

BI-MONTHLY OUTREACH JOURNAL OF NATIONAL TIGER CONSERVATION AUTHORITY

GOVERNMENT OF INDIA

s t r i p e s

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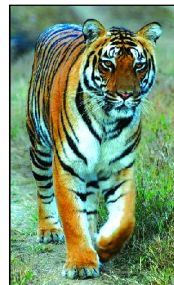


LANDMARKS



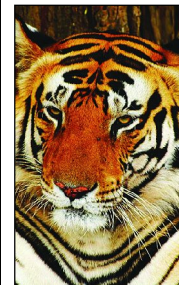
STRATEGIES

EVALUATION



ACHIEVEMENTS

PERSPECTIVES



INITIATIVES

STAFF POSITION IN TIGER RESERVES

All Figures In Nos.

Tiger Reserve	SANCTIONED POST				EXISTING POSITION OF STAFF				VACANT POSTS				
	FR	DR	FG	Total	FR	DR	FG	Total	FR	DR	FG	Total	
Dampa	2	2	10	15	2	0	7	12	0	2	3	3	8
Dudhwa	18	17	86	196	18	14	69	135	0	3	17	61	81
Corbett	19	15	65	219	7	8	76	115	12	7	+11	104	112
NSTR*	15	10	34	169	10	9	29	153	5	1	5	16	27
Ranthambore	8	5	52	164	4	3	47	149	4	2	5	15	26
Sariska	4	4	17	103	2	1	13	97	2	3	4	6	15
Nameri	4	3	31	44	3	3	14	46	1	0	17	+2	16
Kaziranga	7	7	45	212	5	6	38	203	2	1	7	9	19
Manas	3	4	31	165	5	3	36	187	+2	1	+5	+22	+28
Bhadra	4	0	17	38	3	0	15	23	1	0	2	15	18
Nagarhole	9	0	33	106	8	0	31	70	1	0	2	36	39
Dandeli Anshi	5	-	21	60	5	-	18	44	0	-	3	16	19
Bandipur	14	0	41	188	12	0	29	125	2	0	12	63	77
BRT**	6	-	18	63	6	-	16	52	0	-	2	11	13
Tadoba	5	-	11	56	5	-	10	54	0	-	1	2	3
Melghat	22	0	93	277	17	0	90	219	5	0	3	58	66
Pench (Maha)	3	-	7	50	2	-	5	46	1	-	2	4	7
Sahyadri	3	0	4	22	3	0	4	20	0	0	0	2	2
Anamalai	11	0	45	88	11	0	14	63	0	0	31	25	56
KMTR***	12	-	13	38	12	-	8	33	0	-	5	5	10
Mudumalai	9	0	11	39	8	0	10	31	1	0	1	8	10
Parambikulam	4	-	20	43	4	-	19	38	0	-	1	5	6
Periyar	8	3	37	141	8	2	35	121	0	1	2	20	23
Achanakmar	5	6	15	104	5	6	15	47	0	0	0	57	57
Indravati	5	6	9	88	3	3	11	19	2	3	+2	69	72
Udanti-Sitanadi	5	10	16	98	5	5	14	55	0	5	2	43	50
Sunderban	10	23	-	96	6	18	-	50	4	5	-	46	55
Buxa	24	74	-	233	22	55	-	185	2	19	-	48	89
Palamau	9	-	29	175	8	-	22	39	1	-	7	136	144
Valmiki	10	0	20	77	9	0	11	58	1	0	9	19	29
Simlipal	24	14	75	182	21	1	53	130	3	13	22	52	90
Satkosia	13	6	46	107	8	2	33	71	5	4	13	36	58
Namdapha	4	0	8	24	3	1	9	16	1	+1	+1	8	7
Pakke	4	1	10	17	2	1	6	7	2	0	4	10	16
Bandhavgarh	9	7	25	85	7	7	21	53	2	0	4	32	38
Kanha	19	20	60	209	11	19	35	173	8	1	25	36	70
Satpura	12	16	58	183	9	13	49	102	3	3	9	81	96
Sanjay Dubri	7	4	19	65	4	2	9	45	3	2	10	20	35
Pench (MP)	9	7	35	70	7	9	21	54	2	+2	14	16	30
Panna	12	4	23	95	10	4	27	73	2	0	+4	22	20

Forest Range Officer
Deputy Ranger

Forester
Forest Guard

* Nagarjuna Sagar ** Biligiri Ranganathaswamy Temple *** Kalakkad Mundanthurai





Messages

Minister
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EDITOR
Dr Rajesh Gopal

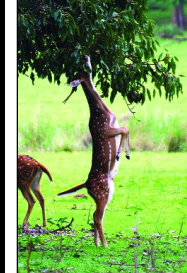
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n o t e f r o m t h e e d i t o r



SEVERAL important updates mark this issue. The independent 'Management Effectiveness Evaluation' (MEE) of tiger reserves was released on 28th July, 2011, based on refined criteria. The framework for this assessment is a globally used one, as adapted to our conditions. Five independent teams for evaluation conducted the assessment using 30 indicators. The 39 tiger reserves have been grouped in landscape clusters similar to the country level tiger assessment. An additional category comprising tiger reserves in the 'red corridor' has been included, besides a separate category for the two reserves where tigers became 'locally extinct'.

Twenty-eight tiger reserves have also been compared with the MEE ratings of 2005-06 and it indicates an overall managerial improvement. The tiger reserves in the 'red corridor' require special measures.

A detailed status report on the Shivalik landscape

emerging from the country level assessment of 2010 has been presented, highlighting the extent and abundance of tiger population, corridor connectivity and conservation needs.

During the 61st meeting of the CITES Standing Committee in August, 2011 our delegation urged the tiger range countries for strict compliance of earlier decisions of the CITES to end all trade in tiger and other Asian big cat body parts and derivatives. The need for sharing information on big cat body part seizures, mortality was also emphasized, besides tiger status assessment on a scientific basis.

India also participated in the workshop on criteria and indicators for monitoring the 'Global Tiger Recovery Plan', held under the aegis of the Global Tiger Initiative.

