or Amur Tiger, Panthera tigris altaica Temminck, 1844.

2.2 Taxonomic status

- Class Mammalia
- Order Carnivora
- Family Felidae
- Genus *Panthera*
- Species *Panthera tigris* Linnaeus, 1758
- Subspecies *Panthera tigris altaica* Temminck, 1844.

3. DISTRIBUTION OF THE AMUR TIGERIN RUSSIA

The former range of the Amur tiger in Russia extended up to the 50o-51oN latitudes. In the early-19th Century, one could encounter tigers in the Amur, Jewish Autonomous, Primorsky and Khabarovsk Regions. Intensive and unregulated hunting resulted in a decline in the total population number from the early-19th Century to the late-1930s. This was accompanied by a fragmentation of its range. On the left bank of the Amur River, the core area of its permanent range remained only in the Lesser Hingan. By 1916, tigers had disappeared from the eastern slopes of the Sikhote-Alin. Small groups of tigers still occurred along the western macro-slopes of the Sikhote-Alin in the Khor, Bikin, Greater Ussurka and Ussuri River basins, as well as in some parts of the Black Mountains and on the left bank of the Amur River within the Kyra and Urmi River catchments. In the 1940s, the distribution of the tiger within the Sikhote-Alin, its main habitat, became fragmented.

In 1947, a blanket ban on the hunting of the Amur tiger was introduced. It succeeded in halting the long-lasting decline in numbers of tigers and stabilizing the population. Isolated population groups gradually began to recolonise suitable available habitats, but the distribution of the tiger remained scattered. From the mid-1960s until the mid-1980s, population numbers increased steadily in all areas south of the Amur River. The tiger recolonised almost all of the suitable habitats within its former range and the population in Sikhote-Alin consolidated into one unifi ed population. The population of tigers in the Eastern Manchurian Mountains, however, remained cut off. From the mid-1980s until the early-1990s in the northern Sikhote-Alin, tigers settled within habitats in which they either didn't occur before, or were formerly extremely rare, such as the Samarga, Nyelma, Botchi and Kopi River catchments. The recolonisation by tigers over the larger part of its range remained relatively stable.

The results of the censuses conducted in 1996 and 2005 showed that tigers occurred within all of the forested area within its range. The largest part of the tiger's range in Sikhote-Alin recovered its contiguity and is now no longer fragmented.
Since 2000, the range of the Amur tiger has begun to extend northwards and westwards. Evidence suggests that an independent population is currently establishing itself within the Jewish Autonomous Region. The population that established itself in the north-eastern part of Sikhote-Alin and in neighbouring areas of the Botchinsky Nature Reserve is becoming increasingly stable.

At present, the total size of the Amur tiger range in Russia approaches 180,000 km2.

Figure 1: Distribution of the Amur tiger in Russia as indicated in the 2005 Census.

From the south- western Primorye, tigers gradually spread into the neighbouring provinces of Jilin and Heilongjiang in China and helped to stabilize the third main grouping of tigers, namely, that living in the Eastern Manchurian Mountains. Research conducted for many years in the western and south-western parts of the Amur tiger's range suggests that, in recent years, the movement of tigers between the mountainous forests in Russia and China has become regular. The protection of the south-western and western populations of the tiger and wild ungulates, along with their habitats, therefore requires special attention.

4. NUMBER OF AMUR TIGERS IN RUSSIA

Since the early-1940s, the number of Amur tigers has been recorded in a special register. In 1959, the fi rst fi eld census of Amur tigers was undertaken and followed a specially-developed methodology. This methodology was later improved and used during the 1978/79, 1984/85 and 1995/96 censuses. It was also used during a monitoring program that was undertaken in specifi c pilot areas from 1997 to 2004.

At the same time, with every new census, coverage improved and methods for data collection and processing were standardized. Identifi cation of footprints was carried out by experienced trackers drawn from wildlife managers, foresters, rangers and professional hunters, each of whom had monitored their areas for a long time. This allowed for the collection of objective information on Amur tiger population numbers.

In order to design, standardize and implement state censuses for the Amur tiger in its natural habitat and for the long-term monitoring of the sub-species at federal and regional levels, the Methodical Recommendations for Conducting and Organisation of the Amur Tiger Census in the Russian Federation, No. 63, was approved by the Ministry of Natural Resources on 15 March 2005. This document, which was based on methods that were tested during previous censuses and monitoring programs, helps guide the annual monitoring undertaken in selectedareas and the full census of tigers that is conducted every 10 years.

Over the last century, the population number of Amur tigers in the Russian Far East has exhibited a variety of trends, with population decline, stabilization and growth occurring over different periods of time and at varying rates. Analysis of the population dynamics of the Amur tiger operating over the last 150 years shows that the most important factor affecting tiger numbers is human impact (Figure 2).

At the end of the 19th Century in the southern region of the Russian Far East, the Amur tiger was a commonly-hunted species. Intensive hunting,

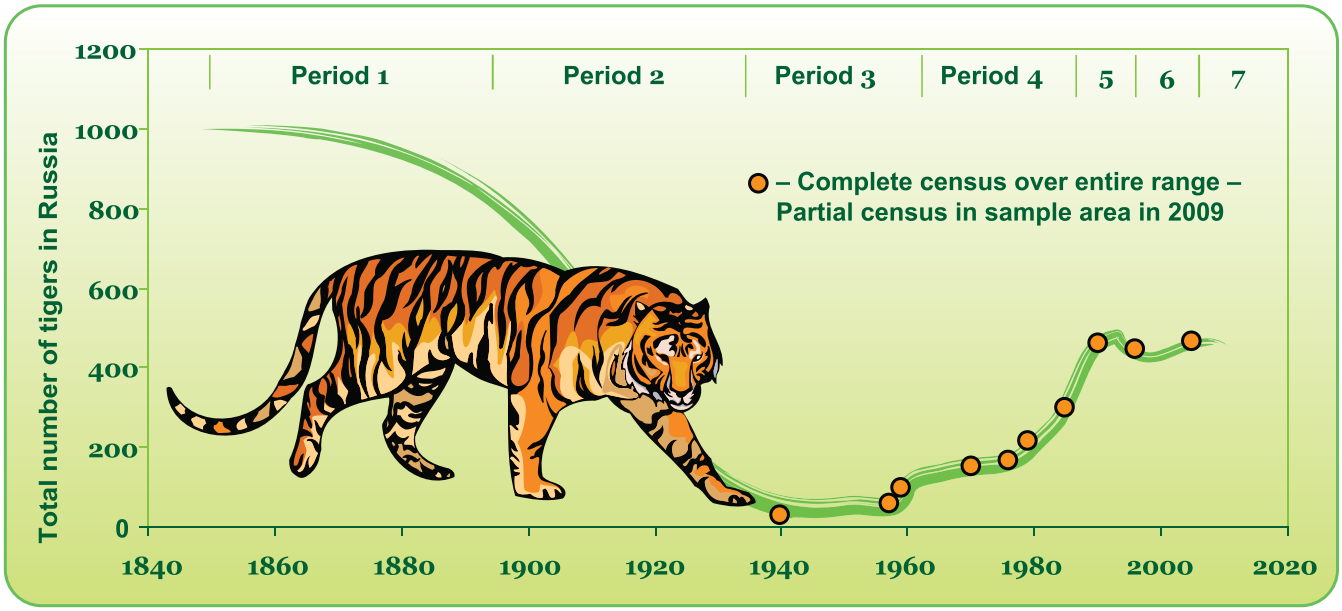

Figure 2: Amur tiger population numbers from 1850. Full censuses conducted from 1940 are shown. Before 1940, estimates of population number have been made based on the size of suitable habitat and the presumed density of prey species at the time.

accompanied by the destruction of its habitat, resulted in a sharp decline in numbers during the fi rst half of the 20th Century. This decline and the fragmentation of the tiger's range continued until the late-1930s when the subspecies teetered on the edge of extinction. After the introduction of the hunting ban in 1947, as well as the partial then full prohibition on the removal of live kittens from the wild, the predators started to reappear in remote and undeveloped areas and population numbers began to gradually recover.

Analysis of the censuses carried out in 1970s showed that population growth and colonization of new habitats by tigers occurred mostly in peripheral areas in the northern part of its former range. The results of the censuses conducted in the 1980s and early-1990s confi rmed a further growth in population numbers and the size of the tiger's range. The 2005 census indicated that during the beginning of the present century the population number stabilized somewhere between 428 and 502 individuals, including between 97 and 109 kittens (comprising 71 to 77 tigers in Khabarovsk Region and 357 to 425 individuals in Primorsky Region).

5. BIOLOGY OF THE AMUR TIGER AND PREREQUISITES FOR CONSERVATION

5.1 Biology and reproduction rate

Tigers evolved in tropical Asia and gradually spread northwards. Settling in the area now found in the Russian Far East, a separate sub-species, the Amur tiger, evolved. The Amur tiger lives on the northern boundary of the species' range where it experiences extremes in natural conditions. Together with human impact, these determine the tiger's relationship with the environment and limit its number and distribution.

The Amur tiger is one of the largest subspecies of tiger and only the Bengal tiger competes with it in size and weight. A male Amur tiger can measure up to 220 cm in body length, while a female varies in body length from 165 to 182 cm. The heaviest tiger recorded living in the wild was 250 kg. The average weight of adult females is 120 kg, while that of males is between 165 and 180 kg. Compared to other subspecies, the Amur tiger has dense and relatively long hair.

Genetic analysis of the Amur tiger population shows that, in Russia, the minimal genetically effective population size is low and amounts to only 35 animals. This is 14 times smaller than the actual population number. Research has shown that two genetically distinct groups of Amur tigers exist within the Russian part of its range. These are the Sikhote-Alin and south-western population groups, both of which are separated from one another by extensive development along the Razdolnayar River. Individual tigers, however, cross over from one group to another. Although low genetic diversity is common in large cat populations, this fact requires special attention with the conservation of the Amur tiger. This is largely because a signifi cant decline in population number can result in considerable genetic loss and irreversible degradation of the subspecies. The south-western population of the Amur tiger in particular requires special attention because of its small size.

The Amur tiger exhibits both solitary and group behaviour (eg. females with cubs). Adult individuals are territorial and mark their territories to indicate their presence. Radio-tracking has shown that the average-sized territory for a male tiger is 1,380 km2, while that for a female is 400 km2. Up to six adult female territories can be found within one resident male's territory, while the territories of same gender adults usually overlap slightly. Frequenting permanent trails and possessing the habits of returning to their kills and revisiting territorial marks, as well as other territorial behavioural traits, make the Amur tiger vulnerable to poaching. The Amur tiger possesses the largest territories of all tiger subspecies, largely due to the low density of prey within its range. Growth in Amur tiger populations, therefore, is impossible without increasing the density of prey species.

The Amur tiger census that was conducted in 2004/05 indicated the following population structure. Approximately 39% of all the tigers counted were adult males, while 25% were adult females. Twenty-two percent (22%) were cubs under the age of 1.5 years, while 6% of tigers were adolescents aged from 1.5 to 3 years. Another 7% of the tigers could not be classifi ed as belonging to any of the above groups and were either adult or adolescent females, or cubs of indeterminate gender.

The lifespan of the Amur tiger is usually no longer than 20 years. The tiger can breed when it reaches 3.5 to 4 years old and pregnancy normally lasts 95 to 20 days. Cubs can be born during any season, but most often in summer. Litter size is from 1 to 5 cubs, while the average litter numbers 2.5 cubs. For the fi rst 1 to 2 months, cubs do not leave their den. A den usually consists of a hollow in a rocky slope and is located on

the upper portion of a north-facing slope. This slope is usually no less than 20%, making it diffi cult for humans to reach. How well the female tiger selects the den site often determines how safe the litter will be and the subsequent breeding success. The identifi cation and protection of such sites, therefore, is especially important in conserving the Amur tiger.

Young tigers start to become independent from 15 to 22 months (the average is 18.8 months). After the family group breaks up, young males disperse and can move long distances. Young females, on the other hand, usually remain within their mother's territory or in a neighbouring area. As a result of this dispersal, the Amur tiger is able to settle in vacant territories. This plays an important role in the subspecies' distribution and expansion of its range. The average interval between litters is 26.5 months. If females lose their litter during the fi rst few months, this average drops to 11 months. The reproductive rate, which also takes into account cub mortality, is 0.6 to 0.7 cubs for each female per year. If one takes the reproductive age of females as being from 3.5 to 14 years, the average female reproductivity during its whole lifespan is 12.1 cubs, while only 6.5 to 7.3 cubs reach the age of one year.

Relatively late reproductive age, low fecundity, a long interval between litters and a high mortality rate amongst young and breeding adults all make the Amur tiger a vulnerable subspecies that is not able to restore its population size following any signifi cant decline in numbers. Furthermore, adverse changes in the condition of the tiger's habitat can also result in a sharp decline in population number. Providing conditions are favourable, however, reproduction can allow for growth in population numbers as well as permit, as has happened in the past, the gradual recovery of populations following signifi cant declines.

The only natural enemy of the Amur tiger is the brown bear. Adult male brown bears can attack female and young tigers with the intention of eating them. Brown and Himalayan bears also scavenge on tiger kills and can chase tigers off their kill. This means that tigers have to kill additional prey.

Understanding the causes of tiger mortality is central to the formulation of an effective conservation strategy for the Amur tiger. Research indicates that a large proportion of deaths amongst Amur tigers is due to human-related causes. The presence of roads within tiger territories represents a particularly serious threat as the majority of animals killed are shot by poachers travelling along the roads in vehicles. It is also a common occurrence for tigers to be run over by vehicles. Natural mortality amongst Amur tigers is not commonly recorded. Data clearly demonstrate that one of the fi rst priorities to be addressed in Amur tiger conservation must be the combating of poaching.

5.2 Habitat requirements

Within t he Russian part of its range, the Amur tiger prefers cedar pine/broadleaf forest and oak forest and, to a lesser extent, broad-leaf and riparian forests. The principal parameters that determine the quality of Amur tiger habitat are the suitability of the habitat for the tiger's main prey items and the degree of human impact. The most suitable habitats for ungulates in the southern part of the Russian Far East are the same types of forest that are favoured by the tiger. Therefore, taking into consideration the close link between predator and prey, the most effective way of conserving the Amur tiger is to manage ungulate habitats on a scientific basis.

The key locations for Amur tiger conservation are clearly those selected from areas that are favoured by both the tiger and its prey. Conservation of forests where Korean cedar pine and Mongolian oak occur will help to stabilize the tiger's existence in Russia. Over-exploitation of these forests and their destruction through wildfi res will result in the loss of feeding grounds for those animals that are potential prey for Amur tigers. It will also lead to further contraction and fragmentation of the tiger's range and seriously threaten the existence of the predator itself.

The other important factor in the tiger's conservation is the preservation of those riparian forests that have been affected most by humans. Tigers regularly use forested rivers and mountain valleys as migration corridors and hunting grounds. This is because such areas are important for concentrations of prey species during winter, especially during those winters when high snowfall is experienced.

In general, relatively low biotopic selectivity amongst Amur tigers has allowed for a contiguous spatial distribution of the tiger throughout highly varied forest mosaics.

5.3 Diet and predatory behaviour

The Amur tiger feeds on a wide range of species. However, the tiger prefers ungulates whose size is equal to or exceeds that of itself. Four species of ungulates, namely, wild boar, red deer, roe deer and sika deer, are the main prey items for tigers. In different parts of the tiger's range, the proportion of these prey species in the tiger's diet depends on their population density. In addition, and especially during periods when there is no snow, the Himalayan and brown bear also contribute signifi cantly to the tiger's diet, as do badger and raccoon dog. The fact that the Amur tiger does not have a limited hunting preference means that it can switch between prey items and has a greater ability to survive in different habitats.

To satisfy its energy needs and depending on its geographical location, the Amur tiger requires between 50 and 70 large ungulates per year, along with other smaller prey items and bears. The reproductive capacity of the majority of tiger prey species does not exceed 15 to 25% a year. Therefore, exploitation of ungulates as game species should take into consideration the needs of tigers that live within hunting management units. The well-being of the Amur tiger is considered to be secure if the number of large ungulates occurring within the tiger's range is between 400 and 500 individuals. Such a density of ungulates does not occur everywhere. Monitoring data shows that population numbers of all tiger prey species are declining and that carrying capacities are steadily decreasing. This is because, among other reasons, natural habitats are being degraded.

Additional factors that negatively affect ungulate population numbers include the unpredictability of pasture production prior to winter and the fact that more and more winters now experience abnormal amounts of snowfall. Populations suffer the most damage when these events occur together.

If the Amur tiger experiences a shortage of natural prey, it can supplement its diet by killing and eating livestock. It does this by leaving the forests and entering human settlements. This situation leads to conflict between tigers and humans that can result in tigers being shot illegally and/or the need to catch and remove them.

This confi rms the need for proactive measures to be taken to stabilize and then signifi cantly increase the number of prey items for the Amur tiger.

5.4 Interaction with humans

Compared to other species, the Amur tiger is not as aggressive towards humans. Usually, a tiger that comes across a human will try to avoid direct contact and leave. Even 'problem' tigers that have lived close to human settlements for a long time and regularly visit them to take livestock normally try to avoid people. Humans encountering tigers is not common, but when they do it is very rare for the predator to show aggression. Nonetheless, a potential threat does exist and in some cases tigers do attack.

Most tigers that attack people are either injured by humans, or are sick or emaciated. A study on tiger attacks on people showed that 57% of attacks involved tigers that had been injured by humans, 14% related to tigers sporting injuries of uncertain cause and 21% involved tigers that were sick or emaciated. Amur tiger poaching, therefore, is not only the main cause of the predator's mortality, but is also one of the main causes of confl icts between the tiger and humans.

The Amur tiger can become aggressive when it has been chased or when it encounters a human unexpectedly, but also when it defends its prey or cubs. Human death from Amur tigers occurs very rarely. In the last 40 years within Russia, 16 fatal cases have been recorded. Between 2001 and 2010, 19 cases of tiger attack were recorded that resulted in two people dying and 12 people being injured. The majority of these attacks were as a result of people provoking tigers to attack.

The most common type of confl ict, representing 57% of total recorded confl icts, is when tigers attack livestock. On average in Russia, 30 head of livestock and domestic animals are killed each year by tigers, the majority of these being dogs and about fi ve cases involving large horned livestock. This is about ten

times less than in other countries.

Other confl icts arise as a result of poaching, vehicles colliding with tigers and people coming across orphaned cubs in the wild. Every year, especially during winter, a number of cubs lose their mothers and are unable to live independently. Some of them fall into the hands of humans. Consequently, the issue of reintroducing tigers that have been raised by humans back into the wild becomes very problematic.

Only if proactive measures aimed at providing favourable natural conditions are in place and if local residents are given guidance on how to behave within the predator's home range, it should be possible to ensure a sustained and peaceful coexistence between the Amur tiger and humans and to minimise confl ict situations and their negative consequences.

6. LIMITING FACTORS

The occurrence of the Amur tiger is determined by both natural (abiotic phenomena, natural enemies and competitors and prey availability) and human factors. Human factors and impacts on the Amur tiger can be divided into two main groups, namely, direct (eg. poaching and the necessary removal of tigers) and indirect (eg. forest fi res, logging, extension of road networks, increase in human population density, hunting activities, etc).

6.1 Direct factors and impacts

Direct impacts include the killing of Amur tigers by poachers, the need to shoot tigers when they attack and also general disturbance to the tiger in its habitat.

The most signifi cant factor threatening the existence of the Amur tiger in Russia is its direct destruction. As studies have shown, 72 to 83% of tiger deaths are caused by humans, most of those by poaching, while natural mortality contributes only 17 to 28% of total deaths.

6.1.1 Retrospective review of Amur tiger removal from the wild in Russia

Data on the removal from the wild of the Amur Tiger in the Russian Far East are limited and patchy and of an ad hoc nature.

At the end of the 19th Century in the southern Far East of Russia, the Amur tiger was the usual animal hunted and up to 100 individuals were shot each year.

This intensive hunting of tigers, resulting from the desire for hunting trophies, led to a sharp decline in the population number during the early-20th Century. At that time, only about 60 individuals were shot each year. At the same time, uncontrolled hunting resulted in the disappearance of the Amur tiger from a larger part of the southern Primorye. Between 1920 and 1945, encounters with the Amur tiger became very rare. In 1947, a full ban on Amur tiger hunting was introduced. Even after the ban, however, the shooting of tigers continued. Up until 1957, between 7 and 8 tigers were shot each year, the majority of them being females defending their cubs and those that were killed when cubs were removed live.

6.1.2 Removal of animals from the wild for educational and scientifi c purposes

After the introduced of the hunting ban in 1947, the capture of cubs only took place to satisfy the needs of zoos, circuses and zoological experts. Up until 1955, between 7 and 11 tigers were captured. The total number of captured cubs between 1947 and 1956 was 41, but only in the Primorsky Region. In 1956, a full ban was introduced on the removal of young tigers from the wild, including for expert purposes. After that, orphaned tigers were removed from nature and placed in zoos much less often.

At present, the use of wildlife species listed in the Russian Red Data Book, including the Amur tiger, is regulated by two Decrees of the Government of the Russian Federation, namely, On Approval of the Regulations of Removal from the Wild Animals Species listed in the Red Data Book of the Russian

Federation, excluding Aquatic Animals, No. 13 of 6 January 1997 and On Issuing Licences for Trading Animal Species listed in the Red Data Book of the Russian Federation, No. 156 of 19 February 1996.

Decree No. 156 states, among others things, that keeping Red Data Booklisted animals in captivity is only permitted for purposes of conservation and reproduction in artifi cial habitats and for scientifi c and educational reasons. Their release back into the wild is also allowed for conservation purposes and/or for replenishing natural populations.

Removal of animals from the wild can only be carried out after permission has been granted by the Federal Supervisory Natural Resources Management Service. This permission is in line with the Administrative Regulation of the Service that carries out the State's function relating to the removal of wildlife species listed in the Red Data Book. This was approved by the Order of the Ministry of Natural Resources, No. 123 of 30 April 2009, which was registered (Registration No. 14115) by the Ministry of Justice on 22 June 2009.

6.1.3 Illegal removal of animals from the wild

Up until the late-1980s in the Russian Far East, illegal removal of Amur tigers from the wild took place only occasionally, usually when animals approached human settlements or attacked domestic animals, but also by hunters during the normal hunting season. At the same time, trading in tiger skins and other tiger products was either very diffi cult or practically impossible. From the early-1990s, however, the illegal removal of tigers became much larger in scale. This was due to reduced control by policing organisations, borders opening, fi rearms becoming more accessible, the illegal trade in tiger parts increasing to satisfy a greater demand from Chinese traders and wealthy Russians and a diffi cult economic environment that caused people to look to other sources of income. Nowadays, the reasons for the illegal removal of tigers remain much the same. The exact number of animals removed, however, is not really known, but in the opinion of experts the actual number is still quite signifi cant and will affect the tiger's ability to survive.

In addition to the removal of the Amur tiger from the wild for trade purposes, there are other reasons for its illegal shooting.

- Intentional shooting of tigers to be rid of a competitor within hunting grounds. When hunting for ungulates, hunters commonly consider the Amur tiger to be a direct competitor and therefore view the predator as an enemy. After fear for their own safety, the concern that tigers will adversely affect ungulate populations is the second reason given by respondents when answering the question "why tigers do not need protection". Although the presence of the Amur tiger helps keep the wolf population from expanding and limiting the ungulate population further, hunters still consider tigers in their hunting grounds to be a direct threat to their source of income. Up until the 1990s, a dead tiger did not have any monetary value and if a hunter shot a tiger for any reason the carcase would most likely be left in the forest.

- Intentional shooting of tigers when they attack domestic animals. Although Amur tigers are sometimes shot in response to them killing livestock, this is not a major problem in the Russian Far East as most livestock is kept indoors overnight. At the beginning of the present century, no more than about fi ve head of livestock being killed by tigers each year was recorded in Primorsky Region. Most often than not, tigers kill domestic dogs, this making up 55% of all attacks on domestic animals. When an injured or problem tiger enters a village looking for food, chained dogs offer very easy prey.

- Unintentional shooting of tigers when people accidentally encounter them and view them as a threat. The number of accidental encounters with Amur tigers gives an indication of the risk posed to local communities. Nevertheless, the total number of cases of attack on humans by tigers remains low. During a 40-year period, tigers injured less than one person a year and caused one human death every two years. Even these fi gures are considered too high as a large number of incidents that took place during the 1990s resulted from unsuccessful poaching attempts that caused tigers to attack humans. Around 60% of those tigers attacking people carried old injuries, mostly bullet wounds, infl icted earlier by humans. Consequently, more than half of the incidents in which people were either killed or injured by tigers were, in effect, caused by humans themselves.

6.1.4 Necessary shooting of problem Amur tigers

Between 1985 and 2005, special permission was granted to shoot 58 tigers, an average of 2.8 tigers

per year. The reasons for issuing such permission were mostly linked to tigers taking livestock or attacking people. Between 1985 and 1990, the number of tigers shot for these reasons was much higher – during the winter of 1986, for instance, 15 tigers were shot. Following the establishment in 1999 of the "problem tiger group" within the Tiger Special Patrol Team, the number of permissions given for shooting troublesome tigers dropped.

6.1.5 Disturbance factors

The Amur tigers that are most susceptible to disturbance factors are those living in areas where there is intensive logging of forests all year round. Clearfelling is normally accompanied by the blazing of an extensive network of roads and tracks that deliver plant and equipment to loggers and transport out the felled trees. Consequently, these areas become accessible to people who visit the forests to collect various natural products and to hunt and fi sh. These forest tracks are also willingly being used by Amur tigers. In doing so, however, they put themselves at risk of being shot by vehicle-borne poachers. The situation is aggravated by the fact that tigers, but especially males, commonly throw caution to the wind when they encounter people and come out into the open. Extension of such road networks, therefore, sharply increases the risk of tigers being killed. Furthermore, the extension and improvement of the road networks help large numbers of hunters to gain access to their hunting grounds during winter. In some areas in the south of Primorsky Region, the number of people hunting ungulates is so high that it doesn't give the tiger much chance to remain unnoticed and undisturbed. People in the area commonly remove tiger kills that they come across. This means that the tiger has to expend more energy on hunting. In areas of low ungulate population density during winter, this can lead to tigers starving. This is of particular danger to female tigers with cubs. During autumn, a serious disturbance factor for the Amur tiger is posed by people collecting Korean cedar pine cones. In years of good harvest, such people enter the forests in their thousands, including specially protected natural areas. Local development, forest logging and the expansion and improvement of road networks, therefore, open up access to remote habitats and signifi cantly increase the disturbance factors for Amur tigers.

6.1.6 Spread of contagious diseases

A number of contagious diseases can cause deaths amongst both adult and young tigers and also decrease fertility amongst breeding pairs. Considering the low genetic diversity within the Amur tiger population (and consequently its high vulnerability to various diseases) as well as the low reproduction rate, the spread of viral and protozoan diseases can represent a threat to the secure existence of the Amur tiger. Tigers can contract a number of contagious diseases through both contact with other tigers and by eating infected animals, especially other predators such as badgers, raccoon dogs, bears and lynx. A threat to the Amur tiger also exists through contact with dogs and, to a lesser extent, cats. Both can act as carriers of a number of diseases that are dangerous to tigers.

6.2 Indirect factors and impacts

Among the forms of indirect human impact affecting populations of the Amur= tiger, the most signifi cant are those relating to the reduction in size of habitats that results from economic development, including clear-felling, and to inappropriate game management that undermines the food resource for tigers. The effect of adverse factors can be aggravated by unfavourable climatic conditions, such as occasional heavy snowfalls that force ungulates to migrate in large numbers up and down slopes. During years of heavy snowfall, the food resource for Amur tigers declines sharply and it may take many years for it to recover. As a result, tiger mortality from starvation and poaching increases and in some years can reach catastrophic levels.

6.2.1 Changes in natural habitat

One of the main reasons why the population status of the Amur tiger is worsening is the loss and transformation of its habitats that has mainly resulted from economic development within the area. During the 20th Century, however, habitat degradation was apparently not the most important factor affecting the Amur tiger population. The main period when the population was recovering (ie. from the 1950s until the 1980s) coincided with the intensive logging of forests within Sikhote-Alin. However, this logging did not have much impact on the population recovery process. Nowadays, the infl uence of habitat degradation on tigers is becoming more signifi cant because road networks are being extended, Korean cedar pine nuts are being extensively harvested, Mongolian oak is being logged and ash and other tree species within key riparian forests are being intensively cut. As a result, the size of habitat suitable for the Amur tiger is contracting and the quality of the habitat for

ungulates is declining. This means that the habitat supports fewer animals. Because habitat degradation is taking place, the importance of those protected areas in which ungulate densities are high and poaching is under control has increased signifi cantly. Suffi cient size of protected areas and the existence of ecological corridors between them are important prerequisites for ensuring the conservation of healthy tiger populations with minimal negative impact from poaching and habitat degradation.

6.2.1.1 Economic development impacts

Russia's economic development programs for the foreseeable future pay special attention to the Russian Far East. In particular, these include the Socio-Economic Development Strategy for the Far East and the Baikal Region for the Period Up Until 2025, No. 2094-r, which was approved by the Decree of the Russian Government on 28 December 2009, and the Federal Special Purpose Program Economic and Social Development of the Russian Far East and Trans-Baikal Region for the Period Up Until 2013, No. 480 of 15 April 1996.

Primorsky Region, which comprises 2.7% of the entire area of the Russian Far East and which contains most of the Amur tiger range, is home to 30% of the entire human population in the Russian Far East. According to the census conducted in 2002, the human population density within the region at the time was 12.2 persons per km2, while the average population density in the Russian Far East was 1.1 persons per km2. Compared with other regions within the overall tiger range in Asia, however, the habitat of the Amur tiger within the Primorsky and Khabarovsk Regions remains much less populated by humans.

A large portion of the river valleys and plains where the Amur tiger and ungulates were most abundant before development took place is now occupied by human settlements and farmland. As a result, the Amur tiger has been forced to move to less suitable habitats which are also less productive for ungulates. This makes the tiger even more susceptible to adverse human impacts.

At the same time, the Amur tiger can adapt to practically all forms of development within an area, providing the natural resources are managed sustainably. An exception, however, is where mining is involved.

The main reason for deterioration in habitat quality for the tiger caused by development is the accompanying reduction in food availability. Within Primorye and Priamurye, tracts of forest where Amur tiger habitat still exist are repeatably affected by the clearing of trees and forest fi res. With every year, the food resource for ungulates subsequently declines. To maintain the number of Amur tigers as well as of other large predators, a high and stable number of wild ungulates is required. This can only be assured if suffi cient food resources are available.

Several existing and planned large development projects could affect the status of the Amur tiger's habitat.

One of them is the construction of the Eastern Siberia – Pacifi c Ocean oil pipeline. This is planned to pass through Amur tiger habitat in the southern part of Sikhote-Alin. The pipeline itself, its associated infrastructure and the oil refi nery, as well as the immediate areas around them, will adversely affect the territories of between 35 and 40 adult tigers.

Another project is the construction of the Sakhalin-Khabarovsk-Vladivostok gas pipeline and refi nery. The pipeline will adversely affect tiger habitats along its entire length, but primarily in the south-western part of Priamurye. The entire project was given the 'green light' by a State Environmental Impact Assessment. However, the pipeline's route will cut through the Leopardovy Federal Nature Refuge and the Strelnikov Ecological Corridor, a protected area of regional importance in the Khabarovsk Region

Road construction projects are of distinct danger to tiger populations as they cause fragmentation of their habitats, raise the disturbance factor and increase the number of tiger deaths on highways. Elevated and unvegetated road embankments and 1.5 to 2.0 m-high safety barriers on both sides of the roads will make such highways impassable for most animals.

Thus, the planning and implementation of socio-economic development projects and programs in the Russian Far East, all necessary to improve the quality of life and welfare of people in the region and the country as a whole, must take into account the need to minimise negative impacts on the Amur tiger and its habitats (ie. preventing habitats from fragmenting and contiguous populations from breaking up into small isolated groups that are not able to survive for long).

