

PROJECT TIGER



YEARS
OF TIGER CONSERVATION
IN INDIA





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निर्वनो वध्यते व्याघ्रो निर्व्याघ्रं छिद्यते वनम् ।
तस्माद्वाघ्रो वनं रक्षेद्वनं व्याघ्रं च पालयेत् ॥ (महाभारत)

(Tigers cannot survive without forests and similarly forests perish without tigers. The tiger should protect the forests and forests should defend their tigers. The Mahabharata Udyoga Parva : 5.29.48)

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TIGERS OF THE WORLD



About 4,500 tigers remain in the wild globally. Since 2017, IUCN has recognized two tiger subspecies, commonly referred to as the continental tiger and the Sunda island tiger. All remaining island tigers are found only in Sumatra, with tigers in Java and Bali now extinct. These are popularly known as Sumatran tigers. The continental tigers currently include the Bengal, Malayan, Indochinese and Amur (Siberian) tiger populations, while the Caspian tiger is extinct in the wild. The South China tiger is believed to be functionally extinct.

TIGER RANGE COUNTRIES IN THE WORLD





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TIGER SYMBOLISM IN INDIAN HISTORY, RELIGION AND CULTURE

The tiger is deeply ingrained in the Indian culture and mythology since time immemorial. It is an integral part of Indian history, culture and religions. Our holy Constitution also enshrines this philosophy by including conservation of forest and wildlife as one of the fundamental duties of every Indian. The most ancient records of tigers are found in the cave paintings of central India dated between 100,000 and 30,000 YBP. The seals and artefacts recovered from the civilizations of the Indus Valley depict tigers with the most ancient deity Shiva as *Pashupatinath* or the lord of animals (~5,000 YBP). The first Protected Areas were declared in India by the Buddhist king Ashoka as *Abhaya Aranya* or 'forests without fear' around 250 BCE. Several wild animals and plants, especially tigers are revered in religions that evolved within the Indian sub-continent (Hinduism, Jainism and Buddhism). This philosophical mindset along with the concept of *Ahimsa* endows the society with a high level of tolerance towards all life forms that extends event to predators like tigers and is still the primary factor responsible for coexistence between high-density human populations and wildlife in India.



*Tiger Seal,
2500–2400 B.C.E.,
Mohenjodaro,
Indus Valley
Civilization*



*Tiger rock
painting in
Satpura, central
India dated
~10,000 YBP*



*Bonbibi, a local deity in East Indian Culture
riding on tigers*

TIGER CONSERVATION IN INDIA (POST-INDEPENDENCE TILL 1973)

E.P. Gee, one of India's most prominent post-independence naturalist and conservationist, estimated in 1964 that there would have been around 40,000 tigers in the country at the turn of the 20th century. The population was declining drastically by mid-20th century and it underwent a catastrophic collapse in the decade post-independence (1947) as tigers were hunted out indiscriminately; mostly driven by proliferation of gun licenses issued in the years following independence, improved access to the forest, clearing of large tracts of forests for various purposes, mushrooming of the new businesses of “Shikar Companies” and fur-trade.

Many naturalists including Jim Corbett and E.P. Gee raised alarms over precipitous decline of tiger numbers in India which was guesstimated at ranging between 2,000 to 4,000 in the early 1960's. Alarmed by this dismal number, the Indian Board for Wild Life (IBWL) – the forerunner to the National Board of Wild Life – held a meeting New

Delhi in July, 1969 recommending a total ban on the export of all wild cat skins, including tigers. The same year, 10th Assembly of IUCN met at Delhi and the Assembly promptly responded by including the tiger in its “Red Data Book” as an endangered species and adopted a Resolution calling for a ban on the killing of tigers.



photo courtesy : Internet

Meanwhile, tiger numbers further dwindled to 1,863 and the situation startled country's highest office and the then Honourable Prime Minister Indira Gandhi immediately deputed a group of specialists which comprised of a mix of naturalists, conservationists, and forest officers to study the latest status of the species and “plan how best to save the Indian tiger from extinction”. IBWL's Executive Committee constituted a 11-member Task Force “to go into the details of the problem and prepare a project to preserve the tiger in the wild in India”. The seed for Project Tiger had thus been laid.



photo courtesy : IUCN

The Task Force submitted its final report in August, 1972 recommending 8 tiger forests spread across India to be brought under the Project's purview. On 1st April, 1973, Project Tiger was inaugurated at Corbett tiger reserve with 9 tiger reserves – Corbett (then Uttar Pradesh), Palamau (then Bihar), Similipal (Orissa), Sundarbans (West Bengal), Manas (Assam), Ranthambhore (Rajasthan), Kanha (Madhya Pradesh), Melghat (Maharashtra) and Bandipur (then Mysore) – which were representative of the various tiger habitat types in India.