Dr Rajesh Gopal
Member-Secretary, NTCA



Message from the Minister

On Release Of The Report On Management Effectiveness Evaluation (MEE) of Tiger Reserves (2010-11)

The Management Effectiveness Evaluation (MEE) process is a global framework to evaluate the performance of protected areas. I am happy to note, that India is among the select countries in the world that has institutionalised the MEE process for its network of protected areas.



India has not only independently assessed the effectiveness of 28 tiger reserves in 2005-2006, but has taken this process forward, by extending this evaluation in 2010-11 to all 39 tiger reserves. The outcomes of this assessment are encouraging and despite all odds, our park managers and front-line staff are putting up a valiant effort to conserve our natural heritage.

I understand that better protection is required for the five tiger reserves located in the 'Red Corridor'. This is a daunting task, and I urge all sections of society to cooperate with us and support our forest and field staff.

I hope that field managers, across all parks closely monitor the performance of the 30 'headline indicators' tailored around the conservation needs of India, to ensure the long-term conservation of our magnificent tigers



and the biological diversity that tiger reserves harbour.

I take this opportunity to compliment the National Tiger Conservation Authority (NTCA), Wildlife Institute of India (WII),

Chief Wildlife Wardens of all Tiger Range States and above all the park managers and the front-line staff for their valuable contribution in securing the conservation of our national animal.

■ [Report On Management Effectiveness Evaluation In TRs On P 6](#)

From The Minister On Release Of The Detailed Report On All-India Tiger Estimate Report (2010)

Tiger conservation in the contemporary era has attracted much global attention due to the highly endangered status of the tiger. A combination of factors, such as habitat shrinkage, decline in prey species, poaching for medicinal and cultural value and the ever-expanding human population, are direct threats faced by tigers. Given that India has the maximum number of tigers and its source areas among the Tiger Range Countries, it is the responsibility of the country and its people to ensure its survival.

'Status of the Tiger, Co-Predators and Prey in India, 2010', is a countrywide assessment of tiger and its prey along with the habitat quality across all tiger landscapes of the country. This study has been structured by data obtained through extensive, unprecedented effort, contributed by the Forest Departments, wildlife biologists and non-governmental organisations across all forested habitats of the 17 tiger states of India. Latest advances in science such as remotely triggered cameras to photograph tigers, landscape applications such as remote sensing and Geographical Information System and other computer software have been used to analyse the data and obtain results. Based on these results, appropriate suggestions have been made for conservation of tigers and their habitat. All important forest corridors that allow movement of tigers across larger landscapes have also been identified.

Altogether, this study presents the much needed information to



This study has been structured by data obtained through extensive effort, contributed by the Forest Depts, wildlife biologists and NGOs across all forested habitats of the 17 tiger states of India

■ Outcome Of The All-India Tiger Estimate On P 8

policy makers, conservationists and academia on important tiger populations in India, size of landscape occupied by them and the important corridors needed for their long-term survival.

This is a truly commendable effort towards Science based monitoring of tigers and will be of immense help in assisting formulation of conservation policy and management strate-

gies for effective conservation of the species and the biota that they represent for future generations of Indians and the world community.

(Jayanthi Natarajan)

Tiger

MEE-TR

Management Effectiveness Evaluation In Tiger Reserves

Subhash Mishra



MANAGEMENT Effectiveness Evaluation (MEE) is the assessment of how well protected areas are being managed and their effectiveness in conserving target flora and fauna. From June, 2010 to July, 2011 the National Tiger Conservation Authority (NTCA) in partnership with the Wildlife Institute of India

(WII) undertook an independent MEE of India's 39 tiger reserves.

SALIENT FEATURES

- Evaluation was done by adapting a globally used framework that is used in more than 140 countries in the world
- All 39 tiger reserves in the country evaluated, including the five in 'Red Corridor'

■ Five independent teams conducted the evaluation.

■ Thirty headline indicators, developed especially for India

FRAMEWORK

The framework consists of six elements viz. context, planning, inputs, process, outputs and outcomes; each of them has a precise focus of evaluation. This frame-

work assesses the importance of each tiger reserve for conservation in the face of current threats to the species.

For this, the resources used for the successful implementation of programmes that meet management objectives are evaluated for measurable results of their effectiveness and relevance.

The major elements of the evaluation framework include parameters such as:

- ◆ Vulnerability of tiger populations within
- ◆ Protected area design, management planning
- ◆ Suitability of these plans in the context of the major threats

RESULTS

The 39 tiger reserves in 17 States were grouped into the same Landscape Clusters as the tiger estimation exercise, with the addition of the category 'Red Corridor'. The five clusters had an overall MEE of 65%.

Arranged in descending percentages, the landscape MEE scores:

- Central India-Eastern Ghats Landscape: 79
- Western Ghats Landscape: 75
- The North East Hills, Brahmaputra Flood Plain and Sundarbans: 66
- Shivalik Gangetic Plains and Eastern Ghats Landscape: 64
- 'Red Corridor': 42