6.2.1.2 Hunting and game management impacts

The larger part of the Amur tiger's range is located in

areas where hunting is permitted and where game species are managed for the purposes of hunting. At the same time, the most important factors in such areas for maintaining healthy populations of Amur tigers are keeping the number of ungulates at a certain level and meeting the legislative requirements on the protection of Red Data Booklisted animals. This is only possible when hunting resources, together with their habitats, are sustainably managed and protected. However, the following issues run counter to this:

- Management of hunting and the protection of hunting resources are seriously hampered by the current restructuring of relevant state institutions. State supervision and the control of hunting are made diffi cult because the number of hunting management units has risen sharply, while at the same time the number of state hunting inspectors remains critically low.

- The provisions within existing legislation on hunting and the protection of hunting resources make it very diffi cult for state inspectors to lodge violations and provide the necessary evidence. Control of hunting, as provided for in Article 41 of the Federal Law On Hunting and Protection of Hunting Resources, does not take place because staff members in hunting management units have not been granted the legal right to lodge violations. Consequently, they are not adequately able to legally protect the resources they are responsible for.

- When regulations and by-laws on hunting and the protection of hunting resources are being drafted and/or offtake quotas are being set, the food requirements of the Amur tiger, the necessity to maintain healthy populations of ungulates and the changes that occur in ungulate habitats due to forest fi res and logging activities are all not taken into account. There is an urgent need to introduce a new approach to regulating the use of wildlife resources.

- When effective wildlife management takes place within hunting management units, the carrying capacity of habitats increases. This results in an increase in ungulate numbers. Being the main prey items for the Amur tiger, this has a benefi cial effect on the predator. However, when effective wildlife management is not forthcoming, the stability of ungulate populations is not assured. The number of ungulates fails to satisfy the food requirements of tigers and the predator begins to counter the objectives of hunting management units, thereby causing hunters to become more opposed to tigers.

6.2.1.3 Forest management impacts

Forest management is aimed primarily at increasing the productivity of forests and also at improving the quality of habitats for animals living in them, including ungulates and the Amur tiger. At the same time, however, the intensity of forest logging has increased signifi cantly and has resulted in growing negative impacts on the Amur tiger and its habitat.

- The largest impact on the tiger and its prey from forest management makes itself felt through the construction of forestry infrastructure, such as roads, tracks, storage areas, etc. Networks of forest tracks help poachers gain better access to tigers and their prey. In areas with dense forest track networks, hunting pressure is higher and both ungulate and tiger densities are lower. The mandatory closing of such roads once logging operations have been completed is one of the most important steps to achieving effective tiger conservation.

- In areas where Korean cedar pine and mature oak trees are cut, ungulates fi nd much less food. This is because both cedar pine nuts and acorns

are important food items. Logging must only be allowed if some areas of old-growth forest within each forestry unit are left untouched and if a full ban on the logging of Korean cedar pine is imposed.

- The level of illegal logging has grown signifi cantly. The quantity of illegallycut timber logged over the last seven years was between 50 and 60% of the amount of timber that was cut legally. Over the same period, however, the number of staff responsible for controlling and supervising state forests decreased signifi cantly.

- The incidence of forest fi res has increased, this being the result of not following fi re safety and prevention measures during and after logging operations. The following factors contribute to increased incidence of forest fi res:

- tailings and waste material resulting from logging operations are not removed, so providing additional combustible material

- after logging operations, more sunlight let into the lower forest strata leads to the drying out of forest fl oor cover and topsoil

- forest roads and tracks provide easier access to humans, thereby increasing the risks of accidental and deliberately-lit forest fi res.

- Protection against forest fi res is no longer adequately carried out by forest logging companies.

7. STATUS OF AMUR TIGER PROTECTION

The Amur tiger is one of the most valuable animals in Russia's genetic diversity. Russia was the fi rst country to develop a legislative base for Amur tiger conservation. A complete ban on hunting the tiger was introduced in 1947. The Amur tiger was listed in the USSR Red Data Book back in 1978 and again in the Russian Red Data Book in 1997.

To both protect rare and endangered wildlife species, including the Amur tiger, within Primorsky and Khabarovsk Regions and fulfi l Russia's obligations to the 1992 Convention on Biological Diversity, a Decree (No. 795) On the Conservation of the Amur Tiger and Other Rare and Endangered Species within Primorsky and Khabarovsk Regions was approved by the Russian Government on 7 August 1997. At about the same time on 8 July 1997, the Federal Special Purpose Program on the Conservation of the Amur Tiger was also approved by the Government. Earlier, in 1996, the fi rst Amur Tiger Conservation Strategy for Russia was approved by the Ministry of Natural Resources.

7.1 Conservation legislation

7.1.1 Principal international agreements and conventions

The Amur tiger is an endangered subspecies belonging to the VU A3c category in the Red Data Book of the International Union for the Conservation of Nature (IUCN). This means that the subspecies belongs to a vulnerable taxon whose population number within three generations (45 years) will drop by 30% due to contraction of its range and a decline in the quality of its habitat. The following international agreements exist to help conserve and reestablish rare and endangered species, including the Amur tiger:

- Convention on Biological Diversity (Rio de Janeiro, 5 June 1992) – ratifi ed by Russian Federal Law (No. 16-FZ) on 17 February 1995. This Convention provides for the conservation of biological resources, both in situ and ex situ, as well as for their sustainable use.

- Convention on International Trade in Rare and Endangered Species (CITES) (Washington, 3 March 1973) – the Amur tiger is listed in Annex 1 of CITES. This provides for strict regulation on the export and import of the tiger for commercial purposes.

- The Protocol between the Russian Federation and People's Republic of China on Protection of the Tiger (Beijing, 10 November 1997).

7.1.2 National legislation

7.1.2.1 Listing in Red Data Books

The Amur tiger is listed in the Russian Red Data Book as a Category 2 subspecies, ie. a species continually declining in number which can become endangered if unfavourable factors continue as they are. The removal from the wild of animals listed in the Russian Red Data Book, including the Amur tiger, is regulated by the Decree of the Russian Government On Approval of the Regulations of Removal from the Wild Animals Species listed in the Red Data Book of the Russian Federation, excluding Aquatic

Animals, No. 13 that was approved on 6 January 1997.

According to the above-mentioned regulations, the removal of the Amur tiger from the wild is allowed for purposes of their conservation, monitoring of their population status, regulating their population number, ensuring the health of their population, maintaining human health safety, removing threats to human life and preventing epizootic diseases from spreading to livestock and other domestic animals.

The Administrative Regulation of the Federal Supervisory Natural Resources Management Service was approved by the Order (No. 123) of the Ministry of Natural Resources on 30 April 2009 and registered (Registration No. 14115) by the Ministry of Justice on 22 June 2009.

The trade in animals listed in the Russian Red Data Book, including the Amur tiger, is regulated by the Decree (No. 156) On Issuing Licences for Trading Animal Species listed in the Red Data Book of the Russian Federation that was approved on 19 February 1996.

The trade in Amur tigers is only allowed based on permission being granted by the Federal Supervisory Natural Resources Management Service and is in line with the Administrative Regulation of the Service that carries out the State's function relating to the issuing of licences for trading in animal species listed in the Red Data Book. This was approved by the Order (No. 4) of the Ministry of Natural Resources on 15 January 2008, which was registered (Registration No. 11154) by the Ministry of Justice on 13 February 2008.

Guidelines for Calculating the Monetary Value of Damage to Animal Species Listed in the Russian Red Data Book and to Other Animal Species Not Subject to Hunting or Fishing and Their Habitats were approved by the Order (No. 107) of the Ministry of Natural Resources on 28 April 2008 and registered (Registration No. 11775) by the Ministry of Justice on 29 May 2008.

The Amur tiger is listed in the Red Data Books of four Russian provinces, namely, the Primorsky, Khabarovsk, Amur and Jewish Autonomous Regions.

7.1.2.2 Legislation in the Russian Federation

In Russia, the conservation and use of animal species, including the Amur tiger, and their habitats are covered by a number of laws and by-laws, the most important of these being:

- Federal Law On Environmental Protection, No. 7-FZ of 10 January 2002
- Federal Law On Animal Species, No. 52-FZ of 24 April 1995
- Federal Law On Specially Protected Natural Areas of 14 March 1995.

The conservation and use of animal species and their habitats are also covered by a number of other acts and decrees of the Russian Government and departmental sublaws relating to natural resource use, as well as by acts relating to other branches of law (eg. civil, criminal and administrative legislation).

The most important act relating to the conservation of animals is the Federal Law On Animal Species. It covers conservation and use of animal species in general, as well as more specifi cally the protection and rehabilitation of their habitats to ensure conservation of biological diversity, the sustainable use of its components, the provision of conditions for the long-term survival of animals, the conservation of the genetic diversity of wild animals and other forms of protection for animal species as a part of nature. This Law states that wild animal species within Russia are the property of the State. The Law also defi nes a list of measures to be carried out to conserve the habitats of wild animals, including rare and endangered species (particularly through establishing protected areas), and provides for the protection of areas that are necessary for animals to complete their life cycles (ie. breeding, raising young, feeding, resting, migrating, etc.). In such areas, certain types of economic development and activities can be banned or restricted in both time and nature of implementation.

The Law specifi es the responsibilities and powers of state authorities in wildlife conservation, including those responsibilities that have been delegated by federal authorities to regional authorities and the specific powers of regional authorities and local governments. The Law provides for the rights of individuals and legal entities to question how the responsibilities are being implemented, to undertake their own conservation activities and to assist in the implementation of relevant state programs. The Law identifi es the agencies responsible for the state administration of the conservation of animals and the conservation and rehabilitation of their habitats and defi nes the main principles.

To ensure the conservation of animal species and their habitats, the Law established the requirement to conduct state censuses of wild animals and record how the animals are used, to maintain a state inventory and conduct state monitoring of animal species and to implement state conservation programs.

In addition, the Law states that it is an obligatory requirement to conduct a state environmental impact assessment prior to any development decision being taken that may affect animal species and their habitats.

The Law states that rare and endangered animal species must be listed in the Russian Red Data Book and respective regional Red Data Books. Any activities that can lead to their death, decline in their numbers or damage to their habitats are prohibited. Legal entities and individuals who carry out economic activities within areas where such animals occur are responsible for their conservation. The Law also states that the use of and trade in listed rare and endangered animal species, as well the keeping of them in captivity and their release back into the wild, can only be legally done if the required permission has been granted.

Numerous by-laws and departmental regulations make up a considerably well-developed legal base for administrative authorities and law enforcement agencies to work in the field of conservation of rare and endangered animal species. They also provide a regulatory mechanism with relatively welldefined jurisdictions and separation of duties between federal and regional authorities.

The effectiveness of this generally well-developed system, however, is hindered by the low efficiency in law enforcement and by gaps and defi ciencies in some areas with regards legal instruments and regulations.

For example, the Russian Administrative Code sets out the penalties for destroying rare and endangered animals and plants that are listed in the Russian Red Data Book, or which are protected by international agreements. In addition, any action or inaction that leads to the death, decline in numbers or damage to habitats of animals, as well as to the destruction of plants, collection, removal and keeping in captivity, purchase, sale and postage of rare and endangered animals without the necessary permission being obtained or the conditions being complied with, or if other required procedures have not been followed, will be punished under administrative law.

At the same time, there are no legal provisions to penalise legal entities or individuals for assisting in the placement of announcements on the Internet relating to the sale of tiger skins or purchasing the products of illegal hunting.

Article 20 of the Federal Law On Animal Species requires a state environmental impact assessment to be carried out prior to a decision being made on whether or not any development project that may affect animal species and their habitats goes ahead. Article 24 of the same Law states that actions that may lead to the death, decline in numbers or damage to habitats of animals listed in the Red Data Book are prohibited.

However, as stated by the Federal Law On Environmental Impact Assessment, No. 174-FZ of 23 November 1995, if any development project which may affect the environment is planned to take place outside of protected areas, the continental shelf, exclusive economic zones, inland seas, Russian territorial waters and their adjacent zones, or if such projects do not fall within a special purpose program, a state environmental impact assessment is not required. Consequently, there are no legal grounds to prohibit such developments even if they may negatively affect the habitat of the Amur tiger.

Taking into account the requirements of the above-mentioned Law On Animal Species, it is necessary that the documentation relating to any construction project that is planned to take place within Amur tiger habitat must be subjected to an environmental impact assessment to ensure that it complies with environmental requirements.

7.2 Protected area conservation

At present, an area of approximately 36,000 km2 within the range of the Amur tiger (ie. 20% of its total range) falls within protected areas. Ten percent (10%) of this area consists of protected areas of federal importance (Table 1).

The establishment of transboundary migration corridors with special protection regimes to ensure free movement of animals is being planned. In addition, planning is also being directed at establishing protected areas where traditional forms of natural resource use are to be maintained. These areas will be developed and managed along with

Table 1. *List of protected areas where key tiger habitats are protected*

Name of Protected Area	Area (hectares, 000)	Regions and districts of Russia
FEDERAL NATURE RESERVES (Zapovedniks)		
		Primorsky Region
Kedrovaya Pad	18,045	Khasansky
Lazovsky	120,998	Lazovsky
Sikhote-Alinsky	401,428	Terneisky, Dalnegorsky, Krasnoarmeisky
Ussuriysky	40,432	Ussuriysky, Shkotovsky
		Khabarovsk Region
Bolshekhekhtsirsky	45,439	Khabarovsky
Botchinsky	267,380	Sovetsko-Gavansky
Komsomolsky	64,413	Komsomolsky
NATIONAL PARKS		
		Primorsky Region
Zov tigra (Call of the Tiger)	82,152	Chuguevsky, Olginsky, Lazovsky
Udege Legend	88,600	Krasnoarmeisky
		Khabarovsk Region
Anyuisky 429,370 Nanaisky		
FEDERAL NATURE REFUGES (Zakazniks)		
		Primorsky Region
Leopardovy	169,429	Khasansky, Nadezhdinsky, Ussurysky
		Khabarovsk Region
Khekhtsir	56,000	
REGIONAL NATURE REFUGES (Zakazniks)		
		Primorsky Region
Berezovyi	60,000	Chuguevsky
Vasil'kovsky	34,000	Olginsky
Verkhnebikinsky	746,482	Pozharsky
Poltavsky	119,000	Ussuriysky, Oktyabrsky
Taezhny	29,000	Krasnoarmeisky
Black rocks	12,400	Dalnegorsky
Losiny	26,000	Terneisky
Goraly	4,749	Terneisky
Tikhy	12,600	Anuchinsky
		Khabarovsk Region
Mataisky	114,400	Im. Lazo
Birsky	53,300	Bikinsky
Chukensky	219,700	Im. Lazo
Mopau	54,000	Vaninsky
NATURE PARKS		
		Khabarovsk Region
Vyazemsky	33,000	Vyazemsky
Khoso Khoso	123,100	Komsomolsky
ECOLOGICAL CORRIDORS OF REGIONAL IMPORTANCE		
		Khabarovsk Region
Strelnikov	8,100	Bikinsky
Manominsky	34,300	Nanaisky
Nelminsky	36,700	Sovetsko-Gavansky
Khutinsky 77,480 Vaninsky		

local communities in order to reach a compromise between tiger conservation and sustainable community development.

At the same time, however, an integrated spatial system of protection for the whole Amur tiger habitat, which takes into consideration the important ecological role of the tiger, is not yet in place. Up until now, when a particular category of protected area was selected and the regime for tiger protection was put in place, the importance of habitats for Amur tiger conservation was not always taken into account.

The conservation of the tiger inside protected areas within its key habitat range, in particular the Leopardovy Federal Nature Reserve and the Birsky, Mataisky, Taezhny and Verkhnebikinsky Regional Nature Refuges, is ineffi cient. This is because clear-felling operations are still taking place within these areas.

One of the key issues for the conservation of the Amur tiger is the optimization of land use in areas lying beyond protected areas.

7.3 Captive breeding

Zoos play an invaluable role in attracting broad public attention to issues relating to tiger conservation. They also raise awareness about the need to protect these animals in the wild.

A significant proportion of funds generated by zoos goes towards the conservation of tigers around the world.

Zoos are sources of valuable scientific data and practical experience. New combinations of anaesthetics were developed and tested in zoos, after which they could then be used in research studies on tigers in the wild. Some important indicators that assist in determining the age of animals, such as the condition of teeth and the weight of individuals, were first studied and then later used in the field. Photographs of tiger skin patterns and blood samples taken from captive zoo animals are being used in taxonomic research studies. Studying DNA taken from the faeces of captive tigers helps to develop methods for counting tigers in the wild. Zoo-based training programs have been of great help to local veterinarians, especially when they work with wild tigers that have to be placed in captivity or conduct post mortems.

Tigers were amongst the fi rst animals for which special captive management programs were developed. These include the Tiger Species Survival Plan (SSP) in North America, which was developed in 1982, and the European Program for Amur Tiger Breeding (Tiger Europäische Erhaltungszucht Programme (EEP)), which was established in 1985 in both Europe and Russia. The EEP has been jointly coordinated by Moscow Zoo and the Zoological Society of London (ZSL). Analysis of the present-day situation was conducted to determine whether or not Russia and other post-Soviet countries have suffi cient numbers of Amur tigers to independently manage their collective zoo population. It showed that the successful implementation of a long-term project on breeding the Amur tiger requires one overall management program covering all captive tigers.

The present-day captive population of Amur tigers was formed during the early-1950s and originates from 57 founder individuals. As of now, the combined population of tigers housed in the 91 zoos that make up the EEP numbers 268 tigers (127 males and 141 females). Of this total, 67 tigers (31 males and 36 females) are being kept in 29 zoos that belong to the Euro-Asian Regional Associations of Zoos and Aquariums (EARAZA). Many Russian and other post-Soviet zoos are members of this Association. The combined zoo population falling under the North American Tiger SSP of the American Zoo and Aquarium Association (AZA) presently consists of 131 Amur tigers (54 males and 77 females) housed within 48 zoological institutions within North America.

The total number of Amur tigers in captivity is comparable to the present number of tigers living in the wild. Whether or not all these captive tigers are of pure genetic stock, however, has still to be determined. If need be, captive tigers can be used to reinvigorate the genetic stock of the wild population. Among all the countries falling within the tiger's range, Russia has the best and most effi cient system in place for regulating the interface between captive and wild populations. From the mid-1990s, Russia has followed a principle of determining if any orphaned or injured tigers can be released back into the wild, or if they have to be incorporated into the zoo population. Only those individuals whose condition does not allow them to be released into the wild and who are young enough to be able to adapt to captive conditions become candidates for inclusion in the international breeding program for tigers. Zoos that participate in Amur tiger breeding programs provide the facilities necessary to look after them. Present policy favours placing tigers removed from

the wild in Russian zoos, providing these zoos have the required facilities. If this is not possible, the tigers are shipped to other zoos participating in the EEP, with Moscow Zoo and the EEP coordinator for the Amur tiger being involved in the process.

Since the zoo population was founded, the inflow into zoos of tiger orphans from the wild has expanded the founding genetic stock and increased the genetic diversity of the captive population. Indeed, some genetic lines that have disappeared entirely from the wild genome are now only preserved within the zoo population. This makes the importance of captive populations even greater.

At present in Russia, there is no necessity for reintroducing captive-bred Amur tigers back into the wild. In the future, however, replenishment of the wild population and the reintroduction of lost genes may become desirable. Such activities are not of first priority in the short-term conservation plans for the Amur tiger, but they can be considered as options if there is evidence of genetic weakening through inbreeding within the existing wild population. The Amur tiger is characterized by having the lowest genetic diversity of all tiger subspecies remaining in the wild. Therefore, there is a continuous need to monitor and assess the genetic wellbeing of the wild population.

Using all ways and means available, the management of zoo populations of the Amur tiger will continue to provide as much support as possible to those projects aimed at conserving populations of the subspecies in the wild. It will also continue to maintain a genetic reserve of the subspecies in case a need to use it arises in the future.

8. PRIORITIES FOR CONSERVING THE AMUR TIGER

Conservation of the Amur tiger population can only be assured by implementing a set of activities that are aimed at conserving the animal itself, protecting its habitat and protecting the animals that make up its food source. These activities must take into account the special biological features of the subspecies' boreal existence as well as the lessons learnt from past years.

There are two main tasks necessary for conserving the Amur tiger population. These are removing the causes of the decline in population number and minimizing the negative impacts that lead to the contraction and degradation of those habitats that are

suitable for tigers. It is in these two areas where priority activities must be focused.

8.1 Developing international collaboration

Although the Russian Federation presently carries the main responsibility for the conservation of the Amur tiger in the wild, the future of this sub-species also depends on the status and condition of the tiger population and its habitat in neighbouring countries, specifically the People's Republic of China and North Korea. Small populations of Amur tigers in border areas of China are apparently supplemented by individuals who cross over from Russia. Appearances of tigers in the northern parts of North Korea have also been recorded. Without uniting the efforts of neighbouring countries, it is not possible to assess the level of habitat degradation and the potential for restoring the Amur tiger's natural range. It is also not possible to determine a size for the entire Amur tiger population that can be sustained in the wild. Uniting global efforts will help foster the exchange of information and ideas and increase the possibility of being able to conserve not only the subspecies but also the entire tiger species.

The necessity of enhancing international collaboration in conserving and studying the Amur tiger is governed by a number of factors, first and foremost of which is the trans-boundary nature of human-related impacts. Inter-state cooperation, both within the region and beyond, is worthwhile developing in the following directions:

- Participation in the Global Tiger Initiative which

was announced by the World Bank provides a platform for international collaboration. Coordinated planning of activities in tiger conservation is a task that requires concentrating the efforts of all tiger range countries. The main objectives of the Global Tiger Initiative are:

- to increase the effectiveness of tiger conservation activities through the exchange of experience and information

- to improve the enforcement of conservation law through exchanging experience and international cooperation in combating the illegal cross-border trade in products derived from tigers and other rare and endangered animals species

- to decrease the demand for tiger products by inter alia conducting public awareness campaigns amongst consumers in those countries where tiger products are being used in traditional medicine and where there is also a demand for tiger skins

- to raise the effectiveness of tiger habitat protection

- to develop incentives for supporting tiger conservation at local level

- to develop and improve innovative mechanisms for funding tiger conservation activities, eg. developing mechanisms for joint funding of conservation projects by using carbon credits to compensate for carbon retention, or by paying for environmental services.

- Establishment of international transboundary protected areas for the conservation of the Amur tiger and the Far East leopard.

- Coordination of activities to stop the illegal export and trade of products that are derived from the illicit hunting of tigers and other rare animals. Of special importance is collaboration with China. On a local level, it is worthwhile for the customs services of the Russian Federation and neighbouring provinces in China to work together and exchange information on the cross-border movement of illegal animal products. It is also worthwhile for the respective state institutions to exchange information on illegal international trading routes in both countries.

- Coordination of research programs and cooperation between Amur tiger experts from different countries. Of special importance is the development of a joint methodology for monitoring Amur tigers in Russia and China. This will enable study results from both countries to be properly compared.

- Continuation of collaboration in the management of captive Amur tiger populations within the EEP, European Association of Zoos and Aquaria (EAZA) and the North American Tiger SSP of the AZA

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It is important to collaborate with international non-government conservation organisations, charitable foundations and other non-government bodies. Such collaboration helps to raise additional funding, exchange ideas, draw on best international experience and undertake joint work between Russian and foreign experts in the fi elds of conservation and research within the entire range of the Amur tiger.

8.2 Improving legislation

To increase the effectiveness of Russian conservation law and law enforcement for the conservation of the Amur tiger, it is recommended:

- ensuring that the provisions of Russian law are used to penalize individuals for processing illegally- obtained Amur tiger skins

- formulating regulations to penalize individuals and legal entities for providing Internet space to place announcements relating to the sale of Amur tiger skins and body parts and for purchasing illegally- obtained Amur tiger parts, as well as to penalize those individuals who place such announcements

- enhancing administrative penalties for killing Amur tigers by introducing amendments to Article 8.35 of the Russian Administrative Code (ie. Removal of Rare and Endangered Species of Animals and Plants) by adding the storage and transportation of the Amur tiger, its body parts and derivatives to the list of activities subject to penalty. The severity of the penalty for individuals must be increased – instead of "from 1,000 to 2,500 roubles", it should read "from 2,000 to 5,000 roubles." Confi scation of any vehicle used for transporting tiger parts must also be provided for

- enhancing penalties for the illegal removal and transportation of the Amur tiger, its body parts and derivatives over the Russian customs border

by introducing the following amendments and additions to the Russian Criminal Code: · in Part 2 of Article 188 on smuggling, extend the term "Contraband" and the list of items and objects for which the transport across customs borders are prohibited by adding the words "animals and plants listed in the Russian Red Data Book, their body parts and derivatives" immediately after the words "strategically important goods and valuable cultural objects which are subjected to special regulations for transporting across Russian customs borders" · in Article 258, introduce penalties as for illegal hunting for the illegal transport of animals that are subject to a full hunting ban, as well as their body parts and derivatives. Such an amendment would be entirely in line with the requirements of Part 2 of Article 57, entitled On Penalties for Violating the Law Relating to Hunting and Conservation of Hunting Resources, of the Federal Law On Hunting and Conservation of Hunting Resources and on Introducing Amendments into Some Russian Legal Acts, No. 209-FZ of 24 July 2009

- introducing amendments and additions to the Federal Law On Environmental Impact Assessment, No. 174-FZ, and ensuring that the documentation relating to any construction project planned to take place within Amur tiger habitat is subjected to an environmental impact assessment

- formulating and approving Regulations of Trade of Products Derived from Hunted Animals

- adding Korean cedar pine to the List of Tree and Bush Species Prohibited for Logging, No. 162, approved by the Russian Government on 15 March 2007

- restricting logging in Amur tiger habitats within those forests containing Korean cedar pine by introducing amendments to:

- Paragraph 12 of the Regulations for Logging that were approved by the Order of the Ministry of Natural Resources, No. 184 of 16 July 2007, by changing the part referring to the Korean cedar pine to the following wording: "With the exception of cutting down dead or damaged trees, it is not permitted to log those forests that consist of 30% or more Korean cedar pine trees, or those forests that consist of 20% Korean cedar pine trees in case of equal or less presence of each of any other dominant tree species in the stand's composition"

- Paragraph 51 of the Regulations for Logging by adding the following wording: "When clear-cutting is conducted, Korean cedar pine and Manchurian nut trees should be left within seed stock trees, tree groves and forest strips"

- the Forest Management Guidelines that were approved by Order No. 31 of the Ministry of Natural Resources on 6 February 2008 by inserting guidelines on identifying nut forests, ie. those forests containing one or more Manchurian nut trees, forests that consist of 30% or more Korean cedar pine trees, or those forests that consist of 20% Korean cedar pine trees in case of equal or less presence of each of any other dominant tree species in the stand's composition"

- reducing the logging quota in mature oak forests found within Amur tiger habitats by updating the valuation of forests containing Mongolian oak, updating permitted quotas on logging Mongolian oak and incorporating the relevant changes in forest management plans and forestry regulations in Primorsky and Khabarovsk Regions

- setting aside specially protected forest areas within Amur tiger key habitats that are in line with Paragraph 3b of Article 102 of the Russian Forest Code and which are based on recommendations on how to exploit forests within tiger habitats that were developed by the Far East Forestry Research Institute

- introducing a ban on all forms of logging in the Leopardovy Federal Nature Refuge by amending the Refuge's proclamation which was approved by the Order (No. 110) of the Ministry of Natural Resources on 22 April 2009

- introducing a ban on all forms of logging in the Birsky, Mataisky, Taezhny and Verkhnebikinsky Regional Nature Refuges by amending their respective proclamations

- introducing necessary amendments to forest management plans in Primorsky and Khabarovsk Regions that relate to the ban on all forms of logging within the Birsky, Mataisky, Taezhny and Verkhnebikinsky Regional Nature Refuges and reconsidering the forest lease agreements that

have been entered into with companies conducting logging operations within these protected areas, as well as assigning to those companies instead forest plots located outside the nature refuges

- assigning legal status to categories of regional protected areas, thereby ensuring their special protection and restricted landuse for purposes of protecting Amur tiger habitats and optimizing the protected area system in Russia

- amending hunting regulations and quotas to take into account the need to maintain healthy populations of prey items for tigers and the changes that take place in ungulate habitats that are linked to forest fi res and logging

- extending rights and responsibilities of local governments to ensure forest fi re prevention and to regulate those periods when individuals can visit forests

- envisaging further improvement in federal and regional legislation and the development of departmental regulations relating to the conservation of the Amur tiger.

8.3 Improving the protected area network

A large number of activities relating to protected area establishment that were in line with the earlier Amur Tiger Conservation Strategy for Russia (approved by the Ministry of Natural Resources in 1996) was accomplished within the Federal Special Purpose Program Conservation of the Amur Tiger. This Program was approved by the Decree (No. 843) of the Russian Government on 8 July 1997.

The protected area network within the range of the Amur tiger is made up of protected areas of various categories and importance. These include state nature reserves (zapovedniks), national parks, state nature refuges (zakazniks) of federal and regional importance and other types of protected area with specially designated landuses, such as buffer protection zones, protection forests and ecological corridors of regional importance. The protected areas help to guard the Amur tiger against poaching and to maintain high densities of ungulates. They also help tigers of all ages to survive and assist in raising their breeding success rate. Nevertheless, taking into account that individual Amur tigers need large territories, protected areas need to be increased in size as much as possible. In addition and to increase the effectiveness of protected areas, they should be connected by ecological corridors where possible.

To optimize the protected area system, it is necessary:

- to ensure the effective functioning of the Kedrovaya Pad Federal Nature Reserve and the Leopardovy Federal Nature Refuge by:

- developing management plans for both protected areas with the necessary funding being allocated from the federal budget

- taking steps to establish a single protected area (called the 'Leopard Land National Park') that would incorporate both the Kedrovaya Pad and Leopardovy protected areas, as well as a necessary expansion in size of the total area under protection

- to establish a Russia-China transboundary protected area that would on the Russian side incorporate the 'Leopard Land National Park', formed through the fusion of the Kedrovaya Pad and Leopardovy protected areas, and on the Chinese side incorporate the Hunchun protected area

- to enhance protection in the Ussuriysky Federal Nature Reserve by:

- granting to its rangers all the rights of state inspectors

- establishing a buffer zone adjacent to the Reserve that restricts certain types of land use

- securing UNESCO Biosphere Reserve status for both the core Ussuriysky Federal Nature Reserve and the adjacent buffer zone that would also incorporate parts of the Orlinoye State Experimental Hunting Management Unit and the Training/ Experimental Forestry Management Unit belonging to the Ministry of Agriculture

- to establish a federal protected area that would preserve traditional forms of land use along the Bikin River

- to establish a regional nature refuge (zakaznik) within the Strelnikov mountain range in Primorsky Region by way of compensating for the building of a pipeline between Khabarovsk and Vladivostok

- to establish ecological corridors of regional importance linking protected areas in the key tiger habitats that have management regimes that reduce the negative impacts on tiger habitats, such as clear-felling and road construction

- to incorporate within federal and regional protected area spatial plans all the proposed protected areas of varying categories and importance, so ensuring that the most important habitats for both the Amur tiger and its food source are protected.

8.4 Increasing the effectiveness of Amur tiger conservation outside of protected areas

The effectiveness of Amur tiger conservation outside of protected areas, including success in preventing and combating poaching, depends considerably on state support from federal and regional authorities, as well as action from nongovernment organisations.

Strengthening of Amur tiger conservation outside of protected areas can only be effective if it is conducted in a systematic way and in line with the laws of the Russian Federation. It must also be based on the joint and coordinated activities of the Ministry of Natural Resources, the Federal Supervisory Natural Resources Management Service as well as the Service's regional offi ces, Federal Security Service including the 'border guard service', transport police and other authorized regional bodies and interested authorities, as well as local communities.