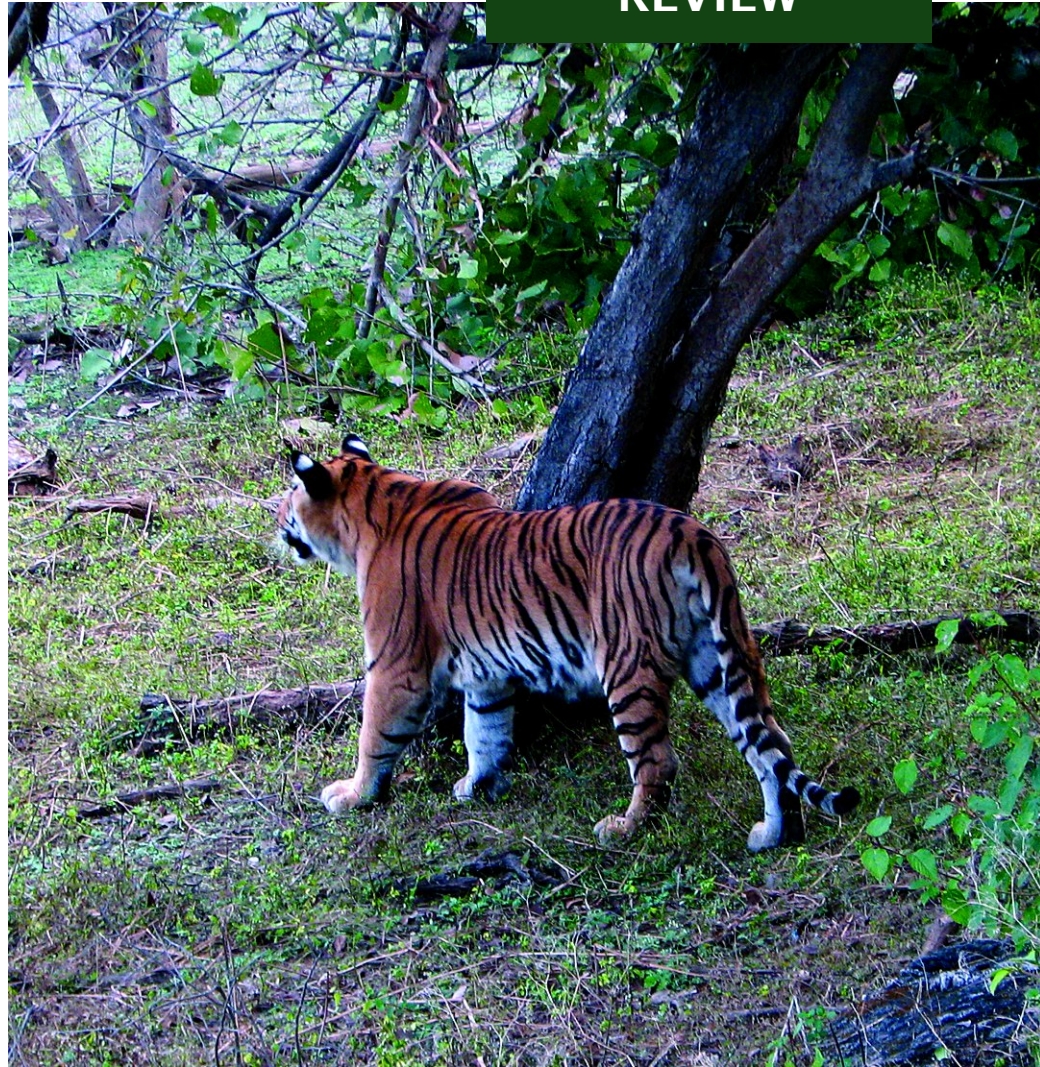
COMPARISON WITH 2005-06

The MEE ratings of 2010-11 and 2005-06 have been compared for 28 tiger reserves, which were also part of 2005-06 evaluation:

- ◆ Very good: Increased by 4%
- ◆ Good: Increased by 3%
- ◆ Satisfactory: Decreased by 7%
- ◆ Poor: Status quo

NEW FINDINGS

- Four percent increase in Very Good Category.
- Reserves such as Panna which lost all its tigers performing well.
- The MEE Assessment 2010-11 indicates most tiger reserves have



complied with statutory requirements such as declaration of buffer zone, tiger conservation plans and have carried out a good assessment of their threats.

- Better trained manpower required to decrease biotic interferences in the core area.
- Better information dissemination of the public required.
- Better participation by stakeholders required.

THE WAY AHEAD

The 2010-11 Management Effectiveness Evaluation indicates an improvement in the overall management of tiger reserves. The five tiger reserves in the 'Red Corridor' require special measures to deal with their current situation. The NTCA in collaboration with WII and Zoological Society of

London (ZSL) has developed a "Monitoring System for Tigers — Intensive Patrolling and Ecological Status" (M-STripES) for managers to assess the status of protection, ecological and biotic pressures and when adaptive management is necessary. The M-STripES would inter-alia provide quantitative data/information which could be used in MEE process.

The M-STripES needs to be pilot tested and then implemented in all tiger reserves. The recommendations for all 39 tiger reserves contained in MEE Report 2011 will have to be speedily implemented. The Tiger Conservation Plans (TCPs) and Annual Plan of Operations (APOs) will have to factor in these results, to enhance the management effectiveness of tiger reserves.

The Status of Tigers, Co-Predators and Prey in India, 2010, synthesizes the results of the second countrywide assessment of the status of tigers, co-predators and their prey in India. The first assessment was done in 2006 and its results subsequently helped shape the current policy and management of tiger landscapes in India.

The current report is based on data collected in 2009-2010 across all forested habitats of 17 tiger States of India with an unprecedented effort of about 477,000 man days by forest staff, and 37,000 man days by professional biologists. The results provide spatial occupancy, population limits, and abundance of tigers, habitat condition and connectivity. This information is crucial for incorporating conservation objectives into land use planning across landscapes so as to ensure the long term survival of free ranging tigers which serve as an umbrella species for the conservation of forest biodiversity. The study reports a countrywide increase of 20% in tiger numbers but a decline of 12.6% in tiger occupancy from connecting habitats.

The Shivalik Hills and Gangetic Plain Landscape had about 20,800 sqkm of potential tiger habitat on the Indian side. The landscape is characterized by the ability to sustain high density of tigers at landscape scales and therefore conservation investments here, pay dividends. In 2010, tigers occupied 6,712 sqkm of forested habitats with an estimated population of 353 (320 to 388) in five separate populations. These were Rajaji and Corbett in Uttarakhand, Dudhwa-Pilibhit and Suhelwa in Uttar Pradesh, and Valmiki in Bihar.

In comparison to 2006, this landscape showed an increase of

Shivalik landscape

Outcome Of The All India Tiger Estimate (2010)



Besides the sand and timber mafia, pressure of urbanisation on forests is a threat to tigers here

30% in area occupancy by tigers and a population increase of 19%. The most important tiger population within this landscape was Corbett having tiger presence in 2,287 sqkm with an estimated population of 214 (190-239). Rajaji was the only Reserve performing below its potential for tigers and requires thoughtful managerial interventions. Several

less protected forests like Ramnagar and Pilibhit recorded good tiger populations that could even rival some tiger reserves. This landscape has contiguous habitat connectivity from Kalesar in Haryana to Kishanpur in Uttar Pradesh. The habitat corridor across the Ganga, between the townships of Rishikesh and Raiwala is almost defunct,



causing a near extinction event of tigers in the vast landscape west of the Ganga. The Rajaji-Corbett habitat linkage is vital for tiger survival in the western part of this landscape. The Dudhwa-Valmiki landscape is now connected only via Nepal forests, and needs to be managed through cooperation with Nepal. Tiger populations of Corbett and Ramnagar currently form a single unit, but connectivity between these habitats is threatened by development along the Ramnagar-Ranikhet highway. Urgent intervention is required to legally secure the remaining two corridors between Corbett and Ramnagar. Important but more tenuous corridors that require attention area) those across the Gola river near Haldwani, Khatima-Surai Range into Pilibhit, b) corridors connecting Kishanpur, Dudhwa National Park and Katarniaghat (units within Dudhwa Tiger Reserve) and, c) Dudhwa Tiger Reserve with the adjoining National Parks and National Forests of Nepal. Valmiki and Chitwan National Parks need to be managed as one tiger population through cooperation with Nepal.

The Terai Arc Landscape (TAL) is located in the Himalayan and the Gangetic Plains bio-geographic zones and includes the regions

of the western Himalayas, upper Gangetic plains and lower Gangetic plains (Rodgers and Panwar 1988). While the Yamuna river (30°30' to 77°30') marks its western limit and the Gandak river (27°15' to 84°45') bounds it on the east, tiger occupancy until as recently as 2004 has also been recorded from areas further westwards in Kalesar Wildlife Sanctuary in Haryana and Simbalbara Wildlife Sanctuary in Himachal Pradesh (Johnsingh et al. 2004). This landscape traverses across the political boundaries of Uttarakhand, Uttar Pradesh and Bihar covering an area of 900km from east to west with a width of 50-60km. The total area occupied by this zone is approximately 42,700 sqkm of which 15,000 sqkm is forested (Johnsingh et al. 2004) and includes three important Tiger Reserves, viz. Corbett, Dudhwa and Valmiki. Several other protected areas lie within this zone under the administration of 20 Forest Divisions.

The TAL in India can be divided into two parts: area between the Yamuna and Sharda rivers and the area east of the Sharda. Most of the TAL between Yamuna and Sharda lies in the bhabar tracts and has about 36% forest cover with relatively low human density (334/sqkm) (Johnsingh et

al. 2004). This region comprises the Rajaji National Park and the Corbett Tiger Reserve which is also located around the largest Tiger Habitat Block (THB) of 4000 sqkm (Johnsingh et al. 2004) with an estimated tiger population in 2006 of 164 in and around Corbett Tiger Reserve alone (Jhala et al. 2008).

The area to the east of the Sharda is characterised by intensive agriculture, high human densities (436/ sqkm) and low forest cover (17%) (Johnsingh et al. 2004). The Protected Areas within this zone comprising two Tiger Reserves, namely, Dudhwa and Valmiki, lack connectivity and experts predict local extinction of the tiger from isolated pockets like Sohagibarwa Wildlife Sanctuary.

In 1927, F W Champion listed 32 species of mammals from the Lansdowne Forest Division of this zone of which the blackbuck and the four-horned antelope no longer exist.

With specific focus on the tiger, research conducted in this zone has laid the foundations for most tiger studies conducted elsewhere in the Indian sub-continent in contemporary times.

Chitwan National Park in Nepal, which is contiguous with the Valmiki Tiger Reserve, became the site for the first

long-term study on the tiger in 1973 with funding from the Smithsonian Institution and WWF.

CONSERVATION SIGNIFICANCE

The terai-duar savannah of the TAL has been recognised as one of the 200 globally important eco-regions for its intact large mammal assemblages (Olson and Dinerstein 1998). Johnsingh et al. (2004) identified nine Tiger Habitat Blocks in this region as disjunct forest blocks with varying tiger populations. These THBs possibly formed a continuum of forests with tigers and their prey until recent times when anthropogenic disturbances and reclamation of land for agriculture disrupted the forest continuity, leaving them connected by means of 13 narrow corridors (Johnsingh et al. 2004). However, this area still holds the key to long-term tiger conservation by hosting two of the important level 1 tiger conservation units, namely, Rajaji-Corbett and Chitwan-Parsa-Valmiki along with some level 2 tiger conservation

units (Wikramanayake et al. 1998). Studies indicate that this landscape complex has 20,800 sqkm of tiger habitat on the Indian side even today (Qureshi et al. 2006).

Currently, the distribution of tigers in this zone is patchy with high variations in the frequency of occurrence (Johnsingh 2006b) even though this zone contains the single largest contiguous terai patch comprising of Pilibhit, Suklaphanta, Kishanpur, Dudhwa, Bardia and Katarniaghat forests.

More importantly, most of the TAL forests in India are connected with the terai zones of Nepal. Since key parts of this complex are in Nepal and Bhutan, transboundary cooperation is essential for effective tiger conservation (Qureshi et al. 2006).

In 1927, F W Champion listed 32 species of mammals from the Lansdowne Forest Division of this zone of which the blackbuck and the four-horned antelope no longer exist.

As of today, this region hosts five species of cervids -chital

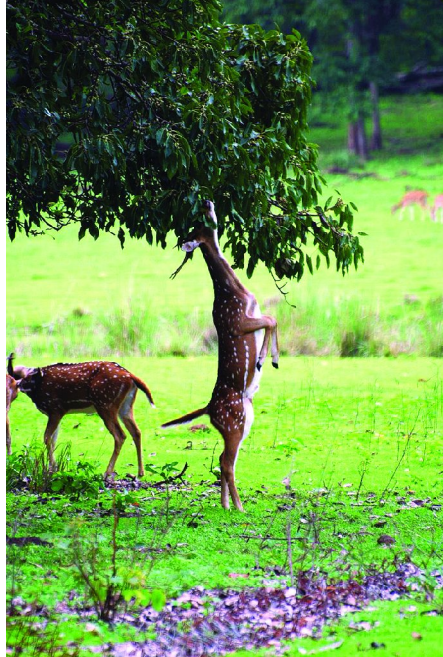
(*Axis axis*), sambar (*Rusa unicolor*), muntjac (*Muntiacus muntjak*), hog deer (*Axis porcinus*) and the swamp deer (*Rucervus duvaucelii*); three antelope species — nilgai (*Boselaphus tragocamelus*), blackbuck (*Antelope cervicapra*) and four-horned antelope (*Tetracerus quadricornis*); and other ungulates like the Asian elephant (*Elephas maximus*), one horned rhinoceros (*Rhinoceros unicornis*) (re-introduced in Dudhwa), wild pig (*Sus scrofa*) and rare species like the hispid hare (*Caprolagus hispidus*).