To raise the effectiveness of Amur tiger conservation and to ensure the protection of its habitats outside of protected areas, it is advisable:

- to develop and implement an integrated system of protecting Amur tiger habitats that takes into account their ecological importance to the tiger population

- to introduce restrictions on some forms of economic activity within the most important tiger habitats. This includes restricting forest logging by introducing a moratorium on the logging of Korean cedar pine, limiting logging in other forests containing Korean cedar pine and restricting the logging of mature oak trees

- to reduce negative impacts of forest logging on Amur tiger and ungulate populations by making it obligatory for lessees of forest plots (specifi cally unlimited lease agreements) to include a special section, entitled "managing forest tracks", within the construction and exploitation of forest infrastructure part of their forest development plans. This is to ensure that forest tracks are blocked off with barriers and are cosed down after logging has been completed

- to enhance the control and supervision over the implementation of responsibilities that have been delegated to regional authorities concerning forest utilisation, protection, conservation and the planting of forests

- to undertake activities aimed at avoiding the creation of 'problem' tigers and the subsequent necessity to shoot them

- to provide for the effective tiger conservation operations of special authorities responsible for the protection and the control and regulation of the use of wild animals and their habitats, including the Tiger Special Patrol Team, by allocating suffi cient funding from the federal budget

- to develop and implement long-term federal and regional programs on restoring populations of wild ungulates within the Amur tiger range that would include inter alia providing special care to ungulates during extreme winters with high snowfall and outbreaks of disease

- to develop a strategy and action plan for game management within Russia, as well as specific game management strategies and action plans for Primorsky and Khabarovsk Regions

- to provide economic incentives for hunting management units where Amur tigers occur, including attracting investment and raising other non-budget funding

- to conduct thorough control over the status of wild populations and domestic animals and to screen all dead and captured Amur tigers and other predators for various diseases

- to minimize the uncontrolled movement of domestic animals

- to conduct thorough veterinary examinations of animals intended for release back into the wild that also include detailed risk assessments

- to oblige road construction companies to build tunnels, overpasses and underpasses for wild animals in order to reduce the chances of them colliding with vehicles

- to ensure that perishable information on the illegal trade in tiger skins and body parts is collected timeously and with the help of local residents

- to identify instances of transporting illegally-obtained Amur tiger parts and to establish control over the illicit markets by locating offers for Amur tiger skins on the Internet and through other media

- to block channels of illegal trade and export in Amur tiger skins and other body parts

- to signifi cantly increase the level of fi nes for transporting and storing Amur tiger body parts

- to inform local residents of the fact that the Amur tiger is a Red Data Booklisted animal and about the consequences to individuals for illegally obtaining and trading in the species and its body parts

- to help attract investment in order to develop small businesses within the settlements located in taiga and to create jobs for unemployed local residents, thereby removing some of the economic causes of poaching. When regional socio-economic development programs are prepared, preference should be given to those initiatives and projects that have minimal impact on the environment and the Amur tiger.

8.5 Scientific research

The conservation of biological diversity, including rare and endangered species, requires up-to-date scientific knowledge and the innovative application of that knowledge. Although up until now the biology and ecology of the Amur tiger have been studied well enough, many specifi c features of the tiger's biology within the Russian Far East have still to be studied in detail. This includes cub mortality, distribution, tiger ecology in peripheral areas of its range, disease, interaction with ungulates, etc.

Research on the Amur tiger can involve a variety of costly activities that utilise, for example, aircraft, satellite tracking, remote sensing, etc. The whole issue of Amur tiger conservation also impinges upon the interests of all users of natural resources. It is therefore necessary to ensure that collaboration takes place between ministerial and academic scientifi c research institutes and their branches within the Russian Far East. Effective implementation of scientifi c research programs should be based on international partnerships. These will help to ensure that scientifi c ideas and current experience are exchanged, the implementation of joint research programs involving Russian and foreign expertise takes places and that acertain level of funding is secured.

The development and implementation of scientifi c research programs on the Amur tiger must take into account the following focus areas of research:

- the present-day distribution of the Amur tiger, its population dynamics and the mapping of tiger distribution to produce a baseline database the total population number of the tiger, its rangeboundary, the distribution and density of the population in different parts of the tiger's range, the gender and age structure of the population and the condition of the tiger's food supply

- a partial census (ie. a monitoring program) is conducted annually along selected routes within sample areas that represent the whole system of enumeration areas used during complete censuses. Since the winter of 1997/98, partial censuses have been conducted in 16 sample areas within Primorsky and Khabarovsk Regions.

The main objective of a partial census is to identify the principal parameters of the tiger population living within sample areas to provide annual indicators of population number dynamics, reproductive status and condition of the food supply and habitat for the whole tiger population. Data collected during a partial census constitute the core component of long-term monitoring programs and provide the basis for making conservation decisions and for selecting the time when full censuses are conducted. Complete and partial censuses are based on a similar methodology. Partial censuses include a longer and more detailed list of parameters necessary to identify trends within the Amur tiger population, the tiger habitats and food resources and other infl uencing factors.

4 1

The fundamental principle of census design and implementation is continuity and consistency in methodology and the analysis of the data obtained.

Monitoring of the Amur tiger population addresses the following parameters:

- population number dynamics and its annual trends
- gender, age, spatial and social structure of the population and trends
- reproductive rates and trends
- spatial distribution and population density
- seasonal and daily migrations
- physiological condition of individuals, including physical and reproductive parameters.

The monitoring of Amur tiger habitats includes not only the recording of environmental factors but also the forecasting of possible habitat changes at ecosystem level. Such changes should be monitored in the following way:

- recording changes that affect habitats
- recording the contraction and/or transformation of habitats resulting from economic activities.

Over the last 12 years, the monitoring program has proved how effective it is in gathering unique and objective information on the Amur tiger population. The information collected is essential for developing adequate and practical activities for long-term tiger conservation. As such, the monitoring program needs to be continued. Present experience suggests, however, that the monitoring of the Amur tiger population can be improved in the following ways:

- improving the methodology for conducting censuses within the entire tiger range by using innovative methods that allow for more precise assessment of population numbers
- adding the health condition of the population and the population's genetic structure to the list of parameters to be monitored
- standardizing the methodology for counting ungulate populations within the tiger's range
- providing access through the Internet to the results of the monitoring programs.

8.7 Prevention and resolution of conflicts

The Amur tiger range in Russia incorporates large areas that are under economic development. Tiger habitat frequently lies adjacent to settlements, industrial areas and other economically developed land. Intensive economic development taking place within tiger habitat requires measures to be undertaken that prevent or resolve confl icts arising between tigers and humans. 42 An important factor in successfully resolving confl icts between tigers and humans is how quickly an expert can reach the place where the confl ict has arisen. After assessing each confl ict, decisions made on how to resolve them must take into account the type of confl ict involved, the tiger's gender and age and the animal's condition and behaviour. The main and most preferable methods of resolving a confl ict are closely monitoring the situation, chasing the animal away, keeping it in captivity for some time and translocating it to a suitable habitat and location elsewhere. The possibility of capturing and radio-tagging individual tigers opens up the options available for resolving the confl ict. Putting down a problem animal can only be considered when a real threat to human life arises that cannot be avoided in any other way. In order to prevent confl icts, it is advisable:

- to maintain the population number of tiger prey items at a stable level that supports both the predators and the needs of hunters, whilst still remaining within the limits of maintaining a sustainable and healthy prey population

- to develop a mechanism for compensating owners of domestic animals (including reindeer farmers) for damage caused by tigers in those cases where the loss of domestic animals was not related to them being kept in unsafe conditions

- to prepare an information handout that recommends certain human behaviour to follow when entering or living within Amur tiger habitats and when encountering a predator. Also, to ensure that local residents and hunters (eg. when issuing hunting licences) are informed about recommended behaviour to follow when encountering a tiger in order to avoid confl icts from arising. To resolve confl icts in a timely and effective manner, it is advisable:

- to ensure effective operations of special authorities responsible for the protection and the control and regulation of the use of wild animals and their habitats, including the Tiger Special Patrol Team, by providing necessary equipment and training programs and by securing suffi cient funding from the state budget

- to develop a mechanism of decision-making and responsive action for resolving confl icts that takes into account the type of confl ict involved, the tiger's gender and age and its condition and behaviour, as well as other circumstances. In such a mechanism, it is advisable to consider handing animals deemed not suitable for release back into the wild over to the European Program for Amur Tiger Breeding (EEP)

- to identify and introduce in practice the most effi cient methods for driving tigers away

- to undertake radio-tagging and satellite-tracking of 'problem' tigers

- to ensure the establishment of an Amur Tiger Rehabilitation Centre that would look after and raise orphaned tiger cubs with the intention of eventually releasing them back into the wild and that would temporarily house captured tigers. As a fi rst step, a project concept, workplan and budget need to be formulated 43

- to ensure that veterinary examinations are carried out on captured problem tigers, that uniform post-mortems are conducted on deceased animals and that standardized methods of collecting biological samples from captured and deceased animals and analysing them for possible diseases are employed.

8.8 Public awareness and education

One of the most important elements in Amur tiger conservation is developing amongst local residents and the public-at-large an understanding and acceptance of the tiger being part of our national heritage and a unique natural feature of world importance. In addition, it is important to elevate personal responsibility of people to follow relevant recommendations and necessary restrictions and raise personal aspirations to willingly take part in conservation activities. The principal criteria for evaluating the effectiveness of working with local residents and the public-at-large are the harbouring of a positive attitude towards Amur tiger conservation and the willingness amongst people to support and take part in conservation activities. A decline in the number of cases of poaching relating to tigers, a growing number of volunteers taking part in conservation campaigns and limiting economic development in order to meet the conservation needs of tigers would all help to testify to the success of Amur tiger conservation activities. To ensure effective long-term conservation of the Amur tiger, it is necessary:

- to instill amongst local residents an understanding of the important role that Russia plays in conserving the world's population of the Amur tiger

- to promote amongst people living within the Amur tiger's natural range a tolerance towards the tiger and an understanding of the need for its conservation

- to develop and carry out promotion campaigns for different target groups within the tiger range that are aimed at creating a positive image of the predator as a symbol of nature in the region

- to help raise the level of professional knowledge amongst decision-makers and natural resource managers, including hunting management unit staff

- to ensure wide distribution amongst local communities of information handouts on behaviours to be followed when people are within the tiger range and what to do when a tiger is encountered

- to help preserve the spiritual and cultural traditions of indigenous peoples and to promote traditional knowledge, rituals and practices that support conservation and which show a respectful attitude towards the Amur tiger

- to help local residents recognise the need for protecting large tracts of cedar pine/broad-leaved forests and the importance of nature reserves and national parks in conserving tigers and other unique natural values in the Russian Far East, as well as develop in peoples' minds an aversion towards poaching

- to help develop public oversight and ensure that reliable information is disseminated to the public-at-large

- to help support those hunting management units that manage their ungulate populations whilst taking into account the needs of the Amur tiger, as well as those other nature management operations that use natural resources in an environmentally-sustainable manner and help conserve both tiger habitats and food resources

- to popularize to the public-at-large the results of current scientifi c studies on Amur tiger ecology.

9. PARTNERS IN THE IMPLEMENTATION OF THE STRATEGY

Effective implementation of the Conservation Strategy for the Amur Tiger in Russia requires continued collaboration between state authorities, research and other institutions relevant to wildlife conservation and the public sector. It also requires the active support and involvement of the public-at-large.

The main onus of responsibility for the effective conservation of the Amur tiger in Russia lies with state authorities.

ACTION PLAN UP UNTIL 2020
FOR THE STRATEGY FOR CONSERVATION
OF THE AMUR TIGER IN THE RUSSIAN FEDERATION

Developing international cooperation	Outputs	Timeline	Responsible parties on the part of the Russian Federation*
1. Developing international cooperation			
1.1 To take part in the Global Tiger Initiative in order to improve coordination of international activities in tiger conservation.	• National program on recovering tiger population numbers that would be part of the Global Tiger Initiative.	2010	Ministry of Natural Resources and Environment (MoNR); Rosprirodnadzor; Ministry of Foreign Affairs (MoFA); Primorsky, Khabarovsk, Jewish Autonomous & Amur Regional Administrations; WWF; Russian Academy of Sciences (RAS)
1.2 To continue trans-boundary collaboration on Amur tiger conservation between Russia & China.			

1.2.1 To maximize work under the Agreement between the Governments of Russia & China on Collaboration in Environmental Protection (Beijing, 27 May 1994) & the Protocol between the Russian Federation & the People's Republic of China on Protection of the Tiger (Beijing, 10 November 1997).	• Joint workshops, conferences & other meetings on tiger conservation. Resolutions of bilateral meetings attended by researchers & technical & other experts. • Exchange of information & data on research, technologies, practices, policy, legislation, regulations & other issues. • Exchange visits of researchers & other experts. • Agreed action plans for collaboration on various issues concerning tiger conservation.	2011-2020	MoNR; Rosprirodnadzor; Primorsky, Khabarovsk, Jewish Autonomous & Amur Regional Administrations; RAS, WWF and other NGOs
1.2.2 To enhance collaboration between state institutions at various levels & scientifi c, international & nongovernmental organizations (NGOs) in order to facilitate fi nding mutuallyacceptable solutions to the most important tiger conservation issues & to establish a Russia-China expert working group on tiger conservation which would include representatives from state, research, international & NGOs that would be able to provide rapid responses to up-to-date information on changes taking place in tiger populations & habitats & suggest ways of resolving developing problems.	• Resolution on establishing a Russia-China expert working group on tiger conservation. • Annual scheduled meetings of the working group & extraordinary meetings if the need arises.	2011	MoNR; Rosprirodnadzor; Primorsky, Khabarovsk, Jewish Autonomous & Amur Regional Administrations; RAS, WWF and other NGOs

1.2.3 To ensure regular dialogue between regional authorities to effectively stop illegal trade in the tiger, its parts & derivatives as well as other animals, exchange perishable information on violations, abnormal weather climatic conditions & emergency situations caused by pollution that may lead to the death of wild animals, disseminate information & campaign.	• Agreements between regional authorities of Russia & China (Khabarovsk Region & Heilongjiang Province, Primorsky Region & Jilin Province) on conservation of the tiger, its habitats & food resources.	2011-2020	MoNR; Rosprirodnadzor; Primorsky, Khabarovsk, Jewish Autonomous & Amur Regional Administrations; RAS, WWF and other NGOs
1.2.4 To strengthen collaboration in studies on the tiger & other wild animals & their habitats by establishing direct scientifi c & technical links between Russian & Chinese organizations, research institutions, universities & applied research & manufacturing companies.	• Direct agreements between Russian & Chinese institutions on collaborating in science & technology that would allow for fundamental & applied research to be undertaken, results to be applied, environmental monitoring to be conducted & scientifi c & technical information to be exchanged, as well as joint Russia-China programs & projects with participating third-party countries to be initiated.	2011-2015	MoNR; Rosprirodnadzor; Ministry of Education & Science (MoES); universities; ministerial research institutes; IUCN Species Survival Commission (SSC); RAS, WWF and other NGOs
1.2.5 To establish a Russia/China transboundary protected area which would incorporate the Russian Kedrovaya Pad State Nature Reserve & Leopardovy Federal Nature Refuge.	• Inter-governmental agreement between Russia & China on the establishment of the trans-boundary protected area. • Additional entry in the List of Actions for the Concept of Cross-border Collaboration in the Russian Federation No. 907-r) approved by the Government of Russia on 3 July 2003.	2013-2015	MoNR; Rosprirodnadzor; MoFA, Primorsky Regional Administration, RAS, WWF and other NGOs

1.2.6 To establish a Russia/China transboundary protected area which would include the projected Russian regional nature refuge on the Strelnikov mountain range in the Khasansky District of Primorsky Region & a protected area in Jilin Province in neighbouring China. This new protected area would assist tiger & other wild animals movement across the border.	• Inter-governmental agreement between Russia & China on the establishment of the trans-boundary protected area. • Additional entry in the List of Actions for the Concept of Cross-border Collaboration in the Russian Federation (No. 907-r) approved by the Government of Russia on 3 July 2003.	2012-2014	MoNR; Rosprirodnadzor; MoFA; Primorsky Regional Administration, RAS, WWF and other NGOs
1.2.7 To establish a Russia/China trans-boundary protected area in the Black Mountains-Chanbaishan area.	• Inter-governmental agreement between Russia & China on the establishment of the trans-boundary protected area. • Additional entry in the List of Actions for the Concept of Cross -border Collaboration in the Russian Federation (No. 907-r) approved by the Government of Russia on 3 July 2003.	2013-2015	MoNR; Rosprirodnadzor; MoFA; Primorsky Regional Administration, RAS, WWF and other NGOs
.3 To strengthen collaboration between Khabarovsk Region & Heilongjiang Province in China on conservation of the Amur tiger, its food resources & habitats.	• Memorandum on cooperation between Khabarovsk Region & Heilongjiang Province in China.	2011-2015	MoNR; Rosprirodnadzor; MoFA; Khabarovsk Regional Administration, RAS, WWF and other NGOs

1.4 To create a mechanism of collaboration between Russia, China & North Korea in order to enhance collaboration on tiger conservation.	• Joint workshops & other meetings on tiger conservation; fi nal documents of meetings held in which experts & representatives from Russia, China & North Korea participated.	2015-2020	MoNR; Rosprirodnadzor; MoFA; WWF and other NGOs
1.5 To strengthen coordination between the customs authorities of Russia, China, North & South Korea in order to stop illegal export & trade in tiger parts & derivatives, as well as body parts & derivatives of other rare & endangered animals.	• Appeal of the Ministry of Natural Resources to relevant customs authorities. • International seminar.	2011-2012	MoNR; Federal Customs Service (FCS); SSC; WWF and other NGOs
1.6 To ensure international cooperation in the conservation of the tiger & other wild animals & their habitats between research institutes, universities, applied research & manufacturing companies, public organizations & experts.	• International research program on the tiger, other wild animals & their habitats. • Conferences & other meetings on tiger conservation; fi nal documents of those meetings. • Exchange of information & materials on research, technology, production, policy, legislation, regulation & other issues on tiger conservation. • Exchange visits of scientists & other experts.	2013-2020	MoNR; Rosprirodnadzor; MoES; universities; ministerial research institutes; SSC; RAS, WWF and other NGOs

1.7 To prepare & approve a program for exchanging experience in Amur tiger conservation between experts from Russia, China & North Korea.	• Program for international seminars to exchange experiences in Amur tiger conservation.	2015	MoNR; Rosprirodnadzor; Primorsky Regional Administration; SSC; WWF and other NGOs
1.8 To continue collaboration in the management of captive Amur tiger populations between the European Program for Amur Tiger Breeding (EEP), European Association of Zoos & Aquaria (EAZA) & the North American Tiger Species Survival Plan (SSP) of the American Zoo & Aqua-rium Association (AZA).	• Annual reports on activities completed under the EEP, EAZA & the North American Tiger SSP of the AZA.	2010-2020	MoNR; Rosprirodnadzor; Moscow Zoo
2. Improving legislation			
2.1 To develop, approve & implement regional programs on the Amur Tiger Conservation Strategy for Russia.	• Primorsky Regional Program for the Implementation of the Amur Tiger Conservation Strategy for Russia. • Khabarovsk Regional Program for the Implementation of the Amur Tiger Conservation Strategy for Russia.	2011-2015	Primorsky & Khabarovsk Regional Administrations; RAS, WWF and other NGOs
2.2 To ensure legal protection of Amur tiger habitats within cedar pine/ broad-leaved & oak forests.			
2.2.1 To add Korean cedar pine to the List of Tree & Bush Species Prohibited for Logging.	• Draft decree of the Russian Government on introducing amendments & additions to Decree No. 162 that was approved by the Russian Government on 15 March 2007.	2010-2012	MoNR; Rosprirodnadzor; WWF

2.2.2 To restrict logging within Amur tiger habitats in those forests containing Korean cedar pine.	• Draft order of the Ministry of Agriculture on introducing amendments to Paragraph 12 of the Regulations for Logging that were approved by the Order of the Ministry of Natural Resources, No. 184 of 16 July 2007, by changing the part referring to the Korean cedar pine to the following wording: "With the exception of cutting down dead or damaged trees, it is not permitted to log those forests that consist of 30% or more Korean cedar pine trees, or those forests that consist of 20% Korean cedar pine trees in case of equal or less presence of each of any other dominant tree species in the stand's composition." • Draft order of the Ministry of Agriculture on introducing amendments to Paragraph 51 of the Regulations for Logging that were approved by the Order of the Ministry of Natural Resources, No. 184 of 16 July 2007 by adding the following wording: "When clear-cutting is conducted, Korean cedar pine & Manchurian nut trees should be left within seed stock trees, tree groves & forest strips." • Draft order of the Ministry of Agriculture on introducing amendments to Forest Management Guidelines that were approved by Order No. 31 of the Ministry of Natural Resources on 6 February 2008 by inserting guidelines on identifying nut forests, ie. those forests containing one or more Manchurian nut trees, forests that consist of 30% or more Korean cedar pine trees, or those forests that consist of 20% Korean cedar pine trees in case of equal or less presence of each of any other dominant tree species in the stand's composition.	2010-2012	MoNR; Rosprirodnadzor; WWF and other NGOs

2.2.3 To reduce the logging quota in mature oak forests found within Amur tiger habitats by updating the valuation of forests containing Mongolian oak, updating permitted quotas on logging Mongolian oak & incorporating the relevant changes in forest management plans & forestry regulations in Primorsky & Khabarovsk Regions.	• Forest management plans for Primorsky & Khabarovsk Regions. • Forestry regulations for Primorsky & Khabarovsk Regions.	2010-2012	Rosleskhoz; MoNR; Rosprirodnadzor; Primorsky & Khabarovsk Regional Administrations; WWF
2.2.4 To set aside specially protected forest areas within Amur tiger key habitats that are in line with Paragraph 3b of Article 102 of the Russian Forest Code & which are based on recommendations on how to exploit forests within tiger habitats that were developed by the Far East Forestry Research Institute.	• Set of documents required to set aside specially protected forest areas within key habitats of the Amur tiger. • Draft ministerial act regulating the setting aside of specially protected forest areas.	2010-2015	Rosleskhoz; MoNR; Rosprirodnadzor; Primorsky & Khabarovsk Regional Administrations; WWF
2.2.5 To extend rights & responsibilities of local governments to ensure forest fi re prevention & to regulate those periods when individuals can visit forests.	• Amendments to the Federal Law On the General Principles of Organization of Local Government in the Russian Federation, No. 131-FZ of 13 October 2003, specifying the responsibilities of local governments to ensure the prevention of forest fi res & to regulate those periods when individuals are allowed to visit forests.	2010-2015	Rosleskhoz; Primorsky & Khabarovsk Regional Administrations; WWF

2.2.6 To extend rights & responsibilities of local governments to ensure forest fi re prevention & to regulate those periods when individuals can visit forests.	• Amendments to the Federal Law On the General Principles of Organization of Local Government in the Russian Federation, No. 131-FZ of 13 October 2003, specifying the responsibilities of local governments to ensure the prevention of forest fi res & to regulate those periods when individuals are allowed to visit forests.	2010-2015	Rosleskhoz; Primorsky & Khabarovsk Regional Administrations; WWF
2.2.7 To establish a comprehensive list of regional protected area categories in the Russian Federation & their respective special protection regimes in order to ensure the conservation of Amur tiger habitats & to optimize the existing system of regional protected areas.	• Draft laws of Primorsky, Khabarovsk & Jewish Autonomous Regions on introducing amendments into their respective legal acts on protected areas of regional importance. • Draft laws of Primorsky, Khabarovsk & Jewish Autonomous regions providing for categories of protected areas, such as ecological corridors.	2010-2015	Primorsky, Khabarovsk & Jewish Autonomous Regional Administrations; WWF
2.2.8 To develop guidelines for calculating the monetary value of damage to animal species listed in the regional Red Data Books & their habitats.	• Draft Guidelines for Calculating the Monetary Value of Damage to Animal Species Listed in the Regional Red Data Books & Their Habitats.	2012-2015	Primorsky & Khabarovsk Regional Administrations
2.3 To ensure legal safeguards are in place in order to maintain healthy populations of tiger food prey items.			

2.3.1 To develop a strategy & action plan for game management within Russia.	• Draft strategy & action plan for game management within Russia.	2010-2013	MoNR
2.3.2 To develop strategies & action plans for game management within Primorsky & Khabarovsk Regions.	• Draft strategies & action plans for game management in Primorsky & Khabarovsk Regions.	2012-2015	Primorsky & Khabarovsk Regional Administrations
2.3.3 To ensure the maintenance of healthy populations of tiger prey items that take into account the needs of hunters.	• Amendments to regulations & quotas that take into account the need to maintain healthy populations of prey items for tiger.	2010-2012	MoNR; Primorsky & Khabarovsk Regional Administrations
2.3.4 To introduce a system of differentiated hunting quotas for ungulates.	• Amendments to relevant articles of the Russian Administrative Code.	2010-2013	WWF; Rosprirodnadzor
2.3.5 To introduce a ban on the hunting of ungulates within their breeding areas or in those areas where ungulate population numbers have declined drastically.	• Relevant draft decrees made by respective regional administrations.	2010-2013	MoNR; Primorsky & Khabarovsk Regional Administrations; WWF and other NGOs
2.3.6 To reduce negative impacts of forest logging on Amur tiger & ungulate populations by making it obligatory for lessees of forest plots (specifi cally unlimited lease agreements) to include a special section, entitled "managing forest tracks", within the "construction & exploitation of forest infrastructure" part of their forest development plans. This is to ensure that forest tracks are blocked off with barriers & are closed down after logging has been completed.	• Relevant amendments to forest development plans. • Relevant amendments to plans for construction & exploitation of forest infrastructure that would ensure the inclusion of a special section on managing forest tracks & their closing down after logging has been completed.	2010-2020	MoNR; Rosleskhoz; Rosprirodnadzor; Primorsky & Khabarovsk Regional Administrations; WWF and other NGOs

2.3.7 To establish a buffer zone adjacent to the Ussuriysky Federal Nature Reserve that restricts certain types of land use from taking place within Amur tiger habitats.	• Draft Decree of the Russian Government on establishing a buffer zone adjacent to the Ussuriysky Nature Reserve.	2010-2015	MoNR; Ministry of Justice (MoJ); Primorsky Regional Administration; WWF
2.4 To strengthen the combat against poaching & the illegal trade in tiger skins & other derivatives.			
2.4.1 To ensure that the provisions of Russian law are used to penalize individuals for processing illegally-obtained Amur tiger skins.	• Results of checking up on how the relevant law provisions are being used.	2010-2020	Rosprirodnadzor; Primorsky & Khabarovsk Regional Administrations; WWF and other NGOs
2.4.2 To formulate regulations to penalize individuals & legal entities for providing space on the Internet in order to place announcements relating to the sale of Amur tiger skins & body parts & for purchasing illegally-obtained Amur tiger parts, as well as to penalize those individuals who place such announcements.	• Amendments to relevant articles in the Russian Administrative Code.	2010-2012	MoNR; MoJ; Rosprirodnadzor; Primorsky & habarovsk Regional Administrations; WWF and other NGOs
2.4.3 To enhance administrative penalties for killing Amur tigers by adding the storage & transportation of the Amur tiger, its body parts & derivatives to the list of activities subject to penalty, & also by increasing the size of penalties & providing for confi scation of any vehicle used for transporting tiger parts.	• Draft Federal Law on introducing amendments to Article 8.35 of the Russian Administrative Code (ie. Removal of Rare & Endangered Species of Animals & Plants) that provides for the inclusion of storage & transportation of the Amur tiger, its body parts & derivatives to the list of activities subject to penalty & increases the size of penalties for individuals – instead of "from 1,000 to 2,500 roubles", it should read "from 2,000 to 5,000 roubles" & also allow for the confi scation of any vehicle used for transporting tiger parts.	2010-2012	MoNR; MoJ; Rosprirodnadzor; Primorsky & Khabarovsk Regional Administrations; WWF and other NGOs

2.4.4 To enhance penalties for the illegal removal & transportation of the Amur tiger, its body parts & derivatives over Russian customs borders by introducing the following amendments & additions to the Russian Criminal Code: • extend the term "Contraband" & the list of items & objects for which the transport across customs borders are prohibited • introduce penalties as for illegal hunting for the illegal transport of animals that are subject to a full hunting ban, as well as their body parts & derivatives. The latter amendment would be entirely in line with the requirements of Part 2 of Article 57, entitled On Penalties for Violating the Law Relating to Hunting & Conservation of Hunting Resources, of the Federal Law On Hunting & Conservation of Hunting Resources & on Introducing Amendments into Some Russian Legal Acts, No. 209-FZ of 24 July 2009.	• Draft Federal Law on introducing amendments to Part 2 of Article 188 of the Russian Criminal Code on smuggling that provides for the extension of the term "Contraband" & the list of items & objects for which the transport across customs borders are prohibited by adding the words "animals & plants listed in the Russian Red Data Book, their body parts & derivatives" immediately after the words "strategically important goods & valuable cultural objects which are subjected to special regulations for transporting across Russian customs borders." • Draft Federal Law on introducing amendments to Article 258 of the Russian Criminal Code that provides for penalties as for illegal hunting for the illegal transport of animals that are subject to a full hunting ban, as well as their body parts & derivatives.	2010-2011	
2.4.5 To formulate & approve Regulations of Trade of Products Derived from Obtaining Species Listed in the Russian Red Data Book.	• Draft Regulations of Trade of Products Derived from Obtaining Species Listed in the Russian Red Data Book.	2010-2015	MoNR

2.4.6 To empower all rangers (regardless of whom they are employed by) to be able to enforce antipoaching regulations.	• Draft regional laws on introducing amendments into relevant regional laws on administrative violations relating to protection, control & regulation of wild animal species & their habitats covered by Paragraph 14, Part 5 of Article 28.3 of the Russian Administrative Code. • Lists of offi cials empowered to draw up charges on administrative violations in accordance with regional legislation.	2010-2013	MoNR; MoJ; Rosprirodnadzor; Primorsky & Khabarovsk Regional Administrations
2.4.7 To increase penalties for the unauthorized entry into hunting grounds whilst in the possession of fi rearms, traps & other hunting equipment, or accompanied by hunting dogs or falcons, or in the possession of a kill. In order to do this, the listed actions should be defi ned by the law as being considered as a part of hunting per se. In 2009, changes made to the defi nition of the term "hunting" made the carrying of unloaded or cased fi rearms during unauthorized entry into hunting grounds, or entry into hunting grounds during periods when hunting was banned, not subject to prosecution. This fact severely hindered the work of rangers in combating the poaching of ungulates.	• To introduce amendments to Paragraph 5 of Article 1 of the Federal Law On Hunting & Conservation of Hunting Resources & on Introducing Amendments into Some Legal Acts of the Russian Federation by stating that entry into hunting grounds whilst in possession of fi rearms, traps & other hunting equipment, or whilst in the company of hunting dogs or falcons, or whilst in possession of a kill or carrying a cased fi rearm when travelling on a public road are all defi ned as hunting.		

2.4.8 To ensure enforcement of Article 41 of the Federal Law On Hunting & Hunting Resources on Introducing Amendments into Some Legal Acts of the Russian Federation, specifi cally that part which relates to initiating charges against suspected poachers by rangers on behalf commercial game farms acting as legal entities or by individual entrepreneurs (eg. lessees of hunting grounds).	• Amendments to the Russian Administrative Code & regional administrative codes to empower rangers working on commercial game farms to initiate charges against suspected poachers. • Amendments to the lists of offi cials empowered to initiate charges against suspected poachers that add to these lists rangers working on commercial game farms.	2010-2011	MoNR; MoJ
2.4.9 To ensure strict control is exerted over those individuals who are repeatedly charged with violations against hunting regulations, to withhold permission from such individuals to possess fi rearms or to hunt, to ensure the registration of such individuals in databases & to provide for the effi cient exchange of information to track repeat offenders.	• Regional databases on those individuals who violate conservation laws.	2010-2012	MoNR; Rosprirodnadzor; Tiger Special Patrol Team; Primorsky & Khabarovsk Regional Administrations; WWF and other NGOs
2.4.10 To defi ne the unauthorized possession of a fi rearm as a crime.	• Amendments to the Russian Criminal Code defi ning the unauthorized possession of a fi rearm as being a crime.	2010-2012	MoNR; MoJ; Rosprirodnadzor; WWF and other NGOs
2.5 To enhance the interaction between nature resource users & conservation organizations in order to effi ciently address sustainable nature management issues within the Amur tiger range.			

2.5.1 To ensure permanent interaction & information exchange between nature resource users & conservation organizations.	• Multi-party agreements between nature resource users & conservation organizations.	2010-2020	Rosprirodnadzor; Primorsky Regional Administration; authorities responsible for the protection & the control & regulation of the use of wild animals & their habitats in Primorsky Region; WWF and other NGOs
2.5.2 To ensure that the documentation relating to any construction project planned to take place within Amur tiger habitat is subjected to an environmental impact assessment.	• Draft federal law on introducing amendments & dditions to the Federal Law On Environmental Impact Assessment, No. 174-FZ of 23 November 1995 that provides for the carrying out of an environmental impact assessment on documentation relating to any construction project that is planned to take place within Amur tiger habitat. • State environmental impact assessment reports.	2010-2020	MoNR; MoJ; Rosprirodnadzor; WWF and other NGOs
2.5.3 To provide for independent environmental impact assessments to be carried out for any development project or other project using nature resources that may affect the Amur tiger population & its habitat.	• Independent environmental impact assessment reports.	2010-2020	Authorities responsible for the protection & the control & regulation of the use of wild animals & their habitats in Primorsky Region; Rosprirodnadzor; WWF; RAS;

2.5.4 To establish a group of experts to undertake environmental impact assessments (EIAs), including independent EIAs, where they relate to tiger conservation – the group would also incorporate members of the Working Group on Amur Tiger Conservation	• List of experts.	2010-2011	Rosprirodnadzor; Tiger Special Patrol Team; RAS, WWF and other NGOs
2.5.5 To prepare a draft proposal on how to provide tax advantages to those legal entities & individuals who make donations towards the conservation & rehabilitation of biodiversity within the Primorsky & Khabarovsk Regions.	• Draft proposal on providing tax advantages to legal entities & individuals	2010-2011	Primorsky & Khabarovsk Regional Administrations
3. Improving the protected area network			
3.1 To establish an effective & functional protected area system within the Amur tiger's range			
3.1.1 To incorporate proposed protected areas of varying categories within the Federal Protected Area Spatial Plan in order to ensure that the most important habitats for both the Amur tiger and its food source are protected.	• Draft Federal Protected Area Spatial Plan that incorporates both newly-proposed federal protected areas as well as extensions to existing protected areas within the Amur tiger's range.	2010-2012	MoNR; Rosprirodnadzor; WWF

3.1.2 To incorporate proposed protected areas of varying categories within regional protected area spatial plans in order to ensure that the most important habitats for both the Amur tiger & its food source are protected & to also incorporate tiger conservation objectives within the regional spatial development plans for Primorsky & Khabarovsk Regions.	• Draft regional protected area spatial plans that incorporate proposed regional protected areas falling within the Amur tiger's range.	2010-2011	Primorsky & Khabarovsk Regional Administrations; WWF
3.1.3 To ensure the effective functioning of the Kedrovaya Pad Federal Nature Reserve & Leopardovy Federal Nature Refuge by drawing up management plans for both protected areas, with the necessary funds being allocated from the federal budget.	• Management plan for Kedrovaya Pad Federal Nature Reserve. • Management plan for Leopardovy Federal Nature Refuge. • Necessary funding allocated from the federal budget.	2010-2012	MoNR; Kedrovaya Pad Federal Nature Reserve; WWF and other NGOs
3.1.4 To establish a single protected area (called the 'Leopard Land National Park') that would incorporate both the Kedrovaya Pad & Leopardovy protected areas, as well as a necessary expansion in size of the total area under protection.	• Draft set of documents necessary for establishing a single protected area (called the 'Leopard Land National Park') that incorporates both the Kedrovaya Pad & Leopardovy protected areas, as well as a necessary expansion in size of the total area under protection. • State Environmental Impact Assessment statement for the documentation on the proposed establishment of the 'Leopard Land National Park'. • Development & Management Plan for 'Leopard Land National Park'.	2012-2013	Kedrovaya Pad Federal Nature Reserve; WWF and other NGOs

3.1.5 To improve protection in the Ussuriysky Federal Nature Reserve by: • granting to its rangers all the rights of state inspectors • establishing a buffer zone adjacent to the Reserve that restricts certain types of land use • securing UNESCO Biosphere Reserve status for both the core Ussuriysky Federal Nature Reserve & the adjacent buffer zone that would also incorporate parts of the Orlinoye State Experimental Hunting Management Unit & the Training/Experimental Forestry Management Unit belonging to the Rosleskhoz	• Draft decree on establishing a buffer zone adjacent to the Ussuriysky Federal Nature Reserve. • Set of documents necessary for securing UNESCO Biosphere Reserve status for both the core Ussuriysky Federal Nature Reserve & the adjacent buffer zone that would also incorporate parts of the Orlinoye State Experimental Hunting Management Unit & the Training/Experimental Forestry Management Unit of the Rosleskhoz	201-2015	MoNR; Rosleskhoz, Ussuriysky Federal Nature Reserve; Primorsky & Khabarovsk Regional Administrations; RAS, WWF and other NGOs
3.1.6 To establish a federal protected area that would preserve traditional forms of land use along the Bikin River.	• Set of documents necessary for proclaiming a federal protected area along the Bikin River. • Draft decree of the Russian Government on establishing a federal protected area along the Bikin River.	2010-2015	MoNR; Primorsky & Khabarovsk Regional Administrations; WWF
3.1.7 To establish a regional nature refuge (zakaznik) within the Strelnikov mountain range in Primorsky Region as a form of compensation for the building of a pipeline between Khabarovsk & Vladivostok.	• Set of documents necessary for proclaiming a regional nature refuge (zakaznik) within the Strelnikov mountain range in Primorsky Region. • Draft decree of the Governor of Primorsky Region on establishing a regional nature refuge (zakaznik) within the Strelnikov mountain range.	2011-2015	Primorsky Regional Administration; WWF

3.1.8 To establish the Solnechnye Gory & Yuzhno-Primorsky nature parks in Primorsky Region.	• Set of documents necessary for establishing the Solnechnye Gory & Yuzhno-Primorsky nature parks in Primorsky Region. • Draft decrees of the Governor of Primorsky Region on establishing the Solnechnye Gory & Yuzhno-Primorsky nature parks.	2011-2015	Primorsky Regional Administration; WWF
3.1.9 To establish regional protected areas (nature parks) in the Samarga River basin	• Set of documents necessary for establishing nature parks in the Samarga River basin in Primorsky Region. • Draft decrees of the Governor of Primorsky Region on establishing nature parks in the Samarga River basin.	2011-2015	Primorsky Regional Administration; WWF
4. Increasing the effectiveness of Amur tiger conservation outside of protected areas			
4.1 To develop an integrated Amur tiger habitat protection system takes into account their ecological importance to the tiger population.			
4.1.1 To identify the most important natural features for both the tiger and its prey (eg. natural salt licks) in order to give them protected status, eg. introduce land use restrictions within the most important tiger habitats, including logging restrictions amongst others.	• Analytical review of Amur tiger population status based on results of the 1995/96 & 2004/05 censuses. • Proposals for an integrated system for protecting Amur tiger habitats that takes into account the habitats' ecological importance to the tiger population.	2010-2012	MoNR; Rosprirodnadzor; RAS, WWF and other NGOs

4.1.2 To establish ecological corridors of regional importance that link those protected areas within key tiger habitats which employ management regimes that reduce the effects of negative impacts, such as clear-felling & road construction, on tiger habitats.	• Proposed system of ecological corridors of regional importance. • Set of documents necessary for establishing ecological corridors of regional importance linking protected areas in key tiger habitats. • Draft decrees of the Governors of Primorsky & Khabarovsk Regions on establishing ecological corridors of regional importance.	2011-2020	Primorsky & Khabarovsk Regional Administrations; WWF and other NGOs
4.1.3 To develop a management plan for an ecological corridor that links the main Amur tiger population in Sikhote-Alin with the isolated population in south-west Primorye.	• Draft management plan for the ecological corridor.	2011-2015	Primorsky Regional Administration; RAS, WWF and other NGOs
4.1.4 To develop a management plan for an ecological corridor that links the Amur tiger populations in south-west Primorye & the Pogranichny Range.	• Draft management plan for the ecological corridor.	2011-2015	Primorsky Regional Administration; RAS, WWF and other NGOs
4.1.5 To enhance the control & supervision over the implementation of responsibilities that have been delegated to regional authorities concerning forest utilisation, protection, conservation & the planting of forests.	• Results of auditing conducted by special authorities of Primorsky & Khabarovsk regions on the protection, control & management of wild animals & their habitats & on forest utilisation, protection, conservation & the planting of forests on how the responsibilities delegated to the regional authorities are implemented.	2010-2020	MoNR; Rosprirodnadzor

4.1.6 To enhance fi re prevention the ability to combat forest fi res within Amur tiger habitats.	• Alarm system is developed. • Local residents are trained. • Anti-fi re infrastructure is improved.	2010-2015	Rosleskhoz; Ministry of Emergency (MoE); MoNR; Rosprirodnadzor; WWF and other NGOs
4.1.7 To ensure the rehabilitation of damaged Amur tiger habitats through a special program of forest restoration.	• Action plan on forest restoration.	2010-2020	Rosleskhoz; MoNR; Rosprirodnadzor; WWF
4.1.8 To provide for the construction of special wildlife crossings across highways to reduce incidences of wild animals being run over by vehicles.	• Projects for constructing wildlife crossings (underpasses & overpasses).	2012-2015	MoNR; Rosprirodnadzor; Primorsky & Khabarovsk Regional Administrations; WWF
4.2 To ensure non-destructive nature resource use within Amur tiger habitats that has minimal impact on the environment & the Amur tiger.			
4.2.1 To introduce through voluntary forestry certifi cation, as stipulated by the Forest Stewardship Council (FSC), sustainable forestry practices within tiger habitat covering an area of no less than 3 million hectares and to add tiger conservation to the list of effectiveness indicators within the voluntary forestry certifi cation scheme.	• Proceedings of workshops. • Mechanism for introducing sustainable forestry practices is developed. • Action plan to help introduce voluntary forestry certifi cation.	2010-2012	Rosprirodnadzor; Primorsky Regional Administration; RAS, WWF and other NGOs
4.2.2 To implement pilot ecotourism projects within Primorsky & Khabarovsk Regions as alternatives to other forms of economic development.	• Pilot ecotourism projects in Primorsky & Khabarovsk Regions. • Tours developed & advertised.	2012-2018	Primorsky & Khabarovsk Regional Administrations; RAS, WWF and other NGOs

4.2.3 To create a 'safari-park' within tiger habitat in order to help develop ecotourism & to conduct scientifi c research.	• Draft set of documents necessary for establishing a 'safari-park'. • Draft regional act for establishing a 'safari-park'.	2011-2015	Primorsky & Khabarovsk Regional Administrations; RAS, WWF and other NGOs
4.2.4 To create incentives for small business development in order to combat unemployment & so reduce poaching.		2011-2020	Primorsky & Khabarovsk Regional Administrations; RAS, WWF and other NGOs
4.2.5 To develop a program & action plans that encourage amongst local residents non-destructive uses of nature resources that have minimal impact on the environment & the Amur tiger by: • involving local residents in ecotourism development within Primorsky & Khabarovsk Regions • supporting local residents in the development of businesses relating to sustainable forestry & game farming	• Actions plans on the involvement of local residents in ecotourism development in Primorsky & Khabarovsk Regions.	2011-2015	Primorsky & Khabarovsk Regional Administrations; RAS, WWF and other NGOs
4.3 To maintain high population numbers of Amur tiger prey species			
4.3.1 To develop a long-term federal program on restoring populations of wild ungulates within the Amur tiger's range that would include inter alia the provision of special care to ungulates during extreme winters with high snowfall & outbreaks of disease.	• Draft long-term federal program on restoring populations of wild ungulates within the Amur tiger's range.	2010-2012	MoNR; Rosprirodnadzor; RAS, WWF and other NGOs

4.3.2 To develop regional programs on restoring populations of wild ungulates within the Amur tiger's range in Primorsky & Khabarovsk Regions.	• Draft regional programs on restoring populations of wild ungulates within the Amur tiger's range in Primorsky & Khabarovsk Regions.	2010-2012	Primorsky & Khabarovsk Regional Administrations; authorities responsible for the protection & the control & regulation of the use of wild animals & their habitats in Primorsky & Khabarovsk Regions; RAS, WWF and other NGOs
4.3.3 To provide economic incentives to hunting management units where Amur tigers occur, including attracting investment & generating other forms of non-budget funding. This should include the testing of special game management practices aimed at increasing ungulate population numbers within pilot hunting management units.	• Reports on special game management practices that have been undertaken.	2012-2020	Primorsky & Khabarovsk Regional Administrations; authorities responsible for the protection & the control & regulation of the use of wild animals & their habitats in Primorsky & Khabarovsk Regions; WWF and other NGOs
4.4 To ensure veterinary monitoring of the Amur tiger population.			
4.4.1 To conduct thorough monitoring of wild animal populations &domestic animals & to screen all dead or captured Amur tigers & other predators for various diseases.	• Monitoring activities.	2010-2020	MoNR; Rosprirodnadzor; Primorsky & Khabarovsk Regional Administrations; WWF and other NGOs
4.4.2 To conduct thorough veterinary examinations of animals intended to be released back into the wild that are also accompanied by detailed risk assessments.	• Veterinary examination reports.	2010-2020	MoA; Primorsky & Khabarovsk Regional Administrations

4.4.3 To undertake a vaccination program for domestic pets & feral dogs & cats to prevent possible outbreaks of disease. Vaccinations must be carried out against the following diseases: viral feline leukemia, caliciviral infection, herpes, chlamydiosis, feline panleukopenia, feline rabies, leptospirosis, canine distemper, canine parvovirus & canine rabies.	• Vaccination program.	2010-2020	MoA; Primorsky & Khabarovsk Regional Administrations
4.4.4 To establish a centre within the Primorsky Agricultural Academy for conducting post-mortem examinations of dead tigers.	• Legal act establishing the Primorsky Agricultural Academy as the only centre in which post-mortem examinations of dead tigers are conducted.	2010	Rosprirodnadzor; MoA; Primorsky & Khabarovsk Regional Administrations; WWF and other NGOs
4.4.5 To provide training for local veterinarians in order to expose them to modern veterinary techniques relating to wildlife conservation.	• Training programs. • Seminars. • Trained experts.	2011-2020	Rosprirodnadzor; MoA; Primorsky & Khabarovsk Regional Administrations; NGOs
4.5 To improve the effectiveness of anti-poaching efforts.			
4.5.1 To conduct annual training courses for state wildlife conservation & protected area inspectors on registering law violations, inspection procedures & drawing up charges according to the Russian Administrative Code & to provide necessary training for newly-enrolled state inspectors as well as improve the qualifi cations of other inspectors.	• Reports.	2010-2020	Primorsky & Khabarovsk Regional Administrations; WWF

4.5.2 To ensure that perishable information on the illegal trade in tiger skins & body parts is collected timeously & with the help of local residents.	• Up-to-date intelligence. • Reports.	2010-2020	Tiger Special Patrol Team; Ministry of Internal Affairs (MoIA)
4.5.3 To identify incidences of transporting illegally-obtained Amur tiger parts by monitoring illicit markets in order to locate offers for Amur tiger skins on the Internet & through other forms of media.	• Up-to-date intelligence. • Reports.	2010-2020	Tiger Special Patrol Team; FCS
4.5.4 To block channels of illegal trade in & export of Amur tiger skins & other body parts in conjunction with branches of the Customs service.	• Up-to-date intelligence. • Reports.	2010-2020	Tiger Special Patrol Team; FCS; Primorsky & Khabarovsk Regional Administrations
4.5.5 To conduct multi-stakeholder meetings, workshops & seminars, as well as to provide other forms of dialogue between authorities, commercial companies & conservation NGOs, in order to discuss economic development plans & spatial planning so that the conservation needs of the Amur tiger are taken into account.	• Proceedings of meetings.	2010-2020	MoNR; Rosprirodnadzor; Primorsky & Khabarovsk Regional Administrations; Tiger Special Patrol Team; RAS, WWF and other NGOs
4.5.6 To prepare reviews on applying Russian administrative regulation practices for state wildlife conservation & protected area inspectors in order to raise their professional level & to improve the effectiveness of their work. The reviews would take into account changes in the law & court procedures.	• Review documents.	2010-2020	MoNR; Rosprirodnadzor; Tiger Special Patrol Team; Primorsky & Khabarovsk Regional Administrations; protected areas; RAS, WWF and other NGOs

5. Scientific research			
5.1 To produce a baseline database with information on the present-day distribution of the Amur tiger, its population dynamics, biology, ecology & habitat condition, as well as information on populations of the tiger's main prey species.	• Database structure. • Database interface. • Data entered into database. * The Tiger Special Patrol Team was designated as being responsible for maintaining this database by a special order of Rosprirodnadzor.	2010-2020	Tiger Special Patrol Team; RAS, WWF and other NGOs
5.2 To develop & implement scientific research programs on the following focus areas: • present-day distribution of the Amur tiger, its population dynamics & the mapping of tiger distribution to produce a baseline database • role of natural & human-related factors on the population dynamics & changing habitats of the Amur tiger • identifi cation of key breeding sites for the Amur tiger • defi nition of the population structure of the Amur tiger using molecular genetics & other modern methods • gender, age structure & other demographic indicators of a population & also the spatial & temporal distribution of animals relating to gender, age & environmental factors (eg. studying spatial population structure, movement & spatial behaviour) • interaction between the Amur tiger & other predators • diet & food availability & the distribution & population dynamics of principal prey items in different parts of the Amur tiger's range • reproductive biology of the Amur tiger • veterinary examination of individual Amur tigers from the wild to monitor for diseases (eg. distemper, toxoplasmosis, pyroplasmosis, etc) • development of scientifi c-based methodology & a program for the rehabilitation & future release back into the wild of orphaned tiger cubs.	• Scientifi c research programs. • Reports on results of scientifi c research.	2010-2015	Tiger Special Patrol Team, RAS, WWF and other NGOs

5.3 To continue studies on the spatial & behavioural structure of the population using modern technologies & methods, including satellite tracking & remote sensing.	• Reports on results of scientifi c research.	2010-2015	RAS, WWF and other NGOs , Tiger Special Patrol Team
5.4 To continue studies on the impact of wildfi res on ungulate populations in areas where numbers have dropped signifi cantly and also on the restoration of Amur tiger habitats.	• Reports on results of scientifi c research.	2010-2015	RAS, WWF and other NGOs , Tiger Special Patrol Team
5.5 To continue studies on the genetic status of Amur tiger populations within its range in Russia using molecular genetics	• Reports on results of scientifi c research.	2011-2020	RAS, WWF and other NGOs , Tiger Special Patrol Team
.5.6 To continue studies on how tiger behaviour develops so that they become part of a methodology for rehabilitating orphaned tiger cubs.	• Draft guidelines for the rehabilitation of orphaned tiger cubs.	2011-2015	RAS; NGOs
5.7 To continue to develop approaches aimed at minimizing the risk of confl ict arising between Amur tigers & humans.	• Reports on results of scientifi c research.	2011-2020	RAS, WWF and other NGOs
5.8 To continue studies & work aimed at building up a bank of genetic material that includes: • the development of a method for collecting the sex organs of recentlydeceased tigers • the collection of gametes (ie. sperm & eggs), skin & muscle tissues from live animals using low-impact methods of sampling (eg. endoscopy, electroejaculation, biopsy).	• Reports on results of scientifi c research.	2011-2020	RAS; NGOs

6. Monitoring the Amur tiger population			
6.1 To establish a single centre that is managed by the Tiger Special Patrol Team for the storage & processing of monitoring data on the Amur tiger population.	• The Tiger Special Patrol Team has responsibility for developing & maintaining the monitoring centre for the Amur Tiger as stated in Paragraph 3 of the Ministry of Natural Resources Order No. 63 of 15 March 2003.	2010-2020	Rosprirodnadzor; Tiger Special Patrol Team
6.2 To improve the methodology for conducting censuses within the entire tiger range by using innovative methods that allow for more precise assessment of population numbers by adding inter alia the health condition of the population & the population's genetic structure to the list of parameters to be monitored.	• Monitoring results.	2010-2020	Rosprirodnadzor; Tiger Special Patrol Team
6.3 To standardize the methodology for counting ungulate populations within the Amur tiger's range.	• Standardized methodology for counting ungulate populations.	2011-2015	MoNR; Rosprirodnadzor; Tiger Special Patrol Team
6.4 To ensure the monitoring of Amur tigers within selected areas.	• Monitoring results, including those obtained using a new method applied within selected areas.	2010-2020	MoNR; Tiger Special Patrol Team; RAS, WWF and other NGOs
6.5 To establish a working group on the monitoring of the Amur tiger that would fall under the auspices of the Far East Rosprirodnadzor.	• Decree issued by the Far East Rosprirodnadzor on establishing a working group on Amur tiger monitoring & listing its membership.	2011	Rosprirodnadzor

6.6 To provide access to results of the monitoring programs through the Rosprirodnadzor website.	• Information on Rosprirodnadzor website.	2011-2020	Rosprirodnadzor
7. Preventing and resolving conflicts			
7.1 To maintain the population number of tiger prey items at a stable level that supports both the predators & the needs of hunters, whilst still remaining within the limits of maintaining a sustainable & healthy prey population.	• Results of censuses of tiger prey species (winter migration counts etc.)	2010-2020	MoNR; Rosprirodnadzor; Primorsky & Khabarovsk Regional Administrations; Tiger Special Patrol Team
7.2 To develop a mechanism for compensating owners of domestic animals (including reindeer farmers) for damage caused by tigers in those cases where the loss of domestic animals was not related to them being kept in unsafe conditions.	• Draft guidelines on compensating owners of domestic animals for damage caused by tigers. • Application form to enable farmers to apply for compensation	2011-2020	MoNR; Rosprirodnadzor; Tiger Special Patrol Team; Primorsky & Khabarovsk Regional Administrations; WWF
7.3 To prepare an information handout that recommends certain human behaviour to follow when entering or living within Amur tiger habitats & when encountering a predator and to ensure that local residents & hunters (eg. when issuing hunting licences) are informed about recommended behaviour to follow when encountering a tiger in order to avoid confl icts from arising. In addition, to recommend conditions in which to safely house domestic animals.	• Information handout. • Information disseminated through TV & other media. • Information materials.	2010-2015	MoNR; Rosprirodnadzor; Primorsky & Khabarovsk Regional Administrations; WWF

7.4 To provide necessary equipment for the Tiger Special Patrol Team to drive away or capture & immobilize large predators & to ensure that the qualifi cations of staff are improved through special training programs.	• Staff of the Tiger Special Patrol Team are trained & necessary equipment is provided.	2010-2013	Tiger Special Patrol Team; WWF
7.5 To identify & introduce in practice the most effi cient methods for driving tigers away & to ensure local residents living within tiger habitats are provided with self-protection devices (eg. pepper sprays, signal fl ares).	• Local residents equipped with self-protection devices.	2010-2020	Tiger Special Patrol Team; WWF
7.6 To undertake the radio-tagging of tigers.	• Report containing information on tiger movements.	2010-2020	Tiger Special Patrol Team; WWF
7.7 To ensure the establishment of an Amur Tiger Rehabilitation Centre that would look after & raise orphaned tiger cubs with the intention of eventually releasing them back into the wild as well as temporarily house captured tigers.	• Concept, work plan & budget for the establishment of an Amur Tiger Rehabilitation Centre. • Decree on establishing an Amur Tiger Rehabilitation Centre.	2011-2020	Rosprirodnadzor; Tiger Special Patrol Team; Primorsky & Khabarovsk Regional Administrations; authorities responsible for the protection & the control & regulation of the use of wild animals & their habitats in Primorsky & Khabarovsk Regions; WWF
7.8 To ensure that veterinary examinations are carried out on captured problem tigers, uniform post-mortems are conducted on deceased animals & standardized methods of collecting biological samples from captured & deceased animals & analysing them for possible diseases are employed.	• Post-mortem reports. • Standardized methods of collecting biological samples from captured & deceased animals & analysing them for possible diseases.	2011-2020	Rosprirodnadzor; Tiger Special Patrol Team; Primorsky & Khabarovsk Regional Administrations; authorities responsible for the protection & the control & regulation of the use of wild animals & their habitats in Primorsky & Khabarovsk Regions; WWF

8. Public awareness and education			
8.1 To promote amongst local residents a tolerance towards the tiger & an understanding of the need for its conservation & also to instill an understanding of the important role that Russia plays in conserving the world's population of the Amur tiger.			
8.1.1 To develop & carry out promotion campaigns for different target groups within the tiger range that are aimed at creating a positive image of the predator as a symbol of nature in the region	• Information disseminated through the media.	2010-2020	MoNR; Rosprirodnadzor; Tiger Special Patrol Team; Primorsky & Khabarovsk Regional Administrations; RAS, WWF and other NGOs
8.1.2 To undertake the following activities: • to publish information in regional & district media on the tiger & its biology, ecology & habitat • to produce environmental radio & television programs on the Amur tiger, conduct competitions within the media for the best program & produce a series of educational programs on rare plant & animal species in Primorsky & Khabarovsk Regions • to develop & maintain a regional website on Amur tiger conservation • to produce & broadcast televised musical promos on Amur tiger conservation	• Information presented or published.	2010-2020	MoNR; Rosprirodnadzor; Tiger Special Patrol Team; Primorsky & Khabarovsk Regional Administrations; RAS, WWF and other NGOs

8.1.2 • to educate local residents through radio & television about the damage caused by poaching & the efforts being employed to combat it • to place in the children's sections of district newspapers quizzes & answers on conservation • to produce fi lms & videos promoting the conservation of rare & endangered species & to persuade fi lm crews from the best federal, regional & foreign fi lm & television companies, as well as school fi lm-making clubs, to make amateur & professional documentaries & show them on local television • to develop, produce & distribute information & promotional leafl ets, brochures, fi eld guides, badges, stickers, postcards, souvenirs & other materials with an Amur tiger theme • to develop, produce & erect billboards, information boards & banners featuring either pictures drawn by children from local neighbourhoods or photographs taken by professional photographers • to place conservation messages on aircraft, ships & vehicles used for transporting both local residents & tourists • to promote Amur tiger conservation by placing advertisements in shops, restaurants & other food outlets • to organize a handicrafts competition with an Amur tiger theme • to illustrate in comic strip form recommendations on behaviours to follow when encountering a tiger & giving phone numbers to call in case of incidents or environmental crimes.	• Information presented or published.		

8.1.3 To liaise regularly with the local media (municipal & district), including the electronic media, make available popularized information on a regular basis & provide opportunities for feedback by conducting discussions, surveys, contests, quizzes, etc.	• Information distributed through the media.	2010-2020	Rosprirodnadzor; Tiger Special Patrol Team; Primorsky & Khabarovsk Regional Administrations; RAS, WWF and other NGOs
8.1.4 To inform local residents about the fact that the Amur tiger is listed in the Red Data Books of Russia & the Primorsky, Khabarovsk, Amur & the Jewish Autonomous Regions and of the penalties that apply for illegally obtaining Amur tigers and their body parts & derivatives.	• Information materials.	2010-2011	Tiger Special Patrol Team; WWF
8.1.5 To present information to local residents on tiger ecology, the conservation needs of the tiger & its prey, the inadmissibility of poaching, the behaviour that people should follow when within the tiger's range & what to do when a tiger is encountered. The information should be presented by the environmental education & communication departments of protected areas.	• Publication of information through various protected area media. • Information placed on protected area websites. • Information available in natural history museums, visitor centres, outdoor information boards, etc.	2010-2020	MoNR; federal & regional protected area administrations; Primorsky & Khabarovsk Regional Administrations; RAS, WWF and other NGOs
8.1.6 To develop eco-trails ('tiger trails') within national parks & nature reserve buffer zones that help promote conservation awareness amongst people living within the tiger's range.	• Information placed along ecological trails (eg. information boards, handouts, etc).	2010-2020	MoNR; federal & regional protected area administrations; Primorsky & Khabarovsk Regional Administrations; RAS, WWF and other NGOs

8.1.7 To establish, replenish & update exhibitions in nature museums & libraries that take into account current developments in museum & library management and use such methods as mobile & static exhibitions of photographs, artwork, children's drawings & projects, posters, essays & school projects, all on the theme of Amur tiger conservation & the role that the tiger plays in the cultures of indigenous peoples living in the southern part of the Russian Far East. To improve ways of interacting with visitors. To establish groups of volunteer lecturers within museums & libraries in order to raise awareness amongst people about the conservation needs of the Amur tiger.	• Up-to-date exhibitions in nature museums & libraries. • Groups of volunteer lectures	2010-2020	MoNR; federal & regional protected area administrations; Primorsky & Khabarovsk Regional Administrations; Department of Education in Primorsky Region; Ministry of Education in Khabarovsk Region; district education departments; RAS, WWF and other NGOs
8.1.8 To organize educational programs for various age groups that focus on recommended human behaviour & rules for keeping domestic animals within the ranges of the tiger & other large predators, on fi re safety in the forest & on survival in the taiga.	• Public awareness & knowledge about human behaviour & rules for keeping domestic animals within the ranges of the tiger & other large predators, on fi re safety in the forest & on survival in the taiga.	2010-2020	Primorsky & Khabarovsk Regional Administrations; Department of Education in Primorsky Region; Ministry of Education in Khabarovsk Region; district education departments; WWF

8.1.9 To conduct seminars & round-table meetings aimed at raising public awareness about legal regulations, including the Russian Criminal Code, so helping to combat environmental crime, including the shooting of rare & endangered species; to hold meetings between conservation authorities & local residents living within the tiger's range in order to explain those areas of the Russian Criminal Code that relate to illegal hunting & the regulations governing the removal of animals listed in the Russian Red Data Book.	• Information handouts on the conservation of the Amur tiger & its habitat.	2020-2020	MoNR; federal & regional protected area administrations; Primorsky & Khabarovsk Regional Administrations; Department of Education in Primorsky Region; Ministry of Education in Khabarovsk Region; district education departments; RAS, WWF and other NGOs
8.1.10 To conduct sociological surveys to identify the attitude of various population groups towards the Amur tiger & its conservation & to inform the public-at-large about the results.	• Questionnaires. • Publicising of survey results	2020-2020	Department of Education in Primorsky Region; Ministry of Education in Khabarovsk Region; district education departments
8.2 To ensure that environmental education & awareness activities on Amur tiger conservation are conducted for children.			
8.2.1 To incorporate current environmental issues into mandatory training courses for teachers.	• Programs for mandatory teacher training courses that include current environmental issues.	2010-2020	Department of Education in Primorsky Region; Ministry of Education in Khabarovsk Region; district education departments
8.2.2 To incorporate environmental education programs which explain the ecological role of tigers in Ussuri taiga ecosystems into school curricula in the Primorsky & Khabarovsk Regions.	• School curricula.	2010-2020	Department of Education in Primorsky Region; Ministry of Education in Khabarovsk Region; district education departments

8.2.3 To include issues on recommended human behaviour to follow when within the tiger's range in 'life safety' lessons that are given at those secondary schools in Primorsky & Khabarovsk Regions that are located within tiger habitats.	• School curricula.	2010-2020	Department of Education in Primorsky Region; Ministry of Education in Khabarovsk Region; district education departments
8.2.4 To produce special guidelines, textbooks, programs & training aids relating to tiger ecology & conservation for schools.	• Special guidelines, textbooks, programs & training aids.	2010-2020	Department of Education in Primorsky Region; Ministry of Education in Khabarovsk Region; district education departments
8.2.5 To erect educational boards with information on the ecology of the Amur tiger within schools.	• Information boards.	2010-2020	Department of Education in Primorsky Region; Ministry of Education in Khabarovsk Region; district education departments
8.2.6 To organize the following environmental education activities within schools: • arrange a schools contest to develop an Internet-based environmental newsletter • organize a trade-fair for children's works that are themed on the Amur tiger • arrange for children's presentations & the screening of fi lms made by children to be given at parents' meetings held at schools • provide support for children's environmental theatre/studios • arrange for the screening of documentaries on the Amur tiger & other Red Data Book-listed species for children & follow these up with discussions.	• Information provided.	2010-2020	Department of Education in Primorsky Region; Ministry of Education in Khabarovsk Region; district education departments

8.2.7 To organize extra-curricular environmental education activities for children, such as summer camps, research expeditions, fi eld schools & various environmental education projects, & to use role playing, contests & other forms of games.	• Information provided.	2010-2020	Department of Education in Primorsky Region; Ministry of Education in Khabarovsk Region; district education departments
8.2.8 To organize an annual regional Day of the Tiger, district, city & regional olympiads, children's art & photographic competitions, festivals, celebrations, gatherings, etc.	• Information provided	2010-2020	Primorsky & Khabarovsk Regional Administrations; Department of Education in Primorsky Region; Ministry of Education in Khabarovsk Region; district education departments; RAS, WWF and other NGOs
8.2.9 To create, using the Primorsky Institute of Advanced Training for Educators as a base, regional audio & video libraries on tiger conservation that can be used to: • produce & broadcast children's radio & television programs • produce & broadcast environmental games, fairytales & plays with Red Data Book-listed animals (including the Amur tiger) acting as main characters • inform the public-at-large through radio & television about the current state of the Amur tiger population, emergencies relating to adverse impacts on tiger habitats & actions being undertaken by authorities to address emerging threats against the Amur tiger • produce & distribute bulletins providing information on the monitoring of tiger populations • produce & distribute educational materials, posters, children's comics & information handouts all about the Amur tiger.	• Information provided.	2010-2020	Primorsky & Khabarovsk Regional Administrations; Department of Education in Primorsky Region; Ministry of Education in Khabarovsk Region; district education departments; RAS, WWF and other NGOs

8.3 To ensure that educational & awareness-raising activities on Amur tiger conservation take place amongst students.			
8.3.1 To develop & introduce environmental programs into the curricula of universities & other higher education institutions & to organize lectures by representatives from conservation authorities & NGOs. To incorporate information on the conservation of the Amur tiger & other wildlife species living in the southern part of the Russian Far East into the curricula of universities in Primorsky & Khabarovsk Regions & to show video documentaries to students.	• Curricula of universities & other higher education institutions.	2010-2020	Department of Education in Primorsky Region; Ministry of Education in Khabarovsk Region; district education departments; RAS, WWF and other NGOs
8.3.2 To organize special seminars, training courses, round-table meetings & science-into-practice conferences.	• Proceedings of special seminars, training courses, roundtable meetings & science-intopractice conferences.	2010-2020	Department of Education in Primorsky Region; Ministry of Education in Khabarovsk Region; district education departments; RAS, WWF and other NGOs
8.3.3 To publish student newsletters & bulletins on tiger conservation.	• Student newsletters & bulletins.	2010-2020	Department of Education in Primorsky Region; Ministry of Education in Khabarovsk Region; district education departments; RAS, WWF and other NGOs

8.3.4 To organize activities for student conservation movements & volunteers.	• Activity reports.	2010-2020	Department of Education in Primorsky Region; Ministry of Education in Khabarovsk Region; district education departments; RAS, WWF and other NGOs
8.4 To provide basic & advanced training courses for experts in Amur tiger conservation.			
8.4.1 To organize seminars & training courses for game farm managers & lessees of hunting grounds in order to share best practices from pilot hunting management units.	• Proceedings of seminars & training courses.	2010-2020	Primorsky & Khabarovsk Regional Administrations

*** – Abbreviations used:**
AZA – American Zoo & Aquarium Association;
EAZA – European Association of Zoos & Aquaria;
EEP – European Program for Amur Tiger Breeding (Tiger Europäische Erhaltungszucht Programme);
EIA – Environmental Impact Assessment;
FCS – Federal Customs Service;
FSC – Forest Stewardship Council;
IUCN – International Union for Conservation of Nature;
MoA – Ministry of Agriculture, MoE– Ministry of Emergency;
MoES – Ministry of Education & Science;
MoFA – Ministry of Foreign Affairs;
MoIA – Ministry of Internal Affairs;
MoJ – Ministry of Justice;
MoNR – Ministry of Natural Resources;
NGO – non-government organisation;
RAS – Russian Academy of Sciences;
Rosprirodnazor – offi cially known as the Federal Supervisory Natural Resources Management Service;
SSC – IUCN Species Survival Commission;
SSP – North American Tiger Species Survival Plan;
UNESCO – United Nations Educational, Scientifi c & Cultural Organization;
WWF – World Wide Fund for Nature.