Amongst large carnivores, leopard (*Panthera pardus*), tiger (*Panthera tigris*), wild dog (*Cuon alpinus*), hyena (*Hyaena hyaena*), the Asiatic black bear (*Ursus thibetanus*) and the sloth bear (*Melursus ursinus*) are found in this zone. Goral (*Naemorhedus goral*) and serow (*Capricornis thar*) can also be found on the slopes of the Shivaliks in this area.

The avifaunal diversity of this region is also vast with Sharma et al. (unpublished data) reporting



549 species of birds from Corbett Tiger Reserve and Pandey et al. (1994) reporting 312 species of birds from Rajaji National Park alone. The Himalayan quail (*Ophrysia superciliosa*) represents a genus endemic to this region but has not been sighted with certainty since 1876. A small section of the Western Himalaya Endemic Bird Area (EBA) falls within this zone and has 11 species restricted to it, though most are birds found in higher elevations. Amongst the rare and endangered birds, the two that stand-out are the Bengal florican (*Houbaropsis bengalensis*) and the swamp francolin (*Francolinus gularis*).



This region hosts five species of cervids: chital, sambar, barking deer, hog deer & swamp deer

CONSERVATION STATUS

Jhala et al. (2008) identified six separate populations of tigers in Shivalik landscape which has been considered an important zone for tiger conservation with a genetically distinct population of tigers (Sharma et al. 2010a). The importance of connecting large tracts of this landscape has been emphasised with the aim of securing a single metapopulation of tigers between Nepal and Indian terai (Wikramanayake et al. 2004; Dinerstein et al. 2007) with as little as \$25 being invested per square kilometre with help from public and private sectors (Dinerstein et al. 2007).

The tiger occupancy zone from Kalesar in Haryana to Kishanpur in Uttar Pradesh has been identified as the most promising unit for long-term tiger conservation in this zone which has already lost tigers from 29% districts where they were historically located. Trans-boundary cooperation would be required to ensure that Protected Areas such as Dudhwa, Sohagibarwa and Valmiki remain connected through the forests of Churia Hills and Protected Areas in Nepal which include Suklaphanta, Bardia and Chitwan for long-term

persistence of the species in this landscape.

Some potential threats to tigers in this landscape include high dependence of local communities on forest resources, lack of connectivity between forest patches, presence of timber and sand mafia, encroachment of urbanisation into forested landscapes along with evidences of tiger and prey poaching (Johnsingh 2006a). In the period 2000-10, 62 tiger bone and other part seizures were made in states which include the Shivalik hills and the Gangetic plain landscape (WWF 2007). Whether all these tigers were killed within this landscape would require further investigation, albeit it does throw light on the presence of criminal activities detrimental to tigers and their prey in the region.

Shivalik hills and the Gangetic plain landscape in contemporary times is an island complex with increasing levels of human-animal conflict, primarily involving large mammalian species such as tigers, leopards and elephants. Almost 90% of the original terai is under intensive agriculture or urbanisation leaving little space for wildlife.

Floods, which used to be an

important character of this landscape, are being controlled extensively through creation of large dams and by changing river courses. However, little thought is ever put into understanding the role of such floods that shape the grassland ecosystems in the terai which further sustain grassland suited species such as the rhinoceros, swamp deer and the Bengal florican.

With regulated intensity and reduced flexibility of river waters in the monsoon, the shifting mosaics of woodland-grassland and their interplay have long ceased to exist, threatening the existence of many grassland specialists in this region.

TIGER OCCUPANCY

In this landscape, 318 (10X10 km) grids within potential tiger habitat, below the elevation of 2500 feet, were surveyed. Tiger signs were detected in 132 of these grids, resulting in a naive occupancy estimate of 41.5%. Of the total available tiger habitat covering 15,973 sqkm in these grids, 7,330 sqkm constituting 46% of the total habitat, was occupied by tigers.

The null occupancy model (corrected for imperfect detections, with no covariates) provided an occupancy estimate of 44 (se 2.9) % with a detection probability of 40%. The best model for tiger occupancy and tiger abundance index for detection probability incorporated the following covariates:

- Prey availability indexed by ungulate encounter rates on transects and dung density

- Landscape features indexed by NDVI, elevation, terrain ruggedness, forested area, area of core habitat, and distance of the grid from a Protected Area

- Human disturbance variables indexed by road density and distance from night lights.

The delta AIC for the top two models was less than two.

Therefore, we used the model averaged coefficients, based on AIC weights of these two models to estimate parameters.

The tiger occupancy estimate from the model averaged coefficients was 43.1 (1.9).

There was better support for detection probability being a function of tiger abundance ($p = 0.546$ (se 0.001) in comparison to models incorporating survey spe-

30 (proportional to the amount of tiger habitat in a grid) the increment in tiger occupancy (from 41.5% naive estimate to 43.1 (se 1.8) best model estimates) by incorporating imperfect detections and covariates was marginal. However, the coefficients of covariates used in the models provided good insight into factors that influence tiger occupancy in this landscape. The

TIGER POPULATION EXTENTS AND ABUNDANCE

Mark-recapture population and density estimates of tigers based on camera-trapping were obtained for Rajaji (Chilla) National Park, Corbett Tiger Reserve, Ramnagar Forest Division, Pilibhit Forest Division, Katerniaghat Wildlife Sanctuary, Kishanpur Wildlife Sanctuary, Dudhwa Tiger Reserve and Valmiki Tiger Reserve. Tiger densities in the Shivalik hills and the Gangetic plain ranged between 3 to 17.4 tigers per 100 sqkm. After joining contiguous grids with tiger presence, five tiger populations were identified within the Shivalik hills and the Gangetic plain landscape.