Thailand Tiger Action Plan 2010-2022

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Department of National Parks, Wildlife and Plant Conservation
Ministry of Natural Resources and Environment
Thailand

"Turning the tide of extinction of wild Tiger, changing the way we treat the world for our future generations."

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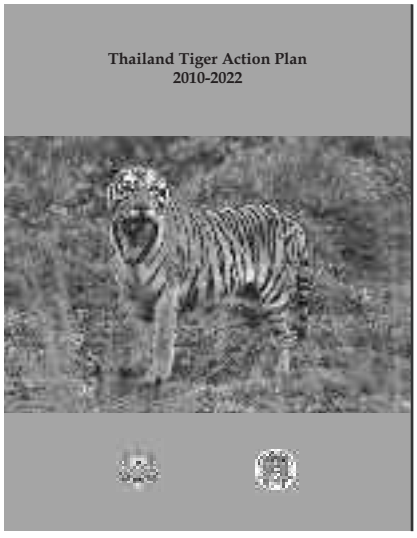

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Female tiger in Huai Kha Khaeng Wildlife Sanctuary.

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Tiger in Huai Kha Khaeng Wildlife Sanctuary.

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Inside back cover double page:

Tiger with a gaur killed in Huai Kha Khaeng Wildlife Sanctuary.

Photographer:

Kwanchai Waitanyakran

CONTENTS

ABBREVIATIONS AND ACRONYMS

ASEAN-WEN	ASEAN Wildlife Enforcement Network
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CC	Community Committee
DNP	Department of National Parks, Wildlife and Plant Conservation
DP-KY	Dong Phayayen – Khao Yai Forest Complex
GEF-5	Global Environment Facility for Biodiversity
GPS	Global Positioning System
GTI	Global Tiger Initiative
HKK	Huai Kha Khaeng Wildlife Sanctuary
HKK-TY	Huai Kha Khaeng and Thung Yai Narasuan Wildlife Sanctuaries
IUCN	International Union for Conservation of Nature
KNR	Khao Nang Rum Wildlife Research Station
KY-TL	Khao Yai and Thap Lan National Park
MIST	Spatial Management Information System
MoU	Memorandum of Understanding
NGOs	Non Government Organizations
NP	National Park
NTFPs	Non Timber Forest Products
PAAO	Protected Area Administration Office
PAC	Protected Area Committee
PAs	Protected Areas
REDD	Reducing Emissions from Deforestation and Forest Degradation in developing countries.
Smart Patrol System	The implementation of a suite of components necessary for effective law enforcement including strategic planning, adequate training and staffing levels, equipment and other resource needs, standardized law enforcement monitoring potocols, and full integration of law enforcement monitoring data into the adaptive management cycle.
Tenasserim-WEFCOM	Tenasserim-Western Forest Complex
Thailand-WEN	Thailand Wildlife Enforcement Network
WCS	Wildlife Conservation Society
WEFCOM	Western Forest Complex
WS	Wildlife Sanctuary
WWF	World Wild Fund for Nature

Message from His Excellency Mr.Abhisit Vejjajiva, Prime Minister of the Kingdom of Thailand

This year is the year of tigers. We all reconise that tigers face a very real threat of extinction as a result of a variety of factors ranging from habitat loss and prey depletion to poaching. This is a challenge not only for tigers but also for biodiversity conservation and for human welfare – a challenge coming from our misperception in the past, that nature's bounty is unlimited and thus can be freely exploited. Now we know that nature is not limiless, and both tigers and humans suffer if free and unlimited exploitation is allowed to continue.

In January 2010, Thailand hosted the 1st Asia Ministerial Conference to strengthen political will on tiger conservation and help political leaders from tiger range countries define bold programs to avert the threat of extinction. The Royal Thai Government fully support the recovery of this threatened species through the development of smart infrastructure and land use, empowerment of communities in and around tiger landscapes, improvement of wildlife law enforcement and governance, building professional capacity, and seeking innovative financing for tiger conservation. Thailand has incorporated all these commitments into our new National Tiger Action Plan, and we are confident that it will contribute to regional and global efforts to conserve the tiger.

As we work together to accomplish this important task, we will be remembered as part of a generation that championed, protected, and initiatrd the conservation of tigers and our entire global natural capital that is part of our planet's life-supporting system.

Thailand looks forward to working with our neighbours and the international community to achieve this goal. The wild tiger is already in crisis – this may be our last chance to save it.

(Abhisit Vejjajiva)
Prime Minister of the Kingdom of Thailand

FORWARD

Tigers are not only incredibly magnificent creatures and important icons of our national and regional Asian heritage but are also essential parts of our forest ecosystem. A loss of wild tigers is a barometer for the health of ecosystem across the region. Nevertheless, tigers are currently under a serious threat of extinction due to an increase of poaching, habitat loss, and prey depletion which adversely affects the whole ecosystem. On the verge of extinction, tiger conservation has gained a momentum in Thailand since the last decade. In 2004, during my first tenure as the Minister of Natural Resources and Environment, Thailand launched the first Tiger Action Plan that government agencies and partners have used as the guidance to save the tiger. Since then, Thailand has played a pivotal role and has made several significant developments in tiger conservation. In this regard, the Department of National Parks, Wildlife and Plant Conservation (DNP) has worked closely with international conservation organizations to establish and implement an international standard patrol system, known as the Smart Patrol System, in the core area of Thailand's Western Forest Complex (WEFCOM). The system has become a model to other tiger range countries that are striving toward improving their protection systems for tigers.

On the illicit cross border trade front, Thailand has been a hub for ASEAN Wildlife Enforcement Network (ASEAN-WEN) in order to fight against organized international wildlife crime, including tigers. In January 2010, Thailand proudly hosted the 1st Asia International Ministerial Conference on Tiger Conservation at Hua Hin, Prachuap Khiri Khan province. At this international conference, the Ministry of Natural Resources and Environment initiated the establishment of the Regional Tiger Conservation and Research Centre at Huai Kha Khaeng Wildlife Sanctuary, the core area of WEFCOM. The Thai models against tiger extinction have provided vital experiences and knowledge exchange to other neighbouring countries for rebuilding tiger populations.

As saving wild tiger is at the very heart of the conservation and biodiversity agenda, I would like to present Thailand's new Tiger Action Plan. With dedication, determination, and collaboration, I am strongly convinced that Thailand will succeed the goal of doubling the wild tiger population by the next Year of the Tiger in 2022. Finally, I would like to thank the hard work and collaborative support from an alliance of governments, international organizations, civil society, and other dedicated partners which significantly help Thailand averting the threat of tiger extinction and contributing to global tiger conservation.

(Suwit Khunkitti)
Minister of Natural Resources and Environment

FORWARD

Thailand is one of the fast growing economies in Southeast Asia. The trade-off, however, is that the current forest cover is 28% of the country area, which is among the lowest in the region. Fortunately, Thailand began establishing wildlife and national park laws and a protected area system almost 50 years ago. The current protected area system covers about 18% of the country area, and the Thai government has already invested in establishment and running of 123 national parks and 58 wildlife sanctuaries. Besides protection of landscapes and their depending wildlife species, the government also undertakes various interventions including nature education, alternative livelihood, and wildlife crime suppression.

Despite the significant efforts and investments, the recent rigorous monitoring systems have revealed that wild tigers are surviving in recoverable numbers only in protected landscapes with a strong history of protection, especially in areas with active park guards and good patrol systems. The on-going intensive population monitoring program has revealed that only one landscape, the Tenasserim-Western Forest Complex (Tenasserim-WEFCOM) can be counted as a "tiger source site". More than 100 adult tigers have been photographed in this landscape over the last 5 years. Tenasserim-WEFCOM is about 25,000 km2 on Thailand's side, and with habitat in Myanmar this is a globally important tiger landscape. The core area is also a world heritage site.

Another landscape that can qualify as a "potential source site" based on camera-trapping evidence is Dong Phayayen–Khao Yai Forest Complex (DP-KY); also a world heritage site. About 8 adult tigers have been photographed from this 6,100 km2 landscape. These two represent the landscapes with the greatest potential for tiger recovery in Thailand.

The success of the 12-year plan of wild tiger recovery is very much dependent on: strengthening landscape-scale conservation interventions in these two landscapes; rigorous research and monitoring; transboundary conservation ties being strengthened to effectively control cross-border trade; and law and policy reforms to support the efforts to reach the vision and goals as stated in the action plan.

Chote Trachu

(Chote Trachu)
Permanent Secretary
Ministry of Natural Resources and Environment
Thailand

PREFACE

As the Director General of the Department of National Parks, Wildlife and Plant Conservation with the main responsibility to protect and manage the nation's natural heritage, especially wildlife and its ecosystem, I am pleased with this new Tiger Action Plan. The new plan will be used effectively as guidance to implement the conservation intervention and monitoring programs to reach the goal of increasing the tiger population by 50 percent in priority landscapes together with other landscapes in Thailand by the next tiger year in 2022.

There are many challenges and threats to the tiger that we have to overcome in order to be successful. The most important threats are poaching of the tiger and their prey in our national parks and wildlife sanctuaries, habitat destruction, and illegal wildlife trade. We must deal with these problems with better tools and approaches. In Thailand, the tiger population only exists in a healthy number in Huai Kha Khaeng and Thung Yai Wildlife Sanctuaries. This is not only because our managers and park rangers have been dedicated and brave in protecting tigers, but also because they have been inventive and adopting new concepts and tools in conservation. It has been clearly proved that science-based conservation and management is a very effective approach to save such an endangered species as tigers. The successful model needs scaling up to the whole Western Forest Complex landscape and other potential tiger landscapes. On the international cooperation front the Department of National Parks, Wildlife and Plant Conservation will continue working with partners to reduce trafficking in international wildlife trade that is threatened tigers and other wildlife in the region.

The Department of National Parks, Wildlife and Plant Conservation stands firm in our duty to protect tigers and other wildlife. We are also pleased to work with local and international partners to implement Thailand Tiger Action Plan. Together, I am strongly convinced that we can save and restore wild tigers and other endangered and threatened wildlife and their habitats for the benefits of our future generations.

(Sunan Arunnopparat)
Director General
Department of National Parks, Wildlife and
Plant Conservation

ACKNOWLEDGMENTS

The Department of National Parks, Wildlife and Plant Conservation wishes to thank government organizations, Non Government Organizations (NGOs), and conservationists who participated in the process of formulating the Tiger Action Plan.

This plan honors the memory of the late Dr. Saksit Treedej, former Permanent Secretary of Ministry of Natural Resources and Environment, for his efforts in developing this plan and his leadership for tiger conservation in Thailand.

For reviewing and commenting on the draft of this action plan, DNP would like to thank the participants from government sectors, universities, NGOs, and civil society who attended the Wildlife Conservation Day meeting at Faculty of Forestry, Kasetsart University, in 2009.

This action plan has been also reviewed and revised through a series of meetings, including the national consultation on National Tiger Recovery Plan. The action plan has benefited greatly from the contributions of the individuals who participated in the national consultation process.

DNP acknowledges the contribution made by many individuals and is grateful to the following people assisting in the compilation the information, preparation, and publication of this action plan: Dr. Theerapat Prayurasiddhi, Deputy Director General, Royal Forest Department, Mr. Chatchawan Pisdamkham, Director of Wildlife Conservation Office, Dr. Ronasit Maneesai, Dr. Saksit Simcharoen, Dr. Dave Smith, Ms. Belinda Steward Cox, Mrs. Achara Simcharoen, Mr. Somphot Duangchantrasiri, Dr. Rungnapar Pattanavibool, Mr. Sompoch Maneerat, Ms. Peeranuch Dulkul Kappelle, Ms. Umpornpimon Prayoon, Mr Supagit Vinitpornsawan, Dr. Prateep Duengkae, Dr. Nantachai Pongpattananurak, Dr. Narit Bhumpakphan, Dr Vijak Chimchome, Dr. Sompoad Srikosamatara, Ms. Mayuree Umponjan, Ms. Angella Smith, Ms.Waraporn Hirunwatsiri and Dr. Andrey V. Kushlin from the World Bank, Mr.Keshav Varma and Dr. Anand K. Seth from GTI, and Mr. Mahendra K. Shrestha from Save the Tiger Fund. Special thanks also go to Dr. Anak Pattanavibool, Director of WCS Thailand, for the long hours he put into creating the wonderful work found throughout the action plan. Dr. Peter Cutter, WWF coordinator, for his help in compiling comments and put his tireless insistence on developing the initial draft of the action plan, and Ms Budsabong Kanchanasaka, DNP tiger scientist, for her energetic and great effort to formulate this action plan.

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EXECUTIVE SUMMARY

Classified as endangered on the IUCN Red List of Threatened Species (IUCN 1996 amended by Cat Specialist Group 2001), the tiger is facing widespread extinction in the near future if poaching, habitat loss, and prey depletion continue. Across its range, a significant number of local populations have gone extinct in the last 25 years and many others are on the verge of extinction. Although tigers in Thailand face similar threats to those in other range countries, tigers still occur within several parts of the country. The largest population occurs in one area near the Thailand/ Myanmar border, the Western Forest Complex, with the highest densities occurring within the Hui Kha Khaeng and Thung Yai Naresuan Wildlife Sanctuaries, Thailand's first Natural World Heritage site. There are two areas where the latest surveys have shown the status of potential source sites. One is the Kaeng Krachan Forest Complex to the south of the Western Forest Complex along the Tenasserim Range next to the Myanmar border. Another is the Dong Phayayen – Khao Yai Forest Complex, also a Natural World Heritage site, near the Cambodian border. The recent country wide surveys for tigers have revealed that tigers occur at very low densities in other parts of the country. After Thailand's first Tiger Action Plan, several important developments with the focus on tiger conservation have happened and become exemplified for the regional and global tiger conservation communities.

In 2004, the Department of National Parks, Wildlife, and Plant Conservation issued Thailand's first official tiger action plan. In the years since then, Thailand has increased tiger conservation efforts and has undertaken more rigorous enforcement, monitoring, and research efforts—especially at the tiger source site in Western Thailand. These efforts include the Smart Patrol System for rigorous patrol and law enforcement monitoring, advanced tiger and prey population monitoring systems as important management response indicators, and increased ecological research to better understand tiger ecology and biology under a Southeast Asian environment. As a result, Thailand is now regarded as a leader in tiger conservation under best practice, science, and policy with much to contribute to the global tiger conservation effort.

Central challenges in the coming years are to (1) ensure that current protection and monitoring systems are sustained in source and potential source sites, (2) expand these systems to cover the whole priority landscapes including the Western Forest Complex – Tenasserim and Dong Phayayen – Khao Yai Forest Complexes, and (3) establish the systems in other sites and landscapes where tigers still occur.

Thailand is pleased to present this twelve year revision of Thailand's National Tiger Action Plan produced in consultation with other government agencies, academics, and non-governmental organizations.

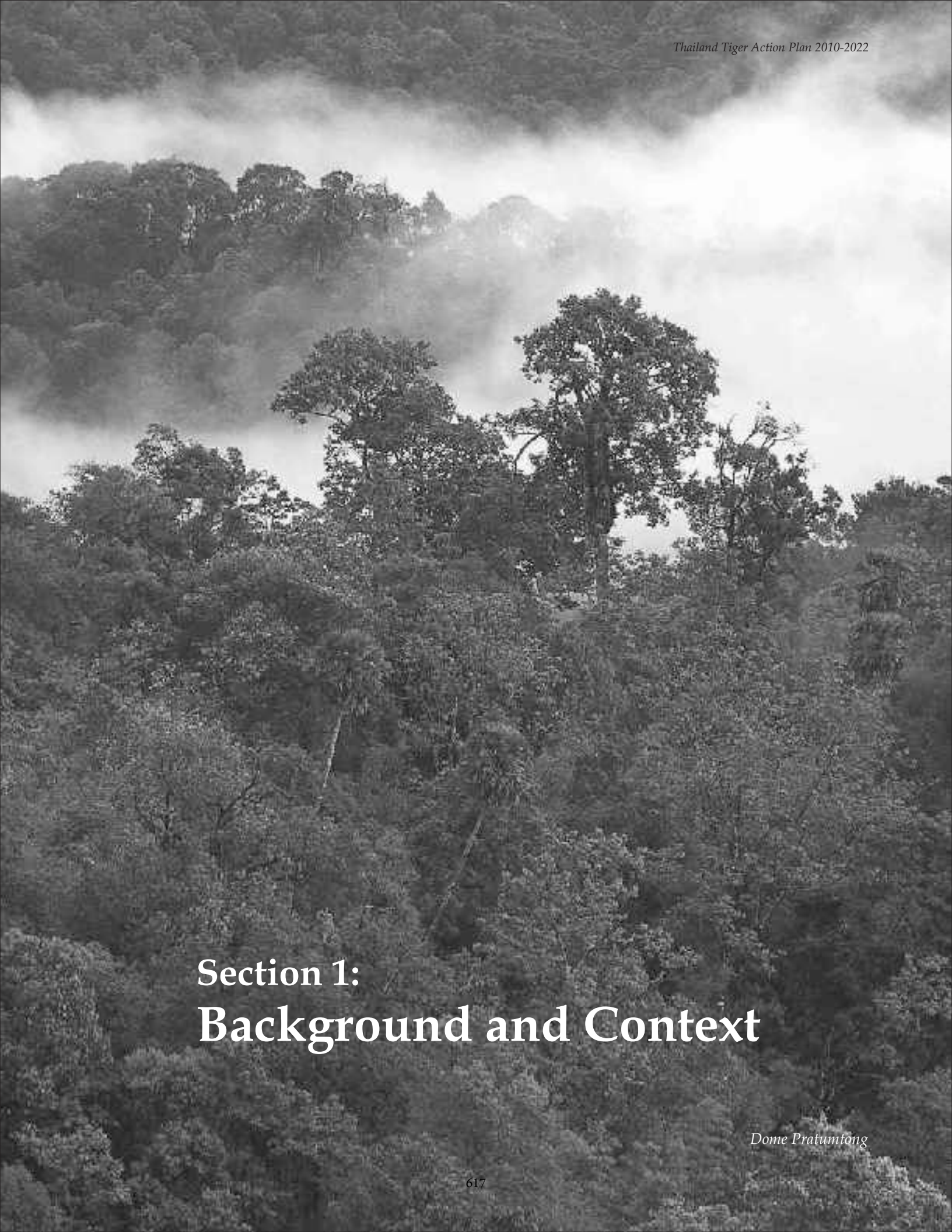
This plan consists of two parts. The first is a review of the ecology and conservation status of tigers in Thailand and a discussion of the conservation challenges that tigers face. The second part is a detailed description of the visions and goals, recommended actions for achieving those goals, details indicators, means of verification, and the anticipated timeframe for each action. This section also details a specific strategy for implementing the plan.

The goals and associated actions for achieving them are arranged under the following five themes:

1) Strengthening direct conservation action and enforcement
2) Building capacity based on successful models
3) Strengthening monitoring, research, and information management
4) Promoting education, awareness, and public participation
5) Strategic financing for tiger conservation.

Accompanying each goal are one or more key points meant to provide the rationale and context for recommended actions.

The success of this plan rests on the effective implementation of the recommended actions through an adaptive management process of periodic evaluation and modification of goals and actions. Adaptive management recognizes that learning is a part of management. To this end, a dedicated Tiger Conservation Committee will be formed and entrusted with ongoing evaluation and implementation of the plan.



Section 1:
Background and Context

Dome Pratumtong

INTRODUCTION

The tiger, *Panthera tigris*, is one of the world's most magnificent animals. Classified as endangered on the IUCN Red List of Threatened species (IUCN 1996 amended by Cat Specialist Group 2001) the tiger faces widespread extinction in the near future if poaching, habitat loss, and prey depletion continue. In the last 25 years, a significant number of populations have gone extinct across the species' range and many others are on the verge of local extinction.

Tigers in Thailand face similar threats to those in other range states and both the range and number of tigers have continued to decline in Thailand due to direct poaching of tigers driven by a thriving illicit commercial wildlife trade, poaching of tiger's prey driven by local demands on wild meat as delicacy, and land encroachment within and around protected areas driven by a mixture of inefficient law enforcement and land use.

However, tigers still occur in many protected areas in different parts of the country. Unfortunately tigers in most areas exist in a vulnerable condition with populations far below a viable level. It is clear that only one landscape stands out as the stronghold of the largest tiger populations in Thailand and, perhaps, Southeast Asia. That landscape is the Western Forest Complex situated along the Tenasserim mountain range, beside the Thailand-Myanmar border. The highest density of tigers are at the core of WEFCOM within the Huai Kha Khaeng and Thung Yai Naresuan Wildlife Sanctuaries (HKK-TY), a Natural World Heritage site.

Since the last Tiger Action Plan published in 2004, important interventions and monitoring of tiger populations have been undertaken in WEFCOM and some other protected areas along the Tenasserim. The government of Thailand, under the leadership of the Department of National Parks, Wildlife and Plant Conservation, and together with other local and international partners, has modernized the patrol and monitoring systems in wildlife sanctuaries and national parks within Tenasserim – WEFCOM landscapes. Such systems have been incorporated into this action plan in the hope of scaling up the systems to safeguard and recover wild tigers in existing and potential tiger landscapes in Thailand.

This plan represents a substantial revision of Thailand's first Tiger Action Plan published in 2004 (Tunhikorn *et al*. 2004). Key additions and changes include:

- Several new goals and actions that make up the heart of the plan
- An explicit specification of a 12 year time horizon for the plan
- Formulation of the plan as a mechanism to provide strategic guidance for tiger
- conservation in Thailand (rather than detailed operational prescriptions)
- A revised "Status of Tigers in Thailand" that reflects recent work to determine the occurrence, relative abundance, and absolute abundance of tigers at the national and site levels
- A call for the formation of a National Tiger Conservation Committee in charged with actively guiding the implementation of the plan via frequent evaluation and detailed annual planning.

The Department of National Parks, Wildlife and Plant Conservation led the revision process with inputs from and consultation with other government agencies, academic institutions, NGOs, and individuals representing the private sector and civil society. Its goal is to inspire a change in the way tiger conservation is viewed in Thailand and to guide the actions of a diverse stakeholder community at a critical time for tiger conservation.

This document consists of two parts. The first reviews the ecology and conservation status of tigers in Thailand and includes a discussion of the conservation challenges facing tigers in Thailand. The second part describes the goals of the plan and recommends actions for achieving those goals.

Actions are divided into the following five themes:

1. Strengthening direct conservation action and enforcement
2. Building capacity based on successful models
3. Strengthening monitoring, research, and information management
4. Promoting education, awareness, and public participation
5. Strategic financing for tiger conservation.

To provide context and rationale for actions, a number of key "Opportunities and Challenges" are identified for each goal.

To be successful, this plan will need significant commitment from a wide range of stakeholders, political resolve from the Thai government, and a renewed interest among Thai citizens.

Why is it Important to Save the Tiger?

Tigers, as the largest carnivores, have an important functional role in Thailand's forest ecosystems.

- Tigers prey upon large mammals, but their role is greater than the animals they eat.

  The entire ungulate community has evolved in response to tigers. Hence the loss of tigers in an area has cascading effects on the ecosystems where they have become extinct.

  As the top predator in the landscapes where they occur, tigers require extensive habitats and thus serve as an indicator of the integrity and health of wild ecosystems and as an umbrella for the conservation of many other species and the last remaining large forested landscapes in Asia.

  Enhancing and saving the natural ecosystems required by tigers provides many benefits to humans, including:

- Water delivery for agriculture, industry, and household use

- Maintenance of forest cover to moderate climate change and maintain local climate regimes

- Preservation of biodiversity to enhance long-term ecosystem stability

- Protection of wild areas that provide irreplaceable aesthetic resources and opportunities for spiritual renewal for an increasing urban human population.

For millennia, the tiger has played a significant role in cultural and spiritual aspects of nearly every Asian society. Today, people throughout the world are inspired by the tiger's grace, beauty, and power. If wild tigers disappear from the earth, an important part of our culture and society will go with them.

In support of the King's "sufficient economy" initiative, Thailand is committed to the sustainable use and conservation of the country's natural resources. Tigers can serve as an inspirational icon for this critical endeavor.

Key Stakeholders in Tiger Conservation in Thailand

To be successful, tiger conservation in Thailand must be a national effort involving government agencies, non-governmental organizations, the private sector, the academic community, and the citizens of Thailand. This plan, rather than assigning responsibilities to specific agencies and individuals, is meant to provide strategic guidance to a diverse and growing collection of actors with a stake in tiger conservation.

The **Ministry of Natural Resources and Environment** is responsible for environmental and biodiversity policy and planning. **The Department of National Parks, Wildlife and Plant Conservation** is the lead implementing agency for tiger conservation. The DNP receives its mandate from the Wildlife Protection and Preservation Act A.D.1960 (1992 Amendment) and the National Park Act A.D.1961. Its main responsibilities include:

- managing activities within the forests and

protected area system in Thailand

- implementing the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)
- suppressing illegal wildlife trade within the country conducting educational outreach to the citizens, business leaders, and government organizations of Thailand.

Under the Ministry, the **Department of Environmental Promotion** and the **Royal Forest Department** also have important roles in protecting biodiversity and educating the public about conservation. **The Ministry of Agriculture and Cooperatives** has policies on livestock husbandry adjacent to protected areas which have a direct impact on tiger and prey populations. Promotion of irrigation and burning of agricultural residue influences watersheds and forests within protected areas.

The Ministry of Interior supervises provincial governors and district and sub-district officials. These senior government officials have a strong impact on conservation through their influence on road building and tourism development near protected areas.

The Ministry of Tourism and Sports, through wise promotion of ecotourism in cooperation with local villagers and the DNP, has a crucial role to play in providing economic incentives for communities to embrace tiger conservation and protect the landscapes that support tigers.

The Ministry of Education has an important role to ensure that basic concepts of the tiger's ecological and cultural significance become part of Thailand's standard curriculum at several educational levels and also to support research that contributes to our understanding of tiger ecology.

The Royal Thai Police has an important role to enforce the law related to wildlife and other natural resources. The police have **the Natural Resources and Environmental Crime Suppression Division** investigating and enforcing illicit wildlife trade throughout the country. **The Border Patrol Police** have also supported DNP in training park rangers working in protected areas and conducting joint patrols along the border areas.

Thai Customs Department is in charge of all the check points at the airports, seaports, and border areas around the country.

The Royal Thai Army is responsible for the management of some natural areas and represents an important training resource.

The Office of Attorney General is in charge of processing court cases related to wildlife and natural resources. It has district provincial offices throughout the country.

Provincial Government Offices can play a critical role in guiding and managing conservation work in their respective provinces.

Conservation NGOs, such as **WCS-Thailand, WWF Thailand, Freeland Foundation, Seub Nakhasathien Foundation,** have long supported tiger conservation activities in Thailand and often serve as a mechanism for ensuring that diverse stakeholders have a genuine voice in the conservation process. In many cases, NGOs have served as a conduit for new approaches and techniques, especially with tiger conservation, from around the world. NGOs raise funds for conservation projects, develop educational programs and publicize the plight of the tiger, support the government's efforts, fund ranger training and research, and act as watchdogs.

Community Leaders and Citizen Groups organized to address issues related to natural resources and the environment have an important contribution to make to the conservation of the tiger in Thailand.

They represent the public will. Citizen support and participation in decision making is still modest and needs to be expanded.