These include:

- The western most population of tigers in Rajaji National Park having tiger occupancy in about 736 sqkm with an estimated population size of between 8-15 individuals

- The single largest tiger population in the landscape around Corbett Tiger Reserve with occupancy of about 2,200 sqkm and an estimated population between 190 to 239 individuals

- The Dudhwa-Kheri-Pilibhit tiger population with occupancy in about 2,110 km² with an estimated tiger population between 106-118 individuals

- The small population in Suhelwa (around 5 individuals) shared with Mahadevpuri- Lamahi forests of Nepal with an occupancy of 441 sqkm

- The Valmiki-Chitwan continuum spanning parts of India and Nepal with 850 sqkm tiger occupancy on the Indian side with 8-10 individuals and a weak connectivity to Sohagibarwa.



cific variation or a constant detection of signs across surveys. With this high detection probability and number of surveys (5 kilometre spatially independent walks) ranging from 3 to

occupancy probability of a grid habitat can be interpreted as a quantitative estimate of habitat suitability for tigers and was a useful tool for mapping source and corridor habitats (Fig. 1.1).

CORRIDORS, CONNECTIVITY & CONSERVATION

This landscape has the potential to have contiguous tiger occupancy from eastern parts of Himachal Pradesh to Kishanpur (UP). From

Kishanpur eastward a tenuous connectivity is still maintained through the forests in Nepal (Suklaphanta, Bardia-Khata corridor, Chitwan National Park) from Dudhwa to Valmiki Tiger Reserve. Within this landscape three major source populations occur with two in India. These are:

■ **The Corbett population** comprises Corbett National Park, Sonanadi Wildlife Sanctuary, Lansdowne Forest Division, Ramnagar Forest Division, and Haldwani Forest Division. The high tiger population density in this region is restricted to parts of the Corbett Tiger Reserve. However, the population outside of the Tiger Reserve is also of great significance with Ramnagar Forest Division having a density of 14 tigers per 100 sqkm and evidences of breeding individuals. This large population of tigers is an indication of good forest health in terms of ungulate prey and cover resulting out of good management practices. The Corbett tiger population serves as a source from where tigers are likely to disperse both westward as well as eastward to maintain the populations in Rajaji and Pilibhit. Due to its size and extent, this single population has a high chance of long-term persistence and thus should be the conservation priority in this landscape.

■ **The Dudhwa-Kheri-Pilibhit tiger population** comprises Pilibhit, Kishanpur, Dudhwa and Katarniaghat in India and Suklaphanta and Bardia in Nepal. This source population, though fragmented into smaller units, probably still shares a common gene-pool and occasionally exchanges individuals through the tenuous habitat corridors and stepping stone connectivity that exists between them. The densities range between 4-7 tigers per 100 km² and though not as high as those in Corbett, on the Indian side the population is over a 100 adult tigers. Considering the



Large population of tigers is an indicator of good forest health in terms of ungulate prey and cover

Nepal (Suklaphanta and Bardia National Park) population, the total number of tigers in this source would be over 125 adults. The landscape of this population is fraught with conflict as the lands surrounding the Reserves are very fertile, supporting intensive agriculture and sustaining high human population densities.

Conserving tigers in such volatile landscapes is a difficult task and mitigation of conflict in an effective and timely manner is vital. Major conservation investment is required to secure the poor corridor connectivity between the high density sub-populations of this source.

■ **The Chitwan (Nepal)-Valmiki population** has its source population in Chitwan National Park of Nepal. Together with Valmiki which is an extension of the Chitwan Forests (Churia hills) into the Shivaliks of India, the adult tiger population is well over a 100 individuals. On the Indian side, Valmiki Tiger Reserve has the potential to sustain higher tiger densities by reducing human impacts including poaching of tiger prey in this landscape.

Covariates of tiger prey, habitat quality and extent and human pressures were used to model tiger occupancy. Thus, habitat suitability for tigers in the landscape can be determined from the occupancy.

The Circuitscape model output highlights potential connectivity between Protected Areas in this landscape. The least cost path analysis provides the optimal corridor between Protected Areas. Ideally these corridors should be declared as “eco-sensitive” and land use changes that are detrimental to their conservation value discouraged. Some of these corridors require restorative inputs for achieving their full corridor value in connecting wild gene pools.

Currently this least cost corridor analysis considers only the biological aspects to design the optimal corridor path.

Circuitscape results provide insights on potential alternative connectivity as well. Intensive site-specific ground validation is required to align the boundaries of the corridors suggested herein to maximise wildlife values and minimise impact on local economies.

India's Voice At CITES

The 61st meeting of the standing committee (SC61) of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) was convened in Geneva, Switzerland, from 15-19 August, 2011.

Approximately 300 participants attended the meeting, including committee members, observer parties, and inter- and non-governmental organisations. The committee proceeded swiftly through a complex agenda that included relationship with the UN Environment Programme (UNEP); CITES appendices; strategic matters; enforcement matters; trade and conservation issues in species including great apes, elephants, tigers, rhinos, sturgeons, ramin and bigleaf mahogany; and other issues on interpretation and implementation of the Convention.

SC61 agreed to a number of recommendations:

- Report on the Working Group on revising the agreement between the CITES SC and the Executive Director of UNEP
- Conducting a study on the rationale and histo-



ry of the rules applying to votes by secret ballot within CITES' Conference of Parties (CoP)

- Adoption of national laws for the implementation of the Convention
- Review of significant trade (RST); enforcement matters; elephant management and conservation and Asian big cats.

Several inter-sessional working groups were established to carry out work on access to finance; possible solutions to address the challenges encountered by trade in captive-bred or ranchered specimens; taxonomic serial numbers; further implementation of Decision 15.74 on revising Resolution Conf. 10.10 on trade in elephant specimens; livelihood issues related to snake and snake products trade; and rhinos.

These working groups are expected to report back to the next meeting of the standing committee in July 2012. **The Indian delegation was led by Jagadish Kishwan, ADG Wildlife, P R Sinha, Director Wildlife Institute of India and S P Yadav, DIG National Tiger Conservation Authority.**

ASIAN BIG CATS

INTERVENTION BY INDIA ON AGENDA ITEM NO. 41 OF THE 61ST MEETING OF THE STANDING COMMITTEE OF CITES

Mr Chairman,

India is strongly committed to tiger conservation, which is well known. In the recent past, the focused project for conserving tigers has expanded to 40 tiger reserves. This is a major achievement, considering the fact that the project started with only 9 reserves way back in 1973. The total area notified as the core zone of tiger reserves is around 32,578 sqkm, which is almost 1% of our country's geographical area. Besides, in compliance with our statutory requirement, the buffer areas around the core



have also been notified for 25 tiger reserves.