Universities contribute to tiger conservation by providing formal training and field experience, by managing and directing important research programs, and by encouraging the formal dissemination of research and lessons learned through academic conferences, the scientific literature, and other mechanisms. **Kasetsart University, Mahidol University,** and **King Mongkut's University of Technology Thonburi** in particular are the main universities in Thailand that produce wildlife and conservation biologists to serve in many conservation organizations, including DNP.

Privates Companies such as the **Petroleum Authority of Thailand Exploration and Production Public Company Limited** has provided funding for research equipment and supported tiger research efforts such as the Tiger Project at Khao Nang Rum Wildlife Research Station.

Individual Thai Citizens will ultimately determine where tiger conservation ranks on the list of national priorities. Active engagement with the public is thus essential if tiger conservation efforts are to succeed over the long term.

The Natural History of the Tiger

The tiger is the world's largest cat species with wild populations occurring from the far east of Russia to the rainforests of Indonesia. Tigers are largely solitary and territorial; they represent the top of the food chain in all areas where they occur.

Although wild tigers have historically been grouped into subspecies, conservation and genetic management objectives support a stronger emphasis on populations and metapopulations. For example, the geographical distribution of tigers in South Asia represents a continuous decline from the southern tip of India north and eastward through northeast India. The Indochinese tiger extends from Myanmar and southern Yunnan through Laos, Vietnam, Cambodia to the Isthmus of Kra in Thailand. Each subspecies is composed of discrete, largely isolated populations. Many of these populations are small and threatened, so to ensure a future for tigers it is crucial to maintain the land base that supports the remaining few large populations remaining. As few as 3,000 to 3,500 tigers remain globally and only about 1,000 in SE Asia. We must treat every population of tigers as unique and worthy of our best conservation efforts.

For tigers to survive in the wild, they must have sufficient water, cover, and, most importantly, abundant large mammal prey weighing more than 50 kgs. On average, tigers make 40 - 50 kills a year when there is sufficient large prey available (Chunderwat *et al*. 1999; Karanth and Nichols 2002; Seidensticker and McDougal 1993; Sunquist 1981). A study of tiger prey in western Thailand found that tigers consume mostly banteng and sambar, and to a lesser degree gaur, wild boar and barking deer (Petdee 2000). Opportunistically, tigers also attack and eat bears, tapir, young elephants, primates, porcupine, and even peafowl (Petdee 2000; Prayurasiddhi 1997).

Densities of principal prey species influences tiger densities in several ways. As prey densities decline, breeding female ranges become larger, dramatically reducing the number of such females that an area can support. For instance, the size of female home ranges in productive South Asian forests and grassland is 10-20 km2, whereas in the Russian Far East it is as large as 200-400 km2 (Karanth and Sunquist 2000; Miquelle *et al*. 1999; Sunquist 1981).

A long-term study of tigers in Huai Kha Khaeng Wildlife Sanctuary in Thailand has shown that male tigers have home range sizes between 220-291 km2 and female home ranges are between 63-78 km2 (Simcharoen pers. Comm; Simchareon *et al*. 2007). The objective of this study is to determine tiger carrying capacity based on the size of female home ranges in relation to prey abundance. Five females and 3 males have been collared with satellite GPS transmitters to determine the size of home ranges and habitat use patterns. These intensive studies are complimented by an extensive long term camera trapping study in Huai Kha Khaeng, Thung Yai East, and Thung Yai West wildlife sanctuaries.

Tigers moving through an area usually leave overt and distinctive evidence of their presence including tracks, scrapes, and claw marks on trees. Tigers also spray urine on trees and deposit urine and feces on the ground (usually in association with visibly distinctive hind paw scrapes). These scent marks leave an unmistakable odor that may last for several days. Together, these visual and olfactory cues help tigers communicate the boundaries of their territory to other tigers and a range of other species (Smith *et al*. 1989).

Of the many sounds a tiger is capable of emitting, the most likely to be heard is the awesome moaning, 'aa-oo-mh, aa-oo-mh', used during the mating season. This call carries over considerable distances, attracting the resident male to the estrous female. Other vocalizations, which may be heard at close range, include low growling, snarling and coughing grunts. The roar of a tiger is unforgettable in any circumstance.

When tigers mate, they usually remain together for 2 - 5 days, copulating every 15 - 20 minutes day and night. After 102 - 105 days, the female dens in dense vegetation and produces on average 3 cubs. During the first 2-3 days after birth, the female remains at the den for up to 23 hours a day; she gradually leaves for longer periods until the den is abandoned when the cubs are about 2 months old. For the next 2-3 months, the female moves the cubs from place to place, but they still remain hidden most of the day.

Until the cubs are several months old, the cubs go to a kill only after the prey animal has been dispatched by the mother (Smith 1993). By 6 - 7 months of age the cubs begin to accompany their mother on hunts, but the final stalk and kill is by the mother alone. At 11-13 months the cubs' milk canines begin to protrude, pushed out by the emerging adult canines that are fully erupted at 16-17 months. Even though they have

the "equipment" to kill prey at this point, young tigers require 2 - 3 additional months to learn to kill efficiently on their own. During this time, they gradually become independent from the mother, but continue to hunt within the security of her territory. During the years of her life when she is reproductively active, a female will typically give birth from 19 - 24 months after her previous litter is born. Two months later, when she and the cubs abandon the den site, aggression between the female and her previous litter marks the onset of dispersal of the older offspring. The young leave the territory where they were born and raised and face the most critical period in their lives over the next few months of early independence.

Approximately 60% of young males and 40% of females die during this dangerous dispersal period (Smith 1993).

Tigers are territorial. Females protect their area from others of the same sex; males, which have territories overlapping those of 2-7 females, do likewise. Dispersing young face a gauntlet of resident animals guarding their territories and are often forced to reside temporarily in suboptimal habitat at the edge of protected areas where they may come into conflict with humans and their livestock. For females, the dispersal stage usually lasts about 1 year. About 40-50% of daughters settle next to their mother, who will often shift her territory slightly to accommodate a daughter. However, by the time the daughter is fully established as a resident, there is little overlap with her mother's territory.

For males, the task of establishing a breeding territory is more arduous and dangerous. It may take more than 2 years and involve a series of aggressive encounters with resident males which can lead to serious, even incapacitating wounds and sometimes even death.

Unlike in South Asia, where violent and sometimes lethal encounters between humans and tigers are not uncommon, Thailand has few records of aggressive interactions between humans and tigers. The most recent cases of direct human tiger conflict are two cases in Khao Yai National Park: one resulting in the death of a human and a tiger (in 1976) and the other resulting injuries to a human and subsequent killing of the tiger (in 1999). In both cases, the tigers involved were old, had damaged teeth, and were suffering from debilitating wounds that prevented them from pursuing and killing their usual prey.

Livestock depredation occurs regularly, but not

nearly at the frequency experienced in much of South Asia. A few cases of the killing of tigers involved in livestock depredation by local villagers have also been recorded.

Threats to the Tiger

The most significant challenges to tiger survival in Thailand are the same as those faced throughout the species' range: habitat degradation and poaching of prey and tigers. Poaching of tiger prey is primarily driven by an active commercial trade in wildlife to satisfy growing demands by restaurants. Direct poaching of tigers is expected to increase in areas where tigers exist and is driven by the traditional medicine market and ritual demands for amulets.

The gradual conversion of forest cover loss over this past century has resulted in fragmented forest habitat in Thailand that has created isolated tiger populations. Many of these populations are too small to have long-term viability unless current habitat is protected, the amount of habitat increased, and habitat fragments connected by corridors (Smith *et al*. 1998; Wikramanayake *et al*. 1998).

Prey depletion is another important threat to tigers (Karanth and Sunquist 1995). Poaching of prey species is intensive in many protected areas in Thailand. In large portions of many of the protected areas where tigers still occur, there is little or no sign of prey species. Reversing the decline of prey populations within otherwise suitable habitat is crucial not only for the tiger, but also for the ecosystems in which it occurs.

In the early 1990s, tiger poaching increased dramatically throughout the tiger's range. In 2005 the world was shocked with the report that tigers were extinct from Sariska National Park, one of India's

prime tiger reserves. This story brought the problem to the attention of the global public, but the response did not match the growing threat and tiger populations continued to decline. Only about a year later, another of India's premier tiger reserves, Panha National Park, also reported that tigers had been wiped out. Since then, reports of similar trends have become all too common.

In Thailand in March 2010, at least 3 tigers were found dead from poisoning in the interior of Huai Kha Khaeng Wildlife Sanctuary, the site of Thailand's highest tiger densities. While the poachers were confronted by a research team at the scene of the crime, they were able to escape arrest and take with them various parts of a poisoned tiger.

The above examples indicate that tigers are a protection dependent species. Protection at site and landscape levels is imperative if tigers and their prey are to be saved and recovered. Recent scientific findings reveal that existing protection quality in many protected areas in Thailand is not enough to save them. The inefficiency in patrols and lack of law enforcement and monitoring systems is considered a impediment to tiger conservation in Thailand. The system needs to be modernized and the support to park rangers needs significant improvement.

Several other significant factors hinder the survival of the tiger. One is a lack of commitment to using rigorous techniques for estimation of many tiger population parameters. Without baseline data on tiger populations there is no way to measure the success of management efforts. Another gap is the lack of a broad-based awareness and support for tiger conservation. The full support of the people of Thailand and cooperation across institutions and jurisdictional boundaries is vital to securing a sufficient land base for tigers in Thailand.

The Status of Tigers in Thailand

To provide an overview of tiger status in Thailand, the Wildlife Research Division of the Department of National Parks, Wildlife and Plant Conservation conducted sign surveys in 149 terrestrial protected areas from 2004 to 2007 (Kanchanasaka et al. 2010). The results of these surveys were combined with data from several other completed and ongoing studies, providing an accurate estimate of the occupancy and estimated numbers of tigers in Thailand. Sources of data used in this compilation can be found in the Appendix.

Tiger status surveys employed 2 main approaches, (1) searching for signs of tigers over 11,411 km2 of likely tiger travel routes and (2) surveying by using camera traps to record photos of tigers carried out over 3,000 km2 within eight protected areas (Appendix 3 and 4). Both survey approaches focused on the routes most likely used by tigers in given areas such as dirt roads, animal trails, human footpaths, dry riverbeds, and ridgelines.

Track survey data were summarized as the proportion of 500 meter sections walked in which tiger tracks were encountered at least once. Camera trap data were analyzed using capture-recapture techniques to generate estimates of the density of tigers within given survey areas.

To the best of our knowledge, tigers in Thailand occur strictly within the boundaries of existing protected areas. In order to express the status of tiger occurrence at the national level, we applied the following criteria at the resolution of individual protected areas (Table 1):

Conclusion

In Thailand, tigers occur in 25 of 188 terrestrial protected areas from the southern border with Malaysia to the far north near the borders with Laos and Myanmar. Nine of twenty five protected areas have moderate to high tiger density, and only two of these nine protected areas have a high density of tigers. Currently tigers occur in 10 of 17 recognized terrestrial forest complexes. 6 of 10 forest complexes

Table 1 Rules applied to map tiger status at the resolution of individual protected areas in Thailand. The satisfying of any abundance rule was considered sufficient to apply that status class to a particular area.

	Assessment Method & Definitions (Status assigned based on highest class satisfied by any method)		
Status Class	**Density Estimate from Capture – Recapture Camera Trap Data**	**Sign Encounter Rate Index**	**Other**
Tigers occur in relatively high abundance	Estimated density 2.7–2.1 tiger/100 km_2	Proportion of 500 m segments surveyed with tiger sign ≥ 14	In some areas that have informationon tiger abundance from both sign surveys and camera trap surveys, we use the information from camera trap
Tigers occur in moderate	Estimated density between 1 tiger / 100–150 km_2 and 1.4–0.8 tiger/100 km^2	Proportion of 500 m segments surveyed with tiger sign between 8.3 and 3.7	
Tigers occur in low abundance tiger sign ≤ 2	Estimated density 1 tiger / 250–300 km_2	Proportion of 500 m segments surveyed with tiger sign ≤ 2	Evidence for tiger occurrence in this area is irrefutable but is insufficient to establish anything but presence in this protected area
Substantial survey effort indicates that tigers do not occur in these areas	No tigers encountered after 500 trap-nights in sites representing optimal tiger habitat for this protected area	No tigers encountered after at least 10 km of sign survey effort in sites representing optimal tiger habitat for this protected area	
Protected area without surveying		This area contains less potential tiger habitat and sign surveys have not taken place	No record of tiger occurrence over the last 10 years

support low densities of tigers, and one (Western Forest Complex) has a core area with a high tiger density (Huai Kha Khaeng Wildlife Sanctuary) while the other three forest complexes (Khaeng Krachan Forest Complex, Dong Phayayen-Khao Yai Forest Complex (DP-KY), and Hala-Bala Forest Complex) support moderate tiger densities. During 2008 and 2009, Thailand's tiger biologists from Khao Nang Rum Wildlife Research Station conducted camera trap surveys in Huai Kha Khaeng and Thung Yai Wildlife Sanctuary documenting photo-captures of 39 and 14 individual tigers respectively. Based on the results and the sign surveys summarized above, biologists have reached a consensus conclusion that there are likely 190-250 tigers remaining in Thailand (Appendix 2).

Along the Thai-Myanmar border, the Western Forest Complex and the Khaeng Krachan Forest Complex both support significant tiger subpopulations that are connected by extensive intact forests in Myanmar. Together, these areas can support one of the largest tiger populations in the world.

Best Practices for Tiger Conservation

In order to succeed in its goals for tiger conservation, Thailand must continue to draw on lessons learned from past efforts. It is important to critically evaluate what has contributed to successful conservation of tigers in areas where they still occur and to identify what has led to their decline or extinction in other areas.

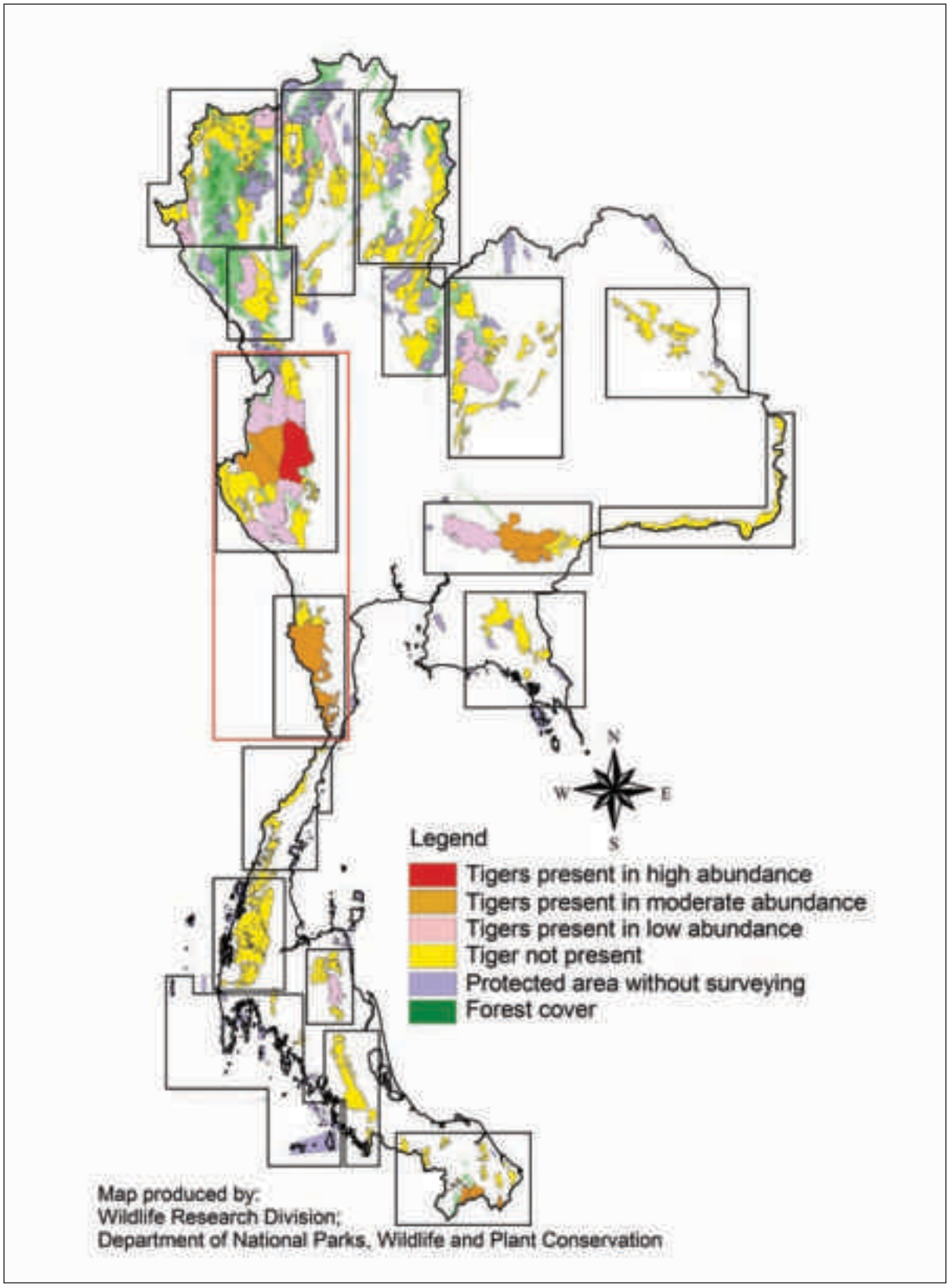


Figure 1 Map showing relative tiger abundance in Thailand. Boxes indicate forest complex management units (Prayurasiddhi *et al*. 1999). The red box indicates the Tenasserim-WEFCOM Tiger Landscape, the only area where tigers occur in high abundance.

The Huai Kha Khaeng Wildlife Sanctuary (HKK) is the location of Thailand's highest measured tiger densities and represents a unique conservation success story in the region. HKK has experienced highs and lows in protection quality. Past observations made by researchers and managers indicated that populations of tigers and their prey species were lower than current levels. Gun shots could be heard everywhere deep inside HKK. Relocations of villages inside HKK more than 20 years ago have given tigers and other wildlife a safer space. Strict protection is the key to controlling poaching in the area. The recovery of tigers and prey has recently been sped up by a modernized protection system, and HKK is now one of the most progressive and systematic tiger and prey management systems in the region.

Another unique development was the application of landscape scale management based on ecosystem management practice. The Western Forest Complex Ecosystem Management Project (WEFCOM 2004) has significantly raised the importance of landscape scale conservation by advocating four main actions including (1) improving protection by training park rangers and strengthening coordination among protected areas, (2) adopting science-based management, (3) establishing provincial conservation fora, and (4) strengthening conservation awareness for local communities.

This management concept is the key to developing further programs to strengthen management, monitoring, research, and partnerships within WEFCOM. Following the WEFCOM ecosystem management project, a tiger focus conservation project, started in Huai Kha Khaeng and Thung Yai Wildlife Sanctuaries since 2005, has given a best-practice management model to protect tigers and their prey. This model includes high impact interventions and monitoring systems at various levels.

Management and Monitoring at Site Level:

- **Smart Patrol System:** Smart Patrol System is a systematic patrol that maximizes the power of information to guide the patrol planning. It currently uses MIST (Spatial Management Information System) as a platform. Park rangers under this system collect important information such as patrol routes, patrol coverage, patrol intensity, points of threats, points of key wildlife species, etc. The information is displayed on maps and in tables. Information reported and discussed among the park rangers and managers is brought to the monthly patrol leader meeting. This results in high morale and self esteem among park rangers. Tigers and prey have subsequently been better protected and are recovering.

- **Intensive long-term monitoring of tigers using camera trapping and capture-based models:** Tiger population monitoring is an integral part of the management scheme for tiger conservation. Since 2005 an annual systematic camera trapping program covering about 1,000 km2 sample area has revealed a density of about 2-3 tigers per 100 km2 and has shown it is stable. Between 7-12 new tigers were captured annually. Camera trapping in Thung Yai Wildlife Sanctuaries has alternated yearly between Thung Yai East and Thung Yai West Wildlife Sanctuaries.

Management and Monitoring at the Landscape Level:

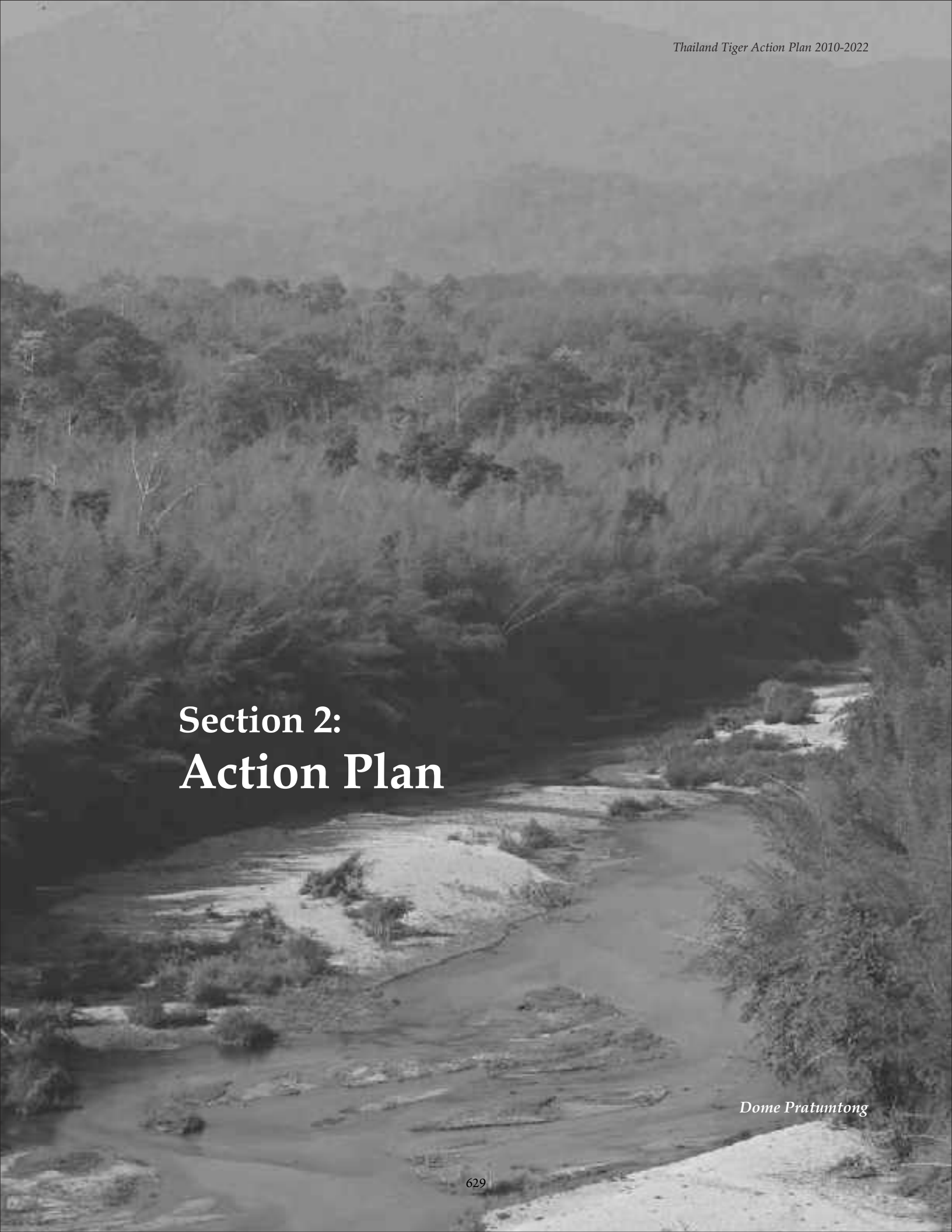
- **Wildlife crime units and wild meat restaurant database:** These are a major intervention to control the demands of wild meat from outside Huai Kha Khaeng Wildlife Sanctuary and other protected

areas adjacent to HKK. A wildlife crime unit was established at the Protected Area Administration Office (PAAO) 12 (Nakornsawan Province) to gather information and enforce wildlife law outside WEFCOM. The unit also gathers information from the wildlife crime web-based database, created for the public to inform them about places around WEFCOM where there is suspected trading of illegal wildlife and wild meat. The tracking of illegal wild meat has become more systematic and enforcement has become more focused.

- **Public campaign with the focus on communities around Huai Kha Khaeng Wildlife Sanctuary:** A focused campaign using the tiger as an iconic species has been launched with strong support from local sub-district administration offices and schools. It focuses on wild meat restaurants, local schools, and communities adjacent to Huai Kha Khaeng Wildlife Sanctuary. The campaign uses the manual "Teachers for Tigers" to work with local schools. This focused campaign has gained clearer and stronger support from local communities for the work to save tigers in HKK and WEFCOM.

- **Occupancy survey:** To survey tigers within WEFCOM, a landscape occupancy monitoring system has been adopted. DNP researchers have worked with support from NGO partners to conduct a systematic survey of WEFCOM in 2010-2011 and plan to repeat this every 3-4 years. The teams walk along the designated grid cells looking for tiger tracks and signs. The monitoring system allows for an understanding of the patterns of tiger distribution in WEFCOM landscape and indicates any changes in tiger bahaviour resulting from managment activities.

The Department of National Parks, Wildlife and Plant Conservation has begun to scale up the model to eight other wildlife sanctuaries and five national parks.



Section 2:
Action Plan

Dome Pratumtong

Vision

By 2022 tigers have recovered and thrive in the priority landscapes managed under high standard interventions and monitoring systems, and Thailand has become a strong support for international collaborations on tiger and wildlife conservation and protected area management in Southeast Asia.

Goals

2-year goals

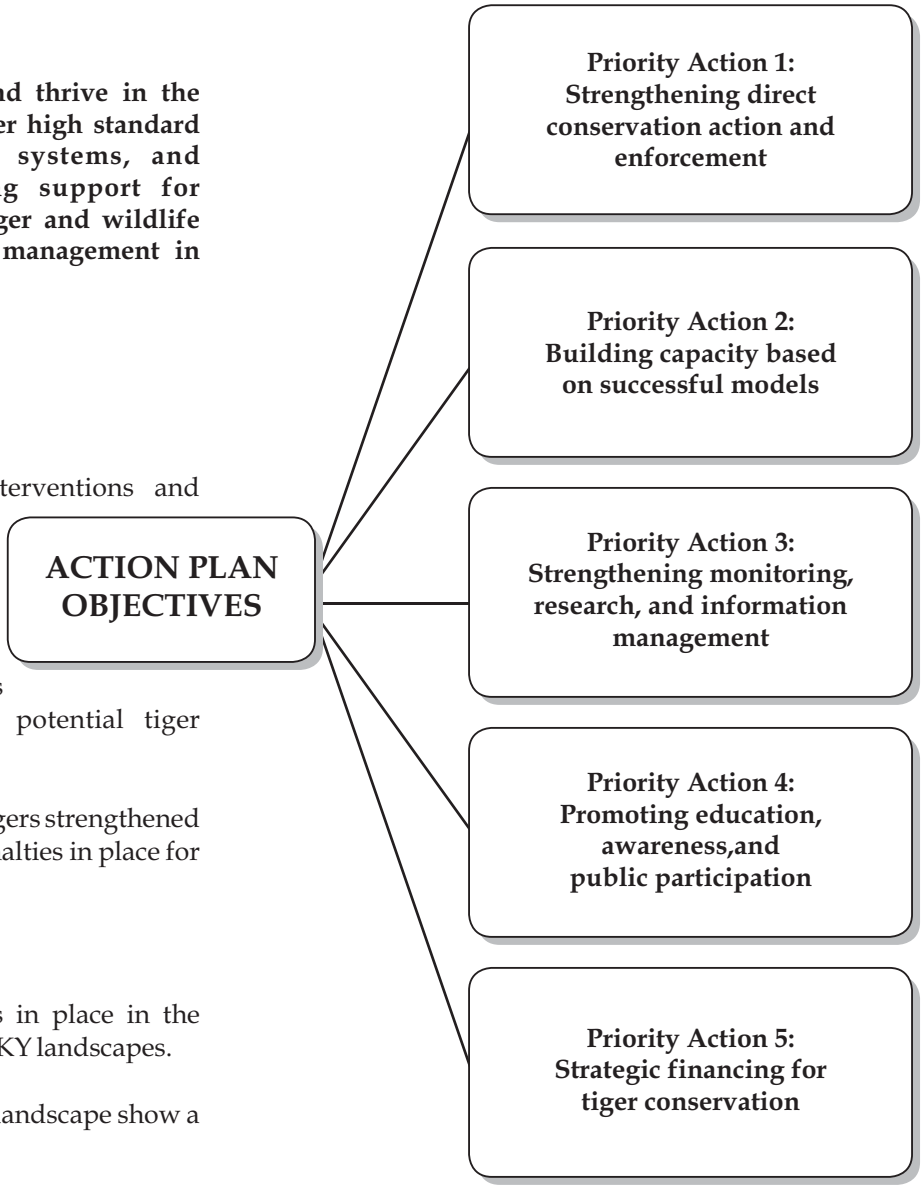
- High-standard monitoring interventions and monitoring systems established and functioning in Tenasserim-WEFCOM and DP-KY landscapes.
- Tiger occurrence status established at all additional potential tiger landscapes.
- The system to monitor captive tigers strengthened and standardized with clear penalties in place for violations.

5-year goals

- Effective management systems in place in the Tenasserim-WEFCOM and DP-KY landscapes.
- Key tiger threats in the priority landscape show a clear decline.
- Important tiger ecology (e.g., home-range variation) in the priority landscapes very well understood and used to guide management.
- Tiger populations stabilized or increased in Tenasserim-WEFCOM and DP-KY landscapes and possibility for re-establishing in other areas explored.

12-year goals

- To increase tiger populations of Thailand by increasing the populations in the Tenasserim – WEFCOM and DP-KY landscapes by 50%, and reestablish populations in other potential tiger landscapes such as Phu Khew – Nam Nao
- Forest Complex and Klong Saeng – Khao Sok Forest Complex.



Action Plan Objectives

For the 5 priority actions mentioned in Section 1, 19 objectives are identified. Activity details of the objectives are described in detail in the next section.

Priority Action 1: Strengthening direct conservation action and enforcement

Objective 1: Promote conservation efforts at the scale of entire populations (e.g., forest complex and associated corridors)

Objective 2: Provide long-term support for tiger habitat restoration activities

Objective 3: Ensure that the government policy of protecting tiger habitat from development threats, as committed to in the Hua Hin declaration, is followed

Objective 4: Encourage community participation and cooperation in protected area conservation activities

Objective 5: Support local communities in developing sustainable economies that reduce dependence on forest resources

Objective 6: Facilitate international cooperation in tiger conservation efforts

Objective 7: Strengthen national laws, policies, and enforcement of tiger related crimes

Objective 8: Support national and international efforts to manage captive tigers responsibly

Priority action 2: Building capacity based on successful models

Objective 9: Establish a Regional Tiger Conservation and Research Center at Huai Kha Khaeng Wildlife Sanctuary

Objective 10: Ensure national training capacity can deliver high quality tiger conservation training at all levels

Priority action 3: Strengthening monitoring, research, and information management

Objective 11: Monitor tiger and prey populations in priority landscapes

Objective 12: Maintain long-term tiger and prey ecology research in priority landscapes

Objective 13: Ensure that relevant information for tiger conservation is well managed and available to inform strategy and planning

Priority action 4: Promoting education, awareness, and public participation

Objective 14: Convey tiger conservation-related messages to a diverse Thai public, policy-makers, and politicians

Objective 15: Ensure that basic concepts of the tiger's ecological and cultural significance become part of Thailand's standard curriculum at several educational levels

Objective 16: Ensure that co-benefits of tiger landscape conservation are understood and appreciated

Priority action 5: Strategic financing for tiger conservation

Objective 17: Identify the costs of effective tiger conservation, current expenditures, and efficiency of these expenditures

Objective 18: Make use of large scale funding opportunities such as Global Environment Facility for Biodiversity (GEF) 5, REDD, and other programs to fund tiger conservation efforts

Objective 19: Develop sustainable funding mechanisms

Activities to Achieve the Objectives

Activities to achieve the objectives are very important part of this action plan to guide the implementation and evaluation processes. To ease the use of the action plan, activities are grouped hierarchically under the objectives for each of the 5 priority actions. Under each objective, key challenges and opportunities are outlined. Activities that respond to or address these challenges and opportunities are then described. The expected outcome, duration, and location of the activities are also addressed under each objective.

Priority Action 1: Strengthening direct conservation action and enforcement

Objective 1: **Promote conservation efforts at the scale of entire populations (e.g., forest complex and associated corridors)**

Challenge: Conservation efforts at the landscape scale are the most important in tiger conservation and recovery, but the majority of areas still lack efficiency and the necessary broad oversight.

Opportunity: Systematic management and enforcement systems under the Smart Patrol System inside the core area of Tenasserim - WEFCOM and the wildlife crime units operating outside the protected area have become a model for Thailand in striving for the recovery of wild tigers.

Expected outcome: The real landscape protection cost, actions, and activities to stop bleeding and to recover wild tigers are understood and adopted at the policy level.

Duration and locations: 12 years, Tenasserim – WEFCOM as the tiger source site and DP-KY as the potential source site.

Activities necessary to accomplish this objective:

Activity1: Strengthen and standardize the "MIST-based Smart Patrol System" in protected areas of current tiger source and potential source sites, including Tenasserim –WEFCOM and DP-KY.

Activity2: Increase the number of competent park ranger teams patrolling in each protected area of priority landscapes up to the level that can effectively secure tigers and their prey.

Activity 3: Strengthen wildlife crime units and informant networks around Tenasserim – WEFCOM and DP-KY to suppress local demands of wild meat and illegal wildlife trade and help apprehend wildlife criminals around protected areas.

Activity 4: Work with district attorneys and judges to ensure substantial punishments on wildlife crimes against tigers and large ungulates.

Activity 5: Overhaul the park ranger system to a higher living and working standard, and provide rewards and incentives to encourage patrolling (e.g., patrolling budgets) and other significant morale boosting programs such as performance-based promotions.

Activity 6: Apply landscape-scale ecological and development models for tiger conservation and engage stakeholders in development sectors (i.e., roads, oil and gas, mining, power) to minimize and mitigate impacts in sectoral activities on tiger habitats.

Objective 2: **Provide long-term support for tiger habitat restoration activities**

Challenge: Many areas in tiger landscapes and potential landscapes are suitable for tiger recovery, but have low ungulate densities due to poaching.

Opportunity: Recovery of wild ungulates as tiger prey and habitat

management in the tiger source site has started to help recovery tiger prey and finally tigers.

Expected outcome: Habitat is suitable for other wildlife species and native biodiversity is restored.

Duration and locations: 12 years, Tenasserim – WEFCOM as the tiger source site and DP-KY as the potential source site.

Activities necessary to accomplish this objective:

Activity 7: Promote use of controlled burning in potential and manageable parts of priority landscapes to maintain grassland for ungulate recovery.

Activity 8: Prevent and suppress fires effectively in evergreen forest areas in priority landscapes to provide good cover and watersheds for tigers and wildlife.

`Amonrat Wongwai

Activity 9: Strengthen the reintroduction program of ungulate prey with the ex-situ succeeded species (i.e., sambars, eld's deer, hog deer) in suitable habitats.

Activity 10: Maintain natural and existing artificial water sources that benefit tigers and ungulates especially during drought periods in priority landscapes.

Activity 11: Establish a system to control invasive species (e.g., *Lantana camara, Mimosa pudica*) in priority landscapes.

Activity 12: Identify priorities for corridor and habitat restoration.

Objective 3: Ensure that the government policy of protecting tiger habitats from development threats, as committed to in the Hua Hin declaration, is followed

Challenge: Large development projects (e.g., highways, dams) are under development and with new proposals often suggested.

Opportunity: Public disapproval of environmental impacts of large scale development projects such as roads and dams is high in many sectors of Thai society.

Expected outcome: Tiger habitats in priority landscapes are intact and connectivity is maintained.

Duration and locations: 12 years, Tenasserim – WEFCOM as the tiger source site and DP-KY as the potential source site.

Dome Pratumtong

Activities necessary to accomplish this objective:

Activity 13: Ensure that no major infrastructure development occurs in core tiger habitats.

Activity 14: Ensure that infrastructure development in corridors and buffer zones conform with Smart Green Infrastructure designs to ensure minimal impact to tiger habitats and maintain landscape connectivity.

Objective 4: Encourage community participation and cooperation in protected area conservation activities

Challenge: Community participation

and cooperation processes are still weak in substance on the link with wildlife conservation.

Opportunity: Protected area committees have been set up in many protected areas to be a platform for participation and cooperation.

Expected outcome: Communities appreciate value of wildlife and help save them.

Duration and locations: 12 years, Tenasserim – WEFCOM as the tiger source site and DP-KY as the potential source site.

Activities necessary to accomplish this objective:

Activity 15: Strengthen and build wildlife conservation networks around the priority landscape to enhance tiger and wildlife conservation in the priority areas.

Activity 16: Provide Protected Area Committees (PAC) and Community Committees (CC) with quality information (e.g., data from Smart Patrol System) on which to base threat reduction decisions and activities.

Objective 5: Support local communities in developing sustainable economies that reduce dependence on forest resources

Challenge: Many local communities living inside and around protected areas of tiger landscape are still using natural resources, especially poaching, in an unsustainable rate.

Opportunity: Wildlife ecotourism can generate a significant alternative income for local communities if managed properly and effectively.

Expected outcome: Improved livelihoods and reduced poverty for local people.

Duration and locations: 12 years,

Tenasserim – WEFCOM as the tiger source site and DP-KY as the potential source site.

Activities necessary to accomplish this objective:

Activity 17: Link communities with agricultural science institutes and agencies to promote agro-forestry in buffer zone areas around priority landscapes to reduce collection of Non Timber Forest Products (NTFPs) inside Protected Areas (PAs).

Activity 18: Develop wildlife-based ecotourism with concrete benefit sharing with communities in appropriate areas in and around PAs.

Objective 6: Facilitate international cooperation in tiger conservation efforts

Challenge: Tiger trade at the international level impacts the populations at the site and landscape levels.

Opportunity: CITES check points are an example of an effective approach to control wildlife trade near the border. ASEAN-WEN also helps strengthen enforcement cooperation among neighboring countries to fight wildlife crimes.

Expected outcome: A stronger international network to fight wildlife crime.

Duration and locations: 12 years, CITES Check points, airports, sea ports.

Activities necessary to accomplish this objective:

Activity 19: Strengthen enforcement capacity of Thailand's CITES programs with better interagency-collaboration and stronger protocols and impact monitoring systems on wildlife trade.

Activity 20: Strengthen and sustain capacity of ASEAN-WEN.

Activity 21: Strengthen bi-lateral cooperation with Cambodia, Laos,Malaysia and Myanmar for transboundary enforcement and monitoring and research.

Supol Pittayasaku

Objective 7: Strengthen national laws, policies, and enforcement of tiger related crimes

Challenge: Enforcement and punishment of wildlife crimes are not strong enough to significantly reduce illegal activities on tigers and wildlife.

Opportunity: The Wildlife Reservation and Protection Act and National Park Act have been in place for Thailand for 50 years as the main laws to protect tigers and their habitats.

Expected outcome: Wildlife crimes are given priority at the policy level.

Duration and locations: 12 years, National level.

Activities necessary to accomplish this objective:

Activity 22: Strengthen enforcement on wildlife crime under the Wild Animal Reservation and Protection Act B.E.2535 (1992) to make sure that convicted offenders receive the highest penalty of Wildlife Laws and related legislations.

Activity 23: Strengthen Thailand Wildlife Enforcement Network (Thailand- WEN) information sharing capacity.

Activity 24: Strengthen investigative capacity and judiciary effectiveness in wildlife crime cases.

Activity 25: Strengthen communication campaigns on wild tiger conservation.

Activity 26: Memorandum of Understanding (MoU) with military, police, Ministry of Interior, Ministry of Education to be strengthened and implemented for better collaboration and training for enforcement.

Objective 8: **Support national and international efforts to manage captive tigers responsibly**

Challenge: Legal and illegal tiger zoos in Thailand are becoming a challenge for the government to control illegal tiger trade.

Opportunity: DNP has started using the tiger stripe database to control tigers in the zoos and is trying to curb illegal tiger trade.

Expected outcome: Public at large have a better understanding of the difference between wild tiger conservation and illegal captive tiger business that harms tiger conversation.

Duration and locations: 12 years, places with illegal captive tigers, zoos, and amusement parks.

Activities necessary to accomplish this objective:

Activity 27: Design and enforce the control programs for captive breeding of tigers in legal tiger zoos with a captive tiger database of individual tracking records.

Activity 28: Discourage illegal activities involving captive tigers, using effective public campaigns which highlight the impacts of tiger conservation.

Activity 29: Public campaigns showing the difference between wild & captive tiger conservation.

Priority action 2: Building capacity based on successful models

Objective 9: **Establish a Regional Tiger Conservation and Research Center at Huai Kha Khaeng Wildlife Sanctuary**

Challenge: High standard curricula and efficiency in international collaborations are important to run a regional training center.

Opportunity: The Smart Patrol System and tiger and prey population monitoring and research programs in WEFCOM have long been in operation and of good enough quality to contribute to tiger conservation and research in the Southeast Asian region.

Expected outcome: The skills of tiger conservation and research are being shared in the region by using the facility in WEFCOM as one of the best places to encounter tiger signs, tracks, and tiger prey in Southeast Asia.

Duration and locations: 12 years, Huai Kha Khaeng Wildlife Sanctuary.

Activities necessary to accomplish this objective:

Activity 30: Designate staff and design an administrative structure to run the center with shared experiences and administrations.

Activity 31: Ensure that the training center has sufficient facilities and equipment to provide high quality training in management, enforcement, and research to serve both Thailand and the region.

Activity 32: Establish technical and enforcement-related curricula that will prepare participants to meet protected area management standards.

Objective 10: **Ensure national training capacity can deliver high quality tiger conservation training at all levels**

Challenge: Numbers and capacity of trainers to conduct high quality training courses on tiger conservation at the national level are still limited.

Opportunity: High standard trainings with tiger conservation focus have existed in Huai Kha Khaeng and Thung Yai Wildlife Sanctuaries for many years.

Expected outcome: The quality of trainers and trainees are improved with high standard courses.

Duration and locations: 12 years, Tenasserim – WEFCOM as the tiger source site and DP-KY as the potential source site.

Activities necessary to accomplish this objective:

Activity 33: Strengthen the local instructor capacity for conducting training courses for tiger research and conservation for Thai and international audiences.

Activity 34: Establish a national standard as sufficient resources for tiger conservation training.

Priority action 3: Strengthening monitoring, research, and information management

Objective 11: Monitor tiger and prey populations in priority landscapes

Challenge: Populations of tigers and prey in the core areas of priority landscapes need intensive monitoring systems with up-to-date technologies to be able to speak with confidence on population trends.

Opportunity: The rigorous population monitoring systems of tigers and prey have been run in the core area of WEFCOM for many years with collaborative support.

Expected outcome: The success of tiger conservation activities can be strongly linked to the target, which is the occurrence of tigers and their prey.

Duration and locations: 12 years, Tenasserim-WEFCOM as the tiger source site and DP-KY as the potential source site and other protected areas for a nation-wide survey.

Activities necessary to accomplish this objective:

Activity 35: Maintain and establish high standard annual population monitoring systems for tigers and their prey in tiger sources and potential source sites in the priority landscapes.

Activity 36: Establish landscape scale occupancy monitoring systems for tigers and prey throughout the two priority landscapes.

Activity 37: Implement a nationwide survey and reporting system on tigers and prey occurrence based on scientific methods.

Objective 12: Maintain long-term tiger and prey ecology research in priority landscapes

Challenge: Understanding the dynamics of tiger biology and ecology in different habitats and landscapes is very important for tiger conservation and restoration.

Opportunity: Huai Kha Khaeng Wildlife Sanctuary is the only site in Southeast Asia with intensive long-term tiger research by a strong research team.

Expected outcome: Managers and conservation scientists have better understanding of how tigers use the landscapes, monitor inbreeding depression, and track the source of tigers and tiger parts confiscated from illegal trade.

Duration and locations: 12 years, Tenasserim-WEFCOM as the tiger source site and DP-KY as the potential source site and other protected areas for a nationwide survey.

Activities necessary to accomplish this objective:

Activity 38: Strengthen long-term tiger ecology study in priority

landscapes, especially to determine maximum densities that can be supported in the landscapes to meet recovery targets.

Activity 39: Determine genetic structure of wild tigers at the population level and of captive tigers.

Khao Nang Rum Wildlife Research Station, WCS-Thailand Program

Objective 13: Ensure that relevant information for tiger conservation is well managed and available to inform strategy and planning

Challenge: Relevant information for tiger conservation is mostly scattered and has not been efficiently used to inform managers.

Opportunity: Information on tiger conservation in WEFCOM has been advanced and well organized over the last 5 years and the Wildlife Conservation Office of DNP has established an information center at the headquarters in Bangkok to be a center for smart patrol database.

Expected outcome: The government of Thailand has a high quality central database to cooperate with other organizations on tiger conservation.

Duration and locations: 12 years, DNP headquarters in Bangkok.

Activity necessary to accomplish this objective:

Activity 40: Develop information structure that facilitates compilation of national tiger related data for improvement of tiger conservation.

Priority action 4: Promoting education, awareness, and public participation

Objective 14: Convey tiger conservation-related messages to a diverse policy makers, and politicians.

Challenge: Most Thai public and policy makers do not perceive tigers as national pride and symbol as elephants.

Opportunity: Tiger can be used as an iconic species if promoted properly

and if enough information on the situation of tigers in WEFCOM is available to motivate public and other sectors in the community.

Expected outcome: Thai society gives strong support for tigers and wildlife conservation and natural resource management.

Duration and locations: 12 years, schools and communities around WEFCOM and DP-KY landscapes and Thai society at large.

Activities necessary to accomplish this objective:

Activity 41: Public campaigns on wild tiger conservation in local schools and communities around priority landscapes using innovative tools and impact monitoring system.

Activity 42: Deliver the message of tiger conservation through mainstream media channels.

Activity 43: Produce quality publications that contain information on tigers and their roles in the ecosystem to the public.

Objective15: Ensure that basic concepts of the tiger's ecological and cultural significance become part of Thailand's standard curriculum at several educational levels

Challenge: Unlike elephants, the story of the tiger's ecological and cultural significance has not been incorporated in any curriculum at any educational level.

Opportunity: Enough information is now available about tigers and their significance to Thailand's ecological system to be part of the curriculum at many levels.

Expected outcome: The government of Thailand has a high quality central database to cooperate with other organizations on tiger conservation.

Duration and locations: 12 years, national level.

Activity necessary to accomplish this objective:

Activity 44: Work with the Ministry of Education to include specific tiger-related learning goals in both primary and secondary standard curricula.

Objective16: Ensure that the co-benefits of tiger landscape conservation are understood and appreciated

Challenge: The ecosystem services and benefits to society that accrue specifically from tiger lanscapes and potential tiger landscapes in Thailand have not been widely acknowledged.

Opportunity: Reliable techniques to quantify ecosystem service values have been used and the results can lead to greater attention from policy makers and other sectors in society. *WCS-Thailand Program*

Expected outcome: More support for tiger conservation from other sectors of the society.

Duration and locations: 12 years, national level.

Activity necessary to accomplish this objective:

Activity 45: Quantify ecosystem service values and use the information to communicate the broader values of tiger conservation landscapes.

Priority action 5: Strategic financing for tiger conservation

Objective17: Identify the costs of effective tiger conservation, current expenditures, and efficiency of these expenditures

Challenge: All current tiger and potential tiger sites and landscapes in Thailand still do not have

sufficient budgets and manpower to conserve and recover wild tigers.

Opportunity: There are examples of tiger conservation costings from other tiger range countries and other successful projects that can be used to estimate the costs of tiger conservation in Thailand.

Expected outcome: The real cost of wild tiger conservation is understood and the budget is increased.

Duration and locations: 12 years, national level.

Activity necessary to accomplish this objective:

Activity 46: Baseline study of protected area costs and efficiency of current expenditures.

Objective18: Make use of large scale funding opportunities such as GEF 5, REDD,and other programs to fund tiger conservation efforts

Challenge: Large scale funding sources such as GEF-5, REDD, and others are not tiger-focused enough to provide funding; addressing too many non-impact activities can detract energy and resources from true tiger conservation and recovery; and the government processes associated with developing large scale funding opportunities takes a long time to go through the government process.

Opportunity: If prepared properly and funded, large scale funding sources can sustain important activities until results of impacts are known.

Expected outcome: Opportunity for funding is expanded

Duration and locations: 12 years, Tenasserim-WEFCOM as the tiger source site and DP-KY as the potential source site.

Activities necessary to accomplish this objective:

Activity 47: Utilize GEF-5 programmatic funding opportunity to secure additional national funding for tiger landscape conservation support.

Activity 48: Develop full REDD+ funding strategy for the Dawna Tenasserim landscape.

Objective19: Develop sustainable funding mechanisms

Challenge: Tiger conservation and recovery take a long time before results start to be seen and in many areas funding sustainability is the key problem that has led to failure.

Opportunity: In Thailand the government budget is the most sustainable mechanism for tiger conservation and recovery. However, the budget allocation and expenditure systems need to be overhauled under good governance, which is transparent and monitorable.

Expected outcome: Opportunity for funding is expanded and sustained.

Duration and locations: 12 years, Tenasserim-WEFCOM as the tiger source site and DP-KY as the potential source site.

Activities necessary to accomplish this objective:

Activity 49: Identify potential payment for ecosystem services mechanism and develop pilot projects to demonstrate their values.

Activity 50: Establish a trust fund for conservation activities in priority landscapes.

Activity 51: Enhance ecotourism opportunities in and around tiger landscapes and ensure that revenues flow more directly to tiger conservation efforts.

Policy Change to Support the Objectives

To accomplish Thailand Tiger Action Plan, related agencies should implement following actions:

- Develop policies on promotion, salaries and social security systems for protected area staff and park rangers
- Encourage policy makers to develop policies on career paths for superintendents of protected areas (national parks and wildlife sanctuaries) for effectiveness and continuity of the work quality
- Up list tigers to the reserved species under the Wild Animal Reservation and Protection Act B. E. 2535 (1992)
- Strengthen enforcement of wildlife crime under the Wild Animal Reservation and Protection Act B.E.2535 (1992) to make sure that convicted offenders receive the highest penalty of Wildlife Laws and related legislations.

Action Plan Implementation

To be successful in recovering wild tiger populations following the vision, goals, priority actions, objectives, and activities mentioned in this plan, the Ministry of Natural Resources and Environment needs to set up a National Tiger Conservation Committee. The members of the committee should come from government agencies, education institutes and NGOs involved with tiger conservation and recovery under the action plan. This committee will have the following activities:

1. Meet annually to review progress of the National Tiger Action Plan as follows:


WCS–Thailand Program

   - Review progress of key activities, objectives and goals of priority actions with focusing on the tiger source site landscape of Tenasserim-WEFCOM and potential site landscape of DP-KY
   - Evaluate the effectiveness of activities under each priority action
   - Adjust and adapt approaches to fulfill the objectives and priority actions
   - Set up progress targets and a timetable of key activities
   - Consult with experts and scientists on progress toward tiger population goals
   - Prepare information for upcoming meetings on tiger conservation.

2. Convene an annual meeting with stakeholders to report the progress of the action plan.

3. Produce and circulate an annual tiger conservation report.

APPRECIATIVE REMARKS
for
Political Leadership on Tiger Conservation in Thailand
H. E. SUWIT KHUNKITTI
Minister of Natural Resources and Environment

H.E. Suwit Khunkitti is a well renowned public figure in Thai society who has served the country in various important public service and ministerial positions, including Deputy Prime Minister. He has been a prominent conservationist in Thailand for many years, having received the 1995 Best Conservationist award from the Siam Environmental Society. More recently, he was the recipient of the 2009 J. Paul Getty Award for Conservation Leadership, which was deeply appreciated by those who served under him. Since then, the international community has supported his policies to strengthen tiger and wildlife conservation in local and international arenas.

Thailand's first Tiger Action Plan was launched by H.E. Khunkitti during his first term as Minister of Natural Resources and Environment in 2004. This plan directed Thailand to work in cooperation with government, academic, and NGO partners to improve the conservation of tigers and other wildlife. The ASEAN Wildlife Law Enforcement Network (ASEAN-WEN) also was the initiative from his broad vision by working closely with ASEAN countries to suppress the cross-border trade of wildlife in CITES CoP13.

Since returning to MoNRE as minister in 2009, H.E. Khunkitti has given strong support to the Global Tiger Initiative (GTI) and overseen the hosting of two important international tiger conservation meetings – which represent two important recommendations; The Pattaya Manifesto on Combating Wildlife Crime in Asia and Hua Hin Declaration on Tiger Conservation as a result of a ministerial conference on tiger conservation. From these gatherings came clear directives for greater efforts in the area of international cooperation to achieve stated goals in tiger conservation.

Thus, under H.E. Khunkitti's leadership, Thailand is now an active member of the global tiger conservation community. Its recent commitments include measures to increase by more than 50% the tiger populations in priority tiger-source sites; the establishment of the Regional Tiger Conservation and Research Center in Huai

Kha Khaeng Wildlife Sanctuary; and the strengthening of ASEAN-WEN, including its expansion to include the greater Asia region.

The 2nd Thailand Tiger Action Plan you are holding is another important outcome of H.E. Khunkitti's leadership. On behalf of the people working for wildlife, from policy-level down to park rangers battling wildlife crimes at the frontline, the Department of National Parks, Wildlife and Plant Conservation would like to give its sincere appreciation to H. E. Suwit Khunkitti for his leadership in tiger conservation in Thailand.

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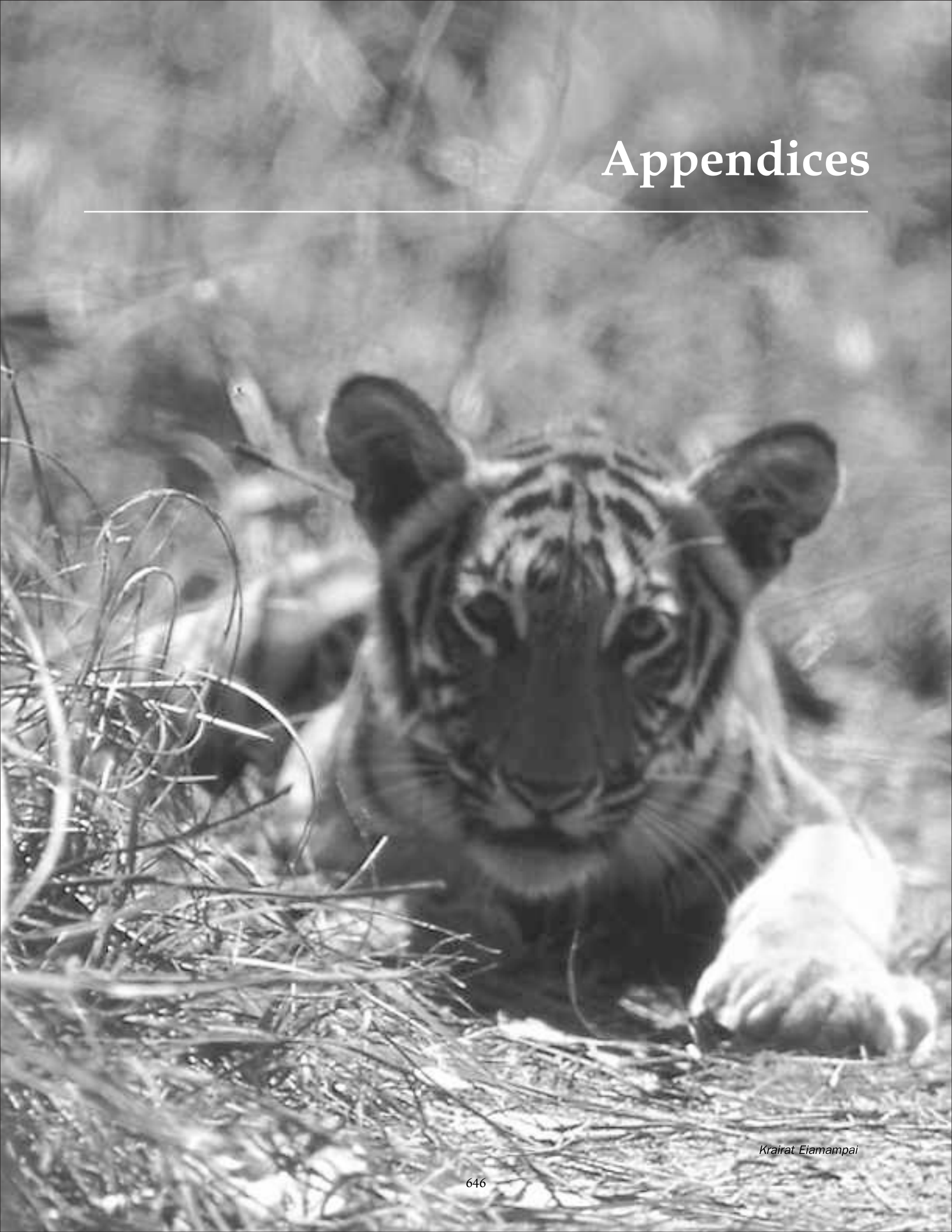
Appendices



Krairat Eiamampai

Appendix 1 Actions, Indicators, and Timelines for Tiger Conservation Actions

	Action	Indicator	Means of Verification	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
1	**Strengthening direct conservation action and enforcement**														
1.1	**Promote conservation efforts at the scale of entire tiger populations (e.g., forest complexes and associated corridors)**														
1.1.1	Strengthen and standardize "Smart patrol system" in protected areas of current tiger source and potential source sites, including Tenasserim – WEFCOM and DP-KY.	Numbers of protected areas with MIST-based smart patrol system;patrol efforts (patrol days, patrol distance, patrol coverage);threat distribution and trend	Monthly reports; meeting minutes	x	x	x	x	x	x	x	x	x	x	x	x
1.1.2	Increase the number of competent park ranger teams patrolling in each protected area of priority landscapes up to the level that can effectively secure tigers and their prey.	Numbers of park rangers in HKK-TY and KY-TL.	Protected area budget and human resources; transparent system of hiring park rangers	x	x	x	x	x	x	x	x	x	x	x	x
1.1.3	Strengthen wildlife crime units and informant networks around Tenasserim – WEFCOM and DP-KY Forest Complex to suppress local demands on wild meat and illegal wildlife trade and help apprehend wildlife criminals around protected areas.	Numbers of wildlife crime units in PAAO 1, 3, 7, 12, 14;data quality in wildlife trade database; enforcement cases	Monthly reports	x	x	x	x	x	x	x	x	x	x	x	x
1.1.4	Work with district attorneys and judges to ensure substantial punishment on wildlife crime against tigers and other large ungulates.	Proportion of cases resulting in conviction;balance applications of penalty ranges	Conviction reports; police reports	x	x	x	x	x	x	x	x	x	x	x	x
1.1.5	Overhaul the park ranger system to a higher living and working standard, and provide rewards and incentives to encourage patrolling (e.g., patrolling budgets) and other significant morale boosting programs such as performance-based promotions.	Better performance-based compensation and promotion;increase in base salaries and benefits;funds for ranger welfare in priority landscapes	Job performances; regular protected areas reports submitted to DNP	x	x	x	x	x	x	x	x	x	x	x	x
1.1.6	Apply landscape-scale ecological and development models for tiger conservation and engage stakeholders in development sectors (i.e., roads, oil and gas, mining, power) to minimize and mitigate impacts in sectoral activities on tiger habitats.	Numbers of management approaches and development models applied at the landscape scale	DNP reports	x	x	x	x	x	x	x	x	x	x	x	x

Appendix 1 Actions, Indicators, and Timelines for Tiger Conservation Actions (con't)

	Action	Indicator	Means of Verification	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
1.2	**Provide long-term support for tiger habitat restoration activities**														
1.2.1	Promote use of controlled burning in potential and manageable parts of priority landscapes to maintain grassland for ungulate recovery.	Areas for control burned;changes in ungulate use of the burned areas	Maps and areas managed using fires	x	x	x	x	x	x	x	x	x	x	x	x
1.2.2	Prevent and suppress fires effectively in evergreen forest areas in priority landscapes to provide good cover and watersheds for tigers and wildlife.	Areas with fire controlled	Satellite image reports	x	x	x	x	x	x	x	x	x	x	x	x
1.2.3	Strengthen the reintroduction program of ungulate prey with the ex-situ succeeded species (i.e., sambars, eld's deer, hog deer) in suitable habitats.	Species, numbers, and locations;numbers of reintroduced animals surviving after reintroductions;breeding success	Reintroduction plan;monitoring system; breeding and reintroduction reports	x	x	x	x	x	x	x	x	x	x	x	x
1.2.4	Maintain natural and existing artificial water sources that benefit tigers and ungulates es-pecially during the drought periods in priority landscapes.	Numbers of water sources;demonstrated increase in prey numbers	Report on monitoring results of wildlife use of water sources and salt licks	x	x	x	x	x	x	x	x	x	x	x	x
1.2.5	Establish a system to control invasive species (e.g., *Lantana camara, Mimosa pudica*) in the priority landscapes.	New areas where invasive species detected	Project surveys;protected areas reports	x	x	x	x	x	x	x	x	x	x	x	x
1.2.6	Identify priorities for corridor and habitat restoration.	Areas identified for corridor and habitat restoration	Maps of corridors	x		x		x		x		x		x	x
1.3	**Ensure that government policy of protecting tiger habitats from development threats, as committed to in the Hua Hin declaration, is followed**														
1.3.1	Ensure that no major infrastructure development occurs in core tiger habitats.	Numbers of major development project rejected	Government reports	x	x	x	x	x	x	x	x	x	x	x	x
1.3.2	Ensure that infrastructure development in corridors and buffer zones conform with Smart Green Infrastructure designs to ensure minimal impacts to tiger habitats and maintain land-scape connectivity.	Number of green infrastructure protects in cooridors and buffer zones	Government reports	x	x	x	x	x	x	x	x	x	x	x	x

Appendix 1 Actions, Indicators, and Timelines for Tiger Conservation Actions (con't)

	Action	Indicator	Means of Verification	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
1.4	**Encourage community participation and cooperation in protected area conservation activities**														
1.4.1	Strengthen and build wildlife conservation network around the priority landscape to enhance tiger and wildlife conservation in the priority areas.	Numbers of wildlife conservation network established; numbers and groups of people trained as volunteers	Wildlife conservation actions participated by members of networks;projects conducted by volunteers	x	x	x	x	x	x	x	x	x	x	x	x
1.4.2	Provide Protected Area Committees (PAC) and Community Committees (CC) with quality information (e.g., data from Smart Patrol System) on which to base threat reduction decisions and activities.	Meeting frequency and resolutions from the meeting;successful cases of particaptorial management approaches	PAs reports; PAC reports;CC reports	x	x	x	x	x	x	x	x	x	x	x	x
1.5	**Support local communities in developing sustainable economies that reduce dependence on forest resources**														
1.5.1	Link communities with agricultural science institutes and agencies to promote agro-forestry in buffer zone areas around priority landscapes to reduce collection of Non Timber Forest Producteds (NTFPs) inside Protected Areas (PAs).	Incomes from agro-forestry products (eg., bamboo shoots, mushrooms)	PAs Reports	x	x	x	x	x	x	x	x	x	x	x	x
1.5.2	Develop wildlife-based ecotourism with concrete benefit sharing with communities in appropriate areas in and around PAs.	Numbers of projects, areas, and activities;revenue flowing to the communities	DNP reports on wildlife-based ecotourism projects; reports on revenues from Ministry of Interior	x	x	x	x	x	x	x	x	x	x	x	x
1.6	**Facilitate international cooperation in tiger conservation efforts**														
1.6.1	Strengthen enforcement capacity of Thailand's CITES programs with better interagency-collaboration and stronger protocols and impact monitoring systems on wildlife trade.	Transparent permit system;numbers of cases resulting from interagency-collaboration; active responses from CITES checkpoints and interagency collaboration	CITES Management Authority of Thailand biennual reports;DNP annual reports and statistics	x	x	x	x	x	x	x	x	x	x	x	x
1.6.2	Strengthen and sustain capacity of ASEAN-WEN.	Enforcement monitoring system; positive response from relevant authorities from ASEAN countries	Progress and annual reports of ASEAN-WEN	x	x	x	x	x	x	x	x	x	x	x	x