The last few years have been extremely important for wild tigers in India. Many milestone initiatives have been taken which complement the recommendations of the Tiger Task Force constituted by our National Board for Wildlife under the Chairmanship of our Hon'ble Prime Minister.

We have accorded 'in-principle' approval to our states for declaring 6 more tiger reserves, besides advising them for proposing another 6 areas, which are crucial as emanating from our national assessment of tiger habitat.

I wish to apprise the participants of the recent country-level assessment of tiger, co-predators, prey and their habitat, carried out once in every four years. This is

the second such assessment based on the refined methodology of double sampling in a mark recapture statistical framework. There is an increase of 20% in tiger numbers when compared to the 2006 assessment.

The current estimate stands at 1,706 with the lower and upper limits being 1,520 and 1,909; the 2006 estimation was 1,411 with the lower and upper values being 1,165 and 1,657. A unique feature of the recent assessment has been the involvement of expertise outside the Government system like the WWF, WTI, Aaranyak and CCMB.

There are six important tiger landscapes in our country and we have photo captures of as many as 635 unique tigers. We are in the process of complementing this massive effort with intensive reserve level monitoring in an ongoing manner using camera traps and distance sampling, while prescribing reserve specific statistical protocols. This would be launched in the coming months.

The second round of independent assessment of 'Management Effectiveness Evaluation' has also been carried out. The 30 headline indicators are the globally used ones, as refined to our situations. Out of 39 assessed tiger reserves, 15 are 'very good', 12 are 'good', 8 'satisfactory' while 4 remaining 'poor'. Compared to the 2006 assessment, there is an increase in the 'very good' as well as 'good' categories.

Protection has been accorded the topmost priority. We have provided funding support to four of our important reserves for raising, arming and deploying the 'Special Tiger Protection Force'. The process has been expedited in others and we



Tiger cannot be conserved by policing alone. Project Tiger has taught us the importance of community involvement. On an average 2.4 million man days are generated annually to involve local workforce in tiger protection. Several of our indigenous people are actively involved in supporting the cause, while deriving livelihood benefits

intend to extend this to 13 of our reserves at present.

Information technology has been used on a pilot basis by launching "e-Eye": electronic surveillance using long range thermal and infrared cameras on a 24x7 basis. The results are encouraging. This has been done with 100% support from Government of India at Corbett. We intend to extend this to other reserves as well.

We have focused on capacity building and have provided funding support to States to sharpen the skills of our frontline staff. The day-to-day patrolling protocol has also been refined in collaboration with the Wildlife Institute of India and Zoological Society of London.

Tiger cannot be conserved by policing alone. Project Tiger has taught us the importance of community involvement. I wish to inform the house that on an average 2.4 million man days are gen-

erated annually, supported by the Government to involve local workforce in tiger protection. It is noteworthy that several of our indigenous people are actively involved in supporting the cause, while deriving livelihood benefits.

To consolidate the source areas, the Project Tiger scheme has recently undergone a revision with scope for more funding support to make the core areas inviolate, besides stepping up the compensation to victims of wild carnivores. A decision has also been taken to reintroduce the extinct Cheetah in one of its historical ranges.

The National Tiger Conservation Authority has been decentralised with three regional offices covering the important tiger landscapes. The states are being supported to actively manage the tiger source areas with support for translocating tigers to favourable habitats having very few tigers.

We believe that conservation



cannot succeed without strict enforcement. The Wildlife Crime Control Bureau, a multidisciplinary organisation, has been active in this regard, besides interacting with other enforcement agencies.

There have been several intelligence-led enforcements and scientific investigations, based on the latest forensic tools, which have been useful in combating wildlife crime relating to tiger and other big cats.

Several notorious wildlife criminals have been prosecuted leading to their imprisonment. There have been many notable seizures. India is in a position to share this experience with other parties at the appropriate forum.

We have bilateral protocols on tiger conservation with Nepal and China and similar protocols are under consideration with Bhutan, Bangladesh and Myanmar.

We support initiatives like 'SAWEN'-South Asia Wildlife Enforcement Network, Tiger Range Countries and other organisations combating the wildlife crimes especially relating to the Asian big cats.

We have successfully launched

INTERVENTION BY THE GLOBAL TIGER FORUM

The Forum has involved itself with the Global Tiger Initiative (GTI) for monitoring the Global Tiger Recovery Program (GTRP) as endorsed by the Tiger Range Countries at St. Petersburg. This mandate has been provided to the Forum by the Tiger Range Countries and the GTI.

The Forum has also received a DGF grant of \$100,000 from the World Bank in this regard. There is a commitment from India to provide a grant of Rs 10 million to the Forum for assisting Nepal in tiger conservation.

The Global Tiger Forum urges the parties, especially Tiger Range Countries:

- ◆ For strict compliance of CITES decisions 14.69, 15.46 and Conf. Res. 12.5 (Rev COP 15), while ensuring urgent enforcement actions to end all trade in tiger and other Asian big cat body parts and derivatives
- ◆ To share information on seizures/trade/mortality
- ◆ To assess present status of tiger, co-predators, prey and habitat based on a scientific, statistically robust protocol.

online reporting of tiger mortality in association with 'TRAFFIC-India' and now all information relating to tiger mortality and seizures is available in the public domain on 'www.tigernet.nic.in'.

Our tiger conservation efforts cannot sustain without efforts and support at the international level.

We urge the Tiger Range Countries:

- ◆ For strict compliance of

CITES decisions 14.69, 15.46 and Conf. Res. 12.5 (Rev COP 15), while ensuring urgent enforcement actions to end all trade in tiger and other Asian big cat body parts and derivatives

- ◆ To share information on seizures/trade/mortality
- ◆ To assess present status of tiger, co-predators, prey and habitat based on a scientific, statistically robust protocol.

Workshop on criteria & indicators for monitoring of

Global Tiger Recovery Plan

The workshop of experts to develop criteria and indicators for monitoring of the Global Tiger Recovery Programme was organised by the Global Tiger Forum (GTF) in collaboration with the Global Tiger Initiative (GTI) and hosted by the government of Vietnam in Hanoi between 2-4 August 2011.