Appendix 1 Actions, Indicators, and Timelines for Tiger Conservation Actions (con't)

	Action	Indicator	Means of Verification	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2012
1.6.3	Strengthen bi-lateral cooperation with Cambodia, Laos, Malaysia and Myanmar for transboundary enforcement and monitoring and research.	Numbers of collaboration projects, areas, and activities	Biennual reports of CITES Management Authority of Thailand; DNP annual reports	x	x	x	x	x	x	x	x	x	x	x	x
1.7	**Strengthen national laws, policies, and enforcement of tiger related crimes**														
1.7.1	Strengthen enforcement on wildlife crime under the Wild Animal Reservation and Protection Act B.E.2535 (1992) to make sure that convicted offenders receive the highest penalty of Wildlife Laws and related legislations.	Numbers of offenders convicted in a range of penalties	Court decisions; DNP reports; DNP Statistics	x	x	x	x	x	x	x	x	x	x	x	x
1.7.2	Strengthen Thailand-WEN information sharing capacity.	Effective monitoring database on performance; positive responses from relevant authorities; enforcement mechanisms developed; information shared	Thailand-WEN annual reports; reports on enfocement actions	x	x	x	x	x	x	x	x	x	x	x	x
1.7.3	Strengthen investigative capacity and judiciary effectiveness in wildlife crime cases.	Prosecution and conviction cases; increasing success in prosecution of cases; capacity building training held	Court decisions;training materials; DNP anuual reports	x	x	x	x	x	x	x	x	x	x	x	x
1.7.4	Strengthen communication campaigns on wild tiger conservation.	Wild tiger conservation discussed at meetings; awareness survey; capacity building trainings held	Meeting minutes;campaign materials;awareness survey results	x	x	x	x	x	x	x	x	x	x	x	x
1.7.5	MoU with military, police, Ministry of Interior, Ministry of Education to be strengthened and implemented for better collaboration and training for enforcement.	Numbers of cooperation projects under the MoU; meetings and dialogues to work with military, police, Ministry of Interior, Ministry of Education	MoNRE annual reports	x	x	x	x	x	x	x	x	x	x	x	x

Appendix 1 Actions, Indicators, and Timelines for Tiger Conservation Actions (con't)

	Action	Indicator	Means of Verification	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
1.8	**Support national and international efforts to manage captive tigers responsibly**														
1.8.1	Design and enforce the control programs for captive breeding of tigers in legal tiger zoos with a captive tiger database tracking records.	Captive tiger database established and run effectively with effective tiger inspection teams.	DNP's reports on status of captive tigers	x	x	x	x	x	x	x	x	x	x	x	x
1.8.2	Discourage illegal activities involving captive tigers, using effective public campaigns which highlight the impacts of tiger conservation.	Effective enforcement on zoos allowed for captive tigers but violating the law; information in the public domain	Enforcement records in DNP annual reports; media pick-ups	x	x	x	x	x	x	x	x	x	x	x	x
1.8.3	Public campaigns showing the difference between wild & captive tiger conservation.	Strong campaign and clear public understanding on tiger issues;information in the public domain	DNP annual reports;media pick-ups	x	x	x	x	x	x	x	x	x	x	x	x
2	**Building capacity based on successful models**														
2.1	**Establish a Regional Tiger Conservation and Research Center at Huai Kha Khaeng Wildlife Sanctuary**														
2.1.1	Designate staff and design an administrative structure to run the center with shared experiences and administrations.	Clear structure of shared administration established	MoNRE and DNP executive orders	x	x	x	x	x	x	x	x	x	x	x	x
2.1.2	Ensure that the training center has sufficient facilities and equipment to facilitate high quality training in management, enforcement, and research to serve both Thailand and the region.	Successful pilot training courses delivered; a number of projects participated by tiger range countries	DNP annual reports	x	x	x	x	x	x	x	x	x	x	x	x
2.1.3	Establish technical and enforcement-related curricula that will prepare participants to meet protected area management standards.	A curriculum standard for tiger protected area managers designed and used; a number of protected area managers passed the curricuala	DNP executive orders to regulate a curriculum standard on tiger protected areas; DNP Training records	x	x	x	x	x	x	x	x	x	x	x	x

Appendix 1 Actions, Indicators, and Timelines for Tiger Conservation Actions (con't)

	Action	Indicator	Means of Verification	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
2.2	**Ensure national training capacity can deliver high quality tiger conservation training at all levels**														
2.2.1	Strengthen the local instructors capacity for conducting training courses for tiger research and conservation for Thai and international audience.	Training for trainer courses are well designed and launched	DNP annual reports	x	x	x	x	x	x	x	x	x	x	x	x
2.2.2	Establish a national standard as sufficient resources for tiger conservation training.	National standard is agreed and published	DNP annual reports	x	x	x	x	x	x	x	x	x	x	x	x
3	**Monitoring, research, and information management**														
3.1	**Monitor tiger and prey populations in priority landscapes**														
3.1.1	Maintain and establish high standard annual population monitoring systems for tigers and their prey in tiger sources and potential source sites in the priority landscapes.	System of camera trapping and transect for tiger and prey population monitoring established and annually run with rigorous designs	DNP reports on population monitoring systems	x	x	x	x	x	x	x	x	x	x	x	x
3.1.2	Establish landscape scale occupancy monitoring systems for tigers and prey throughout the two priority landscapes.	System of occupancy monitoring for tiger and prey established and run	DNP reports on landscape scale occupancy monitoring systems	x	x	x	x	x	x	x	x	x	x	x	x
3.1.3	Implement a national-wide survey and reporting system on tigers and prey conditions based on scientific methods.	National-wide survey system established and run with rigorous design	DNP reports on a national-wide survey and reporting system on tigers and prey conditions	x	x	x	x	x	x	x	x	x	x	x	x
3.2	**Maintain long-term tiger and prey ecology research in priority landscapes**														
3.2.1	Strengthen long-term tiger ecology studies in priority landscapes, especially to determine maximum densities that can be supported in the landscapes to meet recovery targets.	Tiger and prey ecological studies continued with well designed	Reports and publications on long-term tiger ecology studies	x	x	x	x	x	x	x	x	x	x	x	x
3.2.2	Determine the genetic structure of wild tigers at the population and of captive tigers.	A systems for collecting tiger scats or hair samples established and run efficiently	Genetic structures existed and updated regularly	x	x	x	x	x	x	x	x	x	x	x	x
3.3	**Ensure that relevant information for tiger conservation is well managed and available to inform strategy and planning**														
3.3.1	Develop information structure that facilitates compilation of national tiger related data for improvement of tiger conservation.	Data consolitated from all tiger protected areas easily accessed and used; mechanisms developed	Information structures existed and updated regularly; published manuals	x	x	x	x	x	x	x	x	x	x	x	x

Appendix 1 Actions, Indicators, and Timelines for Tiger Conservation Actions (con't)

	Action	Indicator	Means of Verification	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
4	**Education, awareness, and public participation**														
4.1	**Convey tiger conservation-related messages to a diverse Thai public, policy makers, and politicians**														
4.1.1	Public campaigns on wild tiger conservation in local schools and communities around priority landscapes using innovative tools and impact monitoring system.	Public campaigns on wild tiger conservation designed and used	DNP fact sheets and publications	x	x	x	x	x	x	x	x	x	x	x	x
4.1.2	Deliver the message of tiger conservation through mainstream media channels.	Long-term strategic communication programs developed; publications in magazines or newspapers; public presentations	DNP reports on landscape scale occupancy monitoring systems	x	x	x	x	x	x	x	x	x	x	x	x
4.1.3	Produce quality publications that contain information on tigers and their roles in the ecosystem to the public.	Publications disigned and produced among public at large; information in the public domain	Tiger publications; media pick-ups	x	x	x	x	x	x	x	x	x	x	x	x
4.2	**Ensure that basic concepts of the tiger's ecological and cultural significance become part of Thailand's standard curriculum at several educational levels**														
4.2.1	Work with Ministry of Education to include specific tiger-related learning goals in both primary and secondary standard curricula.	Tiger conservation and related-topics included in the school curriculum	Reports of the MoU implementation between MoNRE and MoE	x	x	x	x	x	x	x	x	x	x	x	x
4.3	**Ensure that the co-benefits of tiger landscape conservation are understood and appreciated**														
4.3.1	Quantify ecosystem service values and use the information to communicate the broader values of tiger conservation lanscapes.	Ecosystem service values quantified;information in the public domain	DNP ecosystem services publications; media production broadcasted	x	x	x	x	x	x	x	x	x	x	x	x
5	**Strategic financing for tiger conservation**														
5.1	**Identify the costs of effective tiger conservation, current expenditures, and efficiency of these expenditures**														
5.1.1	Baseline study of protected area costs and efficiency of current expenditures.	Cost of conservation identified	Study reports	x	x	x	x	x	x	x	x	x	x	x	x
5.2	**Make use of large scale funding opportunities such as GEF 5, REDD, other programs to fund tiger conservation efforts**														
5.2.1	Utilize GEF 5 programmatic funding opportunities to secure additional national funding for tiger landscape conservation support.	Numbers of proposals submitted	Numbers of proposals funded	x	x	x	x	x	x	x	x	x	x	x	x

Appendix 1 Actions, Indicators, and Timelines for Tiger Conservation Actions (con't)

	Action	Indicator	Means of Verification	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2012
5.2.2	Develop full REDD+ funding strategy for the Dawna Tenasserim Landscape.	Funding strategy developed; numbers of proposals submitted	Numbers of proposals funded	x	x	x	x	x	x	x	x	x	x	x	x
5.3	**Develop sustainable funding mechanisms**														
5.3.1	Identify potential payment for ecosystem services mechanism and develop pilot projects to demonstrate their values.	Ecosystem services mechanisms identified; numbers of projects, areas, and activities	Numbers of pilot projects implemented; DNP project reports	x	x	x	x	x	x	x	x	x	x	x	x
5.3.2	Establish a Trust Fund for conservation activities in priority landscapes.	Trust Fund established	Volume and duration of financial support on tiger project	x	x	x	x	x	x	x	x	x	x	x	x
5.3.3	Enhance ecotourism opportunities in and around tiger landscapes and ensure that revenues flow more directly to tiger conservation efforts.	Ecotourism pilot projects developed; proposal submitted	Ecotourism pilot projects tested and applied in and around tiger landscapes	x	x	x	x	x	x	x	x	x	x	x	x

Appendix 2 Estimation of Tiger Population in Thailand[1] **Remark: Tiger density in 25 protected areas.**

Protected Areas	Area (km^2)	Abundance			Population
		High	Moderate	Low	
1. Western Forest Complex					
– Huai Kha Khaeng Wildlife Sanctuary	2817	√			77–59
– Thungyai Naresuan (West) Wildlife Sanctuary	2117		√		31–16
– Thungyai Naresuan (East) Wildlife Sanctuary	1572		√		13–9
– Umpang Wildlife Sanctuary	2587			√	27–23
– Mae Wong National Park	896			√	
– Erawan National Park	530			√	
– Khuan Si Nakharin National Park	1843			√	
– Sai Yok National Park	962			√	
2. Kaeng Krachan Forest Complex					
– Kaeng Krachan National Park	2020*		√		20–14
– Kui Buri National Park	982		√		9
3. Dong phayayen–Khao Yai Forest Complex					
– Khao Yai National Park	2260			√	9–7
– Thap Lan National Park	1805*		√		26–18
– Pang Sida National Park	859		√		
4. Hala–Bala Forest Complex					
– Bang Lang National Park	289		√		7–5
– Hala Bala Wildlife Sanctuary	422		√		
5. Phu khieo–Nam Nao Forest Complex					
– Phu–khieo Wildlife Sanctuary	1571			√	10–9
– Nam Nao National Park	975			√	
6. Doi Phu Kha–Mae Yom Forest Complex					
– Doi Pha Chang Wildlife Sanctuary	583			√	2
7. Srilanna–Khun Tan Forest Complex					
– Doi Luang National Park	1212			√	6–5
– Khun Chae National Park	287			√	
8. Lum Nam Pai–Salawin Forest Complex					
– Mae–Yuam Fang Kwa Wildlife Sanctuary	292			√	8–7
– Chiang Dao National Park	1146			√	
– Salawin National Park	735			√	
9. Mae Ping–Om Koi Forest Complex					
– Om Koi Wildlife Sanctuary	1226			√	5–4
10. Khao Luang Forest Complex					
– Khao Luang National Park	596			√	2
Total					**252–189**

Tiger Abundance – High

Huai Kha Khaeng Wildlife Sanctuary 2.4 ± 0.32 tiger/100 Km^2 (Khao Nang Rum Wildlife Research Station, 2009)

Tiger Abundance – Moderate

Thungyai Naresuan (West) Wildlife Sanctuary 1.1 ± 0.35 tiger/100 Km^2 (Khao Nang Rum Wildlife Research Station, 2009)

Thungyai Naresuan (East) Wildlife Sanctuary 0.68 ± 0.15 tiger/100 Km^2 (Khao Nang Rum Wildlife Research Station, 2009)

Tiger density (other areas) = 1 tiger/100–150 km^2

Tiger Abundance – Low

Tiger density = 1 tiger/250–300 km^2

* **estimated protected area excluded the area of human settlement.**

Appendix 3 Encounter Rate of Tiger Signs in Thailand's Protected Areas[1] **Forest Complex**

1. Lum Nam Pai-Salawin	2. Salawin National Park	0.5
	3. Mae-Yuam Fang Kwa Wildlife Sanctuary	0.5
2. Srilanna-Khun Tan	1. Khun Chae National Park	1.1
	2. Doi Luang National Park	1.6
3. Doi Phu Kha-Mae Yom	1. Doi Pha Chang Wildlife Sanctuary	1.1
4. Mae Ping-Om Koi	1. Om Koi Wildlife Sanctuary	*
6. Phu khieo-Nam Nao	1. Nam Nao National Park	0.7
	2. Phu-khieo Wildlife Sanctuary	0.4
9. Dong phayayen-Khao Yai	1. Khao Yai National Park	0.5
	2. Thap Lan National Park	3.7
	3. Pang Sida National Park	3.9
11. Western	1. Khuan Sri Nakharin National Park	0.4
	2. Erawan National Park	0.8
	3. Thungyai Naresuan (West) Wildlife Sanctuary	25.8
	4. Thungyai Naresuan (East) Wildlife Sanctuary	8.3
	5. Huai Kha Khaeng Wildlife Sanctuary	14.3
	6. Umpang Wildlife Sanctuary	1
	7.Sai Yok National Park	**
	8. Mae Wong National Park	*
12. Kaeng Krachan	1. Kaeng Krachan National Park	5.2
	2. Kui Buri National Park	1.6
15. Khao Luang	1. Khao Luang National Park	0.6
17. Hala-Bala	1. Bang Lang National Park	9.5
	2. Hala Bala Wildlife Sanctuary	4.1

Remark[1] Data between 2004-2007

* Reported by Park Rangers (2009)

** Data from Camera Trap (2006)

Protected Areas	Study Period	Trap night	Remark	No. of Tiger	Estimated Density	Remark
1. Huai Kha Khaeng WS[1]	2010	2935		39	2.4±0.32	(KNR,pers. Comm.)
	2009	2731		39	2.39±0.29	(KNR,2009)
2. Thung Yai WS-W[2]	2009	629		7	1.1±0.35	(KNR,2009)
Thung Yai WS -E[2]	2007	629		7	0.68±0.15	(KNR,2009)
3. Kui Buri NP[3]	2007	1055		2[A]	0.8	**95%CI=3-10**
	2009	1458		2[A]	1	**95%CI=4-10**
4. Kaeng KraChan NP[4]	2001	809		4	2.8(SE0.8)	
5. Thap Lan NP[5]	**2008-2010**			5552	8	
6. Khao Yai NP[6]	**2003-2006**			6172	0	0
7. Klong Saeng WS[7]	**1997-2000**			2690	0	0
	Dec03-Apr04	528		0	0	
8. Mae Nam Pachi[8]	May-Sep2005	540		0	0	

A "Number of Tiger" reported here are during capture-recapture sampling period, but since 2007 WWF has photographed 9 individual tigers in the park, including 3 cubs.

[1, 2] - (Khao Nang Rum Research Station, 2009; WCS-Thailand Program, 2007; WCS-Thailand Program, 2008; WCS-Thailand Program, 2009) [3]- (WWF Thailand, 2008)

NATIONAL ACTION PLAN ON TIGER CONSERVATION IN VIETNAM

PRIME MINISTER

SOCIALIST REPUBLIC OF VIETNAM
Independence – Freedom - Happiness

No.: 539/QD-TTg

Hanoi, April 16, 2014

DECISION
APPROVING THE NATIONAL PROGRAM ON TIGER CONSERVATION 2014 – 2022

PRIME MINISTER

Pursuant to Law on the Government Organization dated December 25, 2001;
Pursuant to Law on Forest Protection and Development dated December 03, 2004;
Pursuant to Law on Biodiversity dated November 13, 2008;
Pursuant to Decree No. 32/2006/ND-CP dated March 30, 2006 on management of endangered, precious and rare forest flora and fauna;
Pursuant to Decree No. 160/2013/ND-CP dated November 12, 2013 of the Government on criteria to determine endangered, precious and rare species and regimes to manage them;
In consideration of proposal of Minister of Agriculture and Rural Development,

DECIDES:

Article 1. To approve the National Program on Tiger Conservation 2014-2022 (hereafter referred to as "Program") with following key contents:

I. OBJECTIVES

1. General objectives

Protecting, conserving tiger, its habitat and prey, contributing to preventing the decrease of and gradually recovering, improving and increasing tiger population size until 2022 according to the goals defined in the global tiger conservation program in which Vietnam committed its participation.

2. Specific objectives

a) Phase I (2014-2017):
- Defining prioritized areas for recovery of tiger, its prey and habitat.
- Enhancing management, supervision of tiger rearing activities in the country.
- Improving effectiveness of prevention and punishment of violations of tiger and its prey conservation.
- Enhancing inter-border tiger and nature conservation activities.

b) Phase II (2018-2022):
- Defining all prioritized habitats for tiger conservation.
- Prevention of illegal hunt, trade and use of tiger products and derivatives.
- Enhancing management and conservation of tiger, its prey and habitat in natural environment.
- Preparing and implementing ex-situ tiger conservation programs to return tigers to its natural habitat
- Establishing a sustainable financial mechanism in natural conservation in general and tiger conservation in particular.

II. SUBJECT AND SCOPE

1. Subject

Activities of domestic and foreign agencies, organizations and individuals related to management, protection and conservation of tiger, its prey and habitat.

2. Scope

- Regarding in-situ conservation, focusing on those areas where tigers are living and which have the potential of tiger recovery at National Parks, Natural Reserves, especially Vu Quang National Park (Ha Tinh province), Pu Mat National Park (Nghe An province), Yok Don National Park (Dak Lak province), Chu Nom Ray National Park (Kon Tum province) and Sop Cop Natural Reserve (Son La province), Song Thanh Natural Reserve (Quang Nam province).
- Regarding legal compliance on tiger conservation, focusing on raising capacity, completing mechanisms, policies and enhancing inter-industry cooperation, international cooperation in preventing illegal hunt, trade, transportation, processing and use of tiger in the country.

III. CONTENTS

1. Defining prioritize areas of tiger conservation

a) Assessment of current situation and defining prioritized areas of tiger conservation are integrated in the contents of other approved and relevant Programs and Strategies such as: Vietnam Forestry Development Strategy 2006-2020, Management Strategy of special-use forests, sea conservation area, inland water conservation area in Vietnam until 2020 with vision to 2030; National Strategy on Biodiversity Conservation until 2020 with vision to 2030;

b) Investigating, researching, assessing feasibility of recovering tigers in areas where tigers are living such as Pu Mat, Vu Quang, Chu Mom Ray, Yok Don National Garden and Sop Cop and Song Thanh Nature Reserve; proposing to construct conservation corridors in tiger's natural habitat;

c) Enhancing examination, control to prevent and minimize activities which have negative impacts on tiger's natural habitat.

2. Formulating observation programs on tiger and its prey population in nature.

a) Developing a set of criteria and indexes for observation and conservation of tiger and its prey in nature;

b) Implementing observation programs on change of tiger and its prey population in prioritized habitat on basis of criteria and indexes approved by competent authorities;

c) Conducting investigation, survey on tiger, its prey and habitat in prioritized areas;

d) Assessing, supervising ecological succession at prioritized habitat of tiger conservation and other potential habitats for tiger conservation;

đ) Implementing scientific research projects on supervising change in wild tiger and its prey population;

e) Conducting researches on transferring and applying advanced scientific solutions in the world on management, protection and supervision of tiger and its prey; encouraging domestic initiatives, technical solutions on management and protection of tiger and its prey.

3. Enhancing management and supervision of tiger breeding for conservation purpose.

a) Investigating, preparing statistics and documents of managing captive tigers in Vietnam; establishing national database system to manage, identify captive tigers (through gene documents, photographs, attachment of electronic chips and marking cards);

b) Developing and applying observation programs at captive tiger rearing facilities in the country;

c) Assessing impacts of tiger captive and breeding activities at rearing facilities on wild tiger conservation;

d) Organizing trainings to strengthen competences, skills to identify, manage captive tigers for managing officers and legal compliance officers of related agencies;

đ) Formulating and implementing research programs on breeding, rearing and conserving tiger and returning tiger to its natural environment; implementing the program of moving, returning and recovering tiger population in habitat of wild tigers, in which legal tiger breeding facilities are encouraged to participate in implementing the Program.

4. Improving effectiveness in prevention and punishment of violations of conservation of tiger and its prey.

a) Reviewing, proposing amendment and supplement of legal regulations on protection of endangered flora and fauna, in which focusing on protection of tiger and its prey to prevent illegal hunt, transportation, capture and use of derivatives from tigers;

b) Formulating documents, training curricula, integrating into regular training programs of related industries;

c) Implementing training programs, supplementary programs to enhance capability of legal compliance officers of tiger conservation in such sectors as public security, customs, market management, border guards; content of trainings focuses on such issues as prevention of illegal trade, transportation of tiger, its derivatives and its prey;

d) Increasing exchange, information sharing and international cooperation in prevention, investigation and dealing with illegal inter-border trade and transportation of tiger;

đ) Developing national archive center for tiger database and sample; listing and marking all tiger samples which are being kept at facilities of individuals and organizations such as museum, display center and zoos and preparing management documents.

5. Strengthening communication, improving awareness to prevent illegal use of products made from tiger, its prey and wild animal:

a) Conducting socio-economic, cultural and historical impact assessments on conservation in general and tiger conservation in particular;

b) Investigating market demand and altitude on consuming products made from tiger, its prey and endangered, precious and rare animals;

c) Organize activities to enhance communication capability of news agencies and related parties. Formulating and implementing communication campaigns to raise community awareness to change habit and reduce the demand for products made from tiger in traditional medicine and encourage active participation of community in tiger conservation;

d) Integrating education on wild animals and plants into curriculum at high school education;
đ) Raising awareness of the society on legal regulations related to protection of tiger and its prey.

e) Applying strict management over publication of traditional medicine documents to screen contents related to use guide regarding products made from endangered, precious and rare animals in disease prevention and treatment.

6. Diversifying sources of capital, establishing a financial mechanism suitable to requirements to strengthen tiger conservation:

a) Assessing current resources and potentials for tiger conservation; assessing integration and mobilization of other resources in management, natural conservation at prioritized areas of tiger conservation;

b) Developing effective management mechanism to mobilize, integrate maximum resources into tiger conservation, in which special attention is paid to mechanism of mobilizing fund from private sector, non-governmental organizations and international community for prioritized area of tiger conservation;

c) Managing financial support for conservation of tiger and endangered animals and plants effectively.

7. To enhance cross-border cooperation with countries sharing the same borders with Vietnam and those in the area and in the world for tiger conservation.

a) To suggest the construction of cross-border tiger conservation areas based on scientific evaluation and the practical situation. To develop mechanisms for cooperation and bilateral action plan between Vietnam - Laos, Vietnam - Cambodia and Vietnam - China in cross-border conservation. To strengthen the fight against cross-border crime in trafficking, illegal transportation of tiger specimens;

b) To promote cooperation in information sharing between Vietnam and bordering countries, countries in the region, organizations and international partners in tiger conservation;

c) To actively participate in and implement international treaties, agreements with member states, international institutions related to the conservation of tigers and other endangered, precious and rare animals, plants such as the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), Global Tiger Forum (GTF), Global Tiger Initiative (GTI), World Bank (WB), International Criminal Police (Interpol), the World Customs Organization (WCO) in the capacity building activities; to mobilize resources to support the conservation, enforcing and sharing related information;

d) To establish at least one cross-border conservation area where tigers are naturally distributed between Vietnam, Laos and Cambodia.

IV. EXPENSES USED FOR THE PROGRAM

1. Funding for the implementation of activities in the national program on tiger conservation will be mainstreamed in the regular budget for activities in forest protection and management, nature conservation, prevention of illicit trafficking of wildlife; plan on protection and development in stage 2011 - 2020; communications and other current programs related to the development of buffer of special-use forests.

2. The ministries, ministerial-level agencies, agencies of the Government and the civil societies organizations shall ensure funds for the implementation of programs, projects and tasks for

biodiversity conservation, environmental protection, forest management and protection, conservation of endangered and rare species, rare from regular state budget under annual plans.

3. People's Committees of centrally administered provinces and cities shall ensure funds from local budgets to implement projects and tasks used for activities within the scope of local management related to nature conservation and management of conservation areas.

4. To encourage and mobilize extra-budgetary funds, financial and technical support from the international community to develop and implement the contents of this program.

V. METHOD OF IMPLEMENTATION

Some main solutions as follows are implemented to achieve the objectives of the program:

1. Planning Solutions

a) Planning on priority areas for tiger conservation is incorporated with the planning of special-use forest system approved by the Prime Minister in Decision No. 218/QD-TTg dated February 7, 2014 approving management strategy on special use forest system, marine protected areas, inland water conservation areas by 2020, vision 2030;

b) Period 2014 - 2017: Reviewing the SUF planning for species conservation that identifies priorities given to conservation and restoration of tigers in nature with an estimated area of 500,000 ha;

c) Period 2017 - 2022: On the basis of evaluating the effectiveness of planning in the previous period, make the adjustment of habitat planning for tiger conservation in line with the reality.

2. Policy mechanism solution

a) To develop and issue technical guidelines, regulations and standards of tiger feeding for non-commercial purposes;

b) Period 2014 - 2017: To review, add, modify and complete the policy to attract financial resources, technical assistance to implement the program;

c) Period 2017 - 2022: To continue to review and evaluate the implementation of nature conservation policy; to supplement, amend it in accordance with the actual implementation in previous period.

3. Solution to mobilize resources

a) To complete the mechanism and enhance coordination between ministries, departments, agencies and local authorities in the implementation of the program, focusing on fighting, preventing and strictly punishing violations of legislation on management and conservation of endangered and rare wildlife;

b) To perform the integration of contents of the program on the strategies, plans, projects, planning schemes on development of industries at central and local levels;

c) To strengthen the capacity of management and law enforcement on the conservation and protection of tigers and their prey;

d) To ensure appropriate funding for the management and protection of tigers, focusing on investment in tiger conservation in the wildlife, fighting, preventing illegal hunting, trafficking and consumption of tiger;

đ) To create a convenient mechanism for organizations, individuals in and outside Vietnam to invest, transfer of technology for the management and conservation of tigers;

e) To suggest and apply new financial mechanisms in accordance with the requirement to invest and support the management and conservation of tigers and their prey.

4. Science and technology solution

a) To give priority to execute the research, transfer and application of advanced science and technology solutions for management, protection and supervision of tigers, tiger prey and ecological processes;

b) To encourage innovation, scientific and technological solutions in water management, conservation and protection of tigers and their prey.
5. Solution to propaganda, education and awareness rising in the society in implementation of the program.

a) To implement the communications program on tiger conservation, integrated with advocacy and dissemination of legal texts on conservation of

nature and endangered and rare species;

b) To organize training courses on media for stakeholders, encourage community involvement in education, propaganda of tiger conservation

6. To strengthen international cooperation on tiger conservation.

a) Based on the contents of the program, related local agencies should strengthen cooperation with other countries, especially those with shared borders to enhance effective control of smuggling tiger across borders;

b) To actively participate in and implement international agreements, the mechanism of regional cooperation, the bilateral cooperation related to the management and protection of tigers;

c) To diversify forms of bilateral and multilateral cooperation with countries, international and regional organizations in management and protection of tigers.

Article 2. Implementation

1. Ministry of Agriculture and Rural Development shall be assigned to establish the Steering Committee for implementation of the program with the participation of ministries, departments, branches and People's Committees of the provinces concerned. It shall organize and guide the implementation of the program; chair and coordinate with ministries, branches and localities in effectively implementing the contents of the program, sending annual report to the Prime Minister.

2. Ministry of Planning and Investment shall balance investment fund in accordance with the annual plan for implementation of the program.

3. Ministry of Finance shall guide the mechanism of allocation, management of use, funding the implementation of projects under the provisions of the Law on the State Budget; directing the Customs force, in close collaboration with the relevant agencies to strengthen inspection and control of trade, transport, export or import of illegal tiger specimens.

4. The Ministry of Natural Resources and Environment shall cooperate with Ministry of Agriculture and Rural Development and relevant ministries and departments to perform planning, dissemination of biodiversity conservation and other related activities according to functions and assigned tasks.

5. Ministry of Public Security shall strengthen measures to prevent and combat criminal violations of the law on protection of tigers and other wildlife species protected by law; promote the investigation, detection and definitely handle the illegal trafficking and transportation of tigers and their prey; enhancing coordination, information exchange with international cooperation in the investigation and handling of cases of cross-border trade of tiger specimens and species of animals and other endangered wildlife.

6. Ministry of Health shall research, identify and encourage the use of alternative products for tiger products and protected species in traditional medicine; issuing written guidance to manage and direct the non-use and prohibition of advertisements of species protected by law in disease prevention and treatment by traditional medical.

7. Ministry of Industry and Trade shall direct market management to closely coordinate with relevant agencies in order to strengthen the inspection and control of illegal trade, transport, export or import of tiger specimens.

8. Ministries, ministerial-level agencies, government agencies, boards, branches and People's Committees of provinces and cities directly under the central government, based on the program, build and implement activities of their ministries, branches and localities.

Article 3. This Decision takes effect from the date of signing.

Ministers, heads of ministerial-level agencies, heads of agencies of the government, Chairman of People's Committees of provinces and cities directly under the Central Government, heads of agencies and relevant organizations shall implement this Decision.

Recipients
- Secretary of the Party Central Committee;

- Prime Minister, Deputy Prime Ministers;
- Ministries, ministerial-level agencies, Government agencies;

- People's Committees of provinces and cities directly under the Central Government

- Ethnicity Council and Committees of National Assembly;
- Central Office and the Committees of the Party;

- Office of the General Secretary;

- Office of the President;

- National Assembly Office;

- Supreme People's Court;

- Supreme People's Procuracy;

- National Financial Supervision Committee;

- State Auditor;

- Bank for Social Policies;

- Vietnam Development Bank;

- Central Committee of the Vietnam Fatherland Front;

- Central offices of the unions;

- Office: Chairman, Deputy Chairmen, Assistant to Prime Minister, CEO of e-payment gateway, departments, subordinate units, gazette;

- Archive: office, KTN (3b).

FOR THE PRIME MINISTER
DEPUTY PRIME MINISTER