Keshav Verma, Programme Director of the Global Tiger Initiative (GTI) stated that the first long-term outcome of the workshop would be to develop criteria and indicators for monitoring of the global tiger recovery programme. The second long-term outcome will be a consensus of the Tiger Range Countries (TRCs) on conducting regular self-assessment of protected areas, management effectiveness, which is critical to achieving the TX2, because project areas support the source population for larger tiger area landscapes.

He stated that these outcomes would be achieved as there was such an incredible unity of purpose and commitment among the TRCs to the St Petersburg Declaration and the GTRP and that partners were ready to help.



INDIA'S NATIONAL TIGER RECOVERY PROGRAM PRIORITIES

- Securing habitats
- Anti-poaching activities
- Improving management
- Capacity building
- Scientific monitoring
- Community engagement and development

UNDER SECURING HABITATS

- Creating inviolate core - Village relocation
- Process is on for enhancement in the budget allocation
- Exclusive tiger agenda
- Monitoring involving independent experts/agency

- Initiatives for online monitoring of village relocation
- Supervisory visits done

ESTABLISHMENT OF NEW TIGER RESERVES

- Now 40 Tiger Reserves
- In-principle approval for six new Tiger Reserves
- Identified six more areas to create Tiger Reserves

ANTI-POACHING ACTIVITIES

- Creation, training and equipping of Special Tiger Protection Force (STPF)
- Sanctioned in 17 TRs
- Syllabus of training finalized
- Local workforce involved

- Committees constituted to analyse TCPs which includes reserve-specific Security Plan

IMPROVING MANAGEMENT Habitat improvement activities

- Improving water resource availability, soil-moisture works, fire lines, forest roads
- Funding support is being provided to 40 TRs
- TCP finalization

Monitoring and Evaluation

- Independent Management Effectiveness Evaluation (MEE) completed, reports released, placed in public domain
- Online reporting of tiger mortality in public domain



Delegates at the Hanoi meet on the Global Tiger Recovery Programme

(www.tigernet.nic.in)

- Details of country-level estimation based on scientifically robust methodology released, placed in public domain
- Decision taken for Intensive Annual Monitoring of important source population (Phase-IV) with the involvement of outside experts; to complement the country level estimation done once in 4 years

Launching of "M-STripES

- Capacity building training workshop organized
- Software customized, funding support provided to WII for implementation

Information Technology

- "e-Eye", an IT based surveillance successfully launched
- Studies on economic evaluations of tiger reserves approved

CAPACITY BUILDING

Improving infrastructure

- 3 regional Offices of NTCA created
- New posts of 4 IGF, 1 DIGF, 6 AIGF, 1 DD Finance created

Improving knowledge agenda

- Exchange of good practices and strengthening knowledge institutions
- Awards for best practices to Tiger Reserves
- Indian delegation visited

China in April 2011

- Russian delegation visited India in May 2011
- All India workshop of FDs — good practices conducted in May 2011

TIGER OCCUPIED LANDSCAPE COMPLEXES

- Tiger occupancy in about 81,800 sqkm
- Potential Habitat of about 300,000 sqkm
- Population estimate of Tiger: **1411 range 1165 to 1657(2008)**
1706 range 1520 to 1909(2010)

COMMUNITY ENGAGEMENT & DEVELOPMENT

Addressing Human-Wildlife Conflict

- Timely and adequate compensation for loss of human/cattle and damages due to crop depredation by wildlife
- Advisory issued for creation of "Rapid Response Teams"
- Funding support for states

Co-existence in buffer/fringe areas of tiger reserves and support for sustainable livelihoods

- Funding provided to Tiger Reserves for mainstreaming tiger conservation & addressing livelihood concerns in the buffer
- Sectoral integration and convergence of ongoing schemes to

benefit communities

- Sustainable livelihoods approaches in buffer
- Village level micro plan & involvement of EDCs
- More than 2.6 million man days of employment generated

NEW INITIATIVES

- Eco-tourism guidelines for PAs, forest areas to be released soon
- Accorded in-principle approval for 6 new Tiger Reserves
- Identified 6 new areas for new creation of new Tiger Reserves
- Corridors identified, Committee to look in to green smart infrastructure development in such areas
- Project Tiger guidelines being revised: to acquire private lands falling under Tiger Reserve; standardizing norms for construction of patrolling camps; doubling the compensation; interpretation centres for awareness generation and involvement of local people; tiger safaris to reduce pressure on TRs.

ACTIVE MANAGEMENT

- Plan for introduction of tigers in new areas
- Reintroduction bison done in the Bandhavgarh tiger reserve
- Plan for barasingha and black-buck introduction in alternate habitat, to augment prey base.

OUTCOMES OF MEE PROCESS (2010-11)



CATEGORY-WISE OUTCOME OF MEE PROCESS

VERY GOOD	Annamalai, Bandhavgarh, Bandipur Bhadra, Dandeli-Anshi, Kalakad-Mundanthurai, Kanha, Kaziranga, Mudumalai, Parambikulam, Pench (Madhya Pradesh), Periyar, Satpura, Sundarbans
GOOD	Buxa, Corbett, Dampa, Dudhwa, Manas, Melghat, Nagarhole, Pakke, Pench (Maharashtra), Ranthambhore, Tadoba-Andhari
SATISFACTORY	Achanakmar, Nameri, Namdapha, Sanjay, Sayadari, Valmiki
POOR	Satkosia

CATEGORY-WISE OUTCOME OF MEE OF TIGER RESERVES, WHICH HAD LOST ALL TIGERS

VERY GOOD	Panna
GOOD	----
SATISFACTORY	Sariska
POOR	----

CATEGORY-WISE OUTCOME OF MEE PROCESS OF TIGER RESERVES IN THE 'RED CORRIDOR'

VERY GOOD	----
GOOD	Nagarjunsagar-Srisailam
SATISFACTORY	Simlipal
POOR	Indravati, Palamau, Udanti-Sitanadi

SUMMARY OF MEE OF TIGER RESERVES RATING NUMBER OF TIGER RESERVES %

RATING	No. of Tiger Reserves	%
VERY GOOD	15	38
GOOD	12	31
SATISFACTORY	8	21
POOR	4	10