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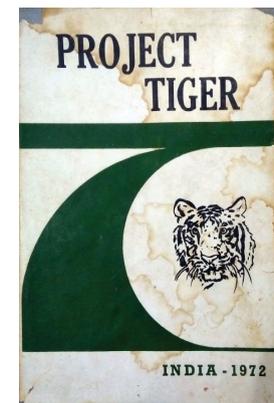
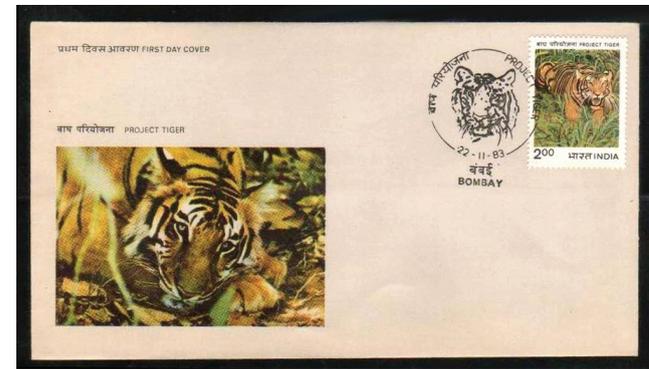
PROJECT TIGER AND BEYOND (1973 - 2006)

Modern conservation era began much after India's independence in the early 1970s, with the enactment of the Wildlife (Protection) Act (WPA, 1972). At the behest of J. C. Daniel and renowned ornithologist Salim Ali from the Bombay Natural History Society, the then Honourable Prime Minister of India took personal interest in tiger conservation and with assistance from the then World Wildlife Fund launched Project Tiger in 1973 as a central Government sponsored scheme in nine Protected Areas of India.



Palamau Tiger Reserve: One of first Tiger Reserves in India

Project Tiger has been one of the largest species conservation initiatives of its kind in the world. Project Tiger Directorate of the Ministry of Environment and Forests was mandated with the task of providing technical guidance and funding support to tiger bearing states. The initial success of Project Tiger evaluated by the pugmark census technique put the figure to around 3,500 tigers by 1990s. This success brought in complacency in protection since legal hunting was banned in India and domestic market for tiger trophies was almost extinguished. However, during this period due to rapid economic growth in South East Asia, demand for tiger body parts for traditional medicine increased substantially. Owing to this increased demand, and after depletion of local tiger populations in majority of SE Asia to unprofitable illegal harvest levels, tiger populations in India became the easy target for poachers.



While India basked in the glory of Project Tiger, tiger populations in India were steadily being decimated by demand driven poaching. In 1992, conservationists raised alarm over more than 40 tigers going missing from the well-known tiger reserves of Kanha, Ranthambore, Sariska and Bandhavgarh. The following year recorded one of the largest ever hauls of tiger skins and bones in New Delhi leading to seizure of 287 kg of tiger bone while the undercover agents were promised another 1,000 kg of bones. But it was only after the local extinction of tigers at Sariska Tiger Reserve in 2005 and associated media coverage causing huge uproar, that then Honourable Prime Minister appointed a Tiger Task Force to address the tiger conservation crisis in India.

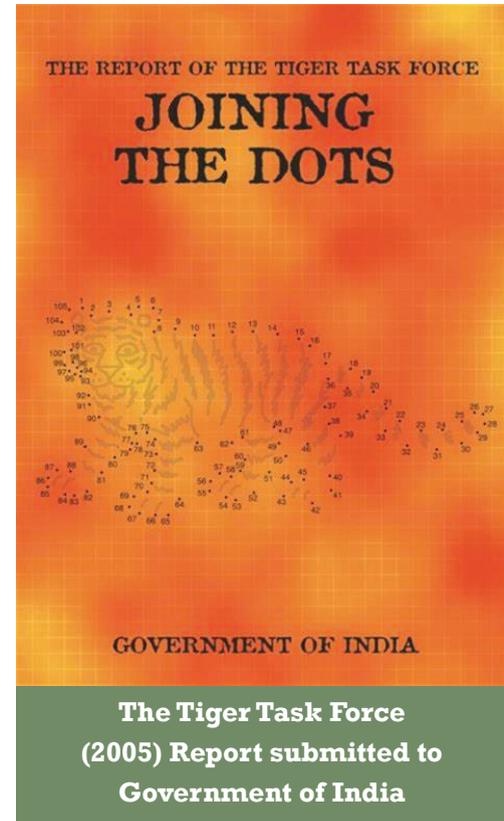


TIGER TASK FORCE REPORT AND CREATION OF NATIONAL TIGER CONSERVATION AUTHORITY (2006)

It was evident that India's flagship conservation program was facing challenges. The primary objective of the Task Force was to review the past Conservation Strategies and accordingly modify the future plan so as to strengthen the Tiger Conservation Agenda in the country. The Tiger Task Force took cognizance of problems that plagued tiger conservation in India, some of that are universal across the range of the tiger, while others were unique to India. Tiger Task Force submitted its report "Joining the Dots" and suggested implementable remedies through policy and management interventions.

After a thorough research, the Tiger Task Force pinpointed major problems as systematic institutional failure, failure in protection due to alienation of poor local communities, inappropriate reporting of tiger numbers, need for inviolate space for conservation, isolation of small Protected Areas and need for habitat connectivity—a landscape approach to tiger conservation planning, amongst others.

The major recommendations of the Tiger Task Force were a paradigm shift for (tiger) conservation from being an exclusion model that alienated local communities to an inclusive one, where the local community became satisfied partners in conservation efforts. These recommendations led to the amendment of the Wildlife (Protection) Act of 1972 in 2006 (WPA, 1972 amendment 2006) by the Indian Parliament. The National Tiger Conservation Authority (NTCA) and the Wildlife Crime Control Bureau were created as statutory bodies. This transformed Project Tiger from a mere Central Government funding scheme to one of reciprocal commitments between the Center (NTCA), States (Chief Wildlife Wardens) and Tiger Reserves (Field Directors of tiger reserves).





GENESIS OF TIGER MANAGEMENT IN INDIA

1972

Launch of WPA



The wildlife in general and the Tigers in particular were witnessing a rapid decline by the early 70s, and thereby to check this depletion, the Wildlife Protection Act was enacted in 1972 by the Government of India.

1973

Launch of Project Tiger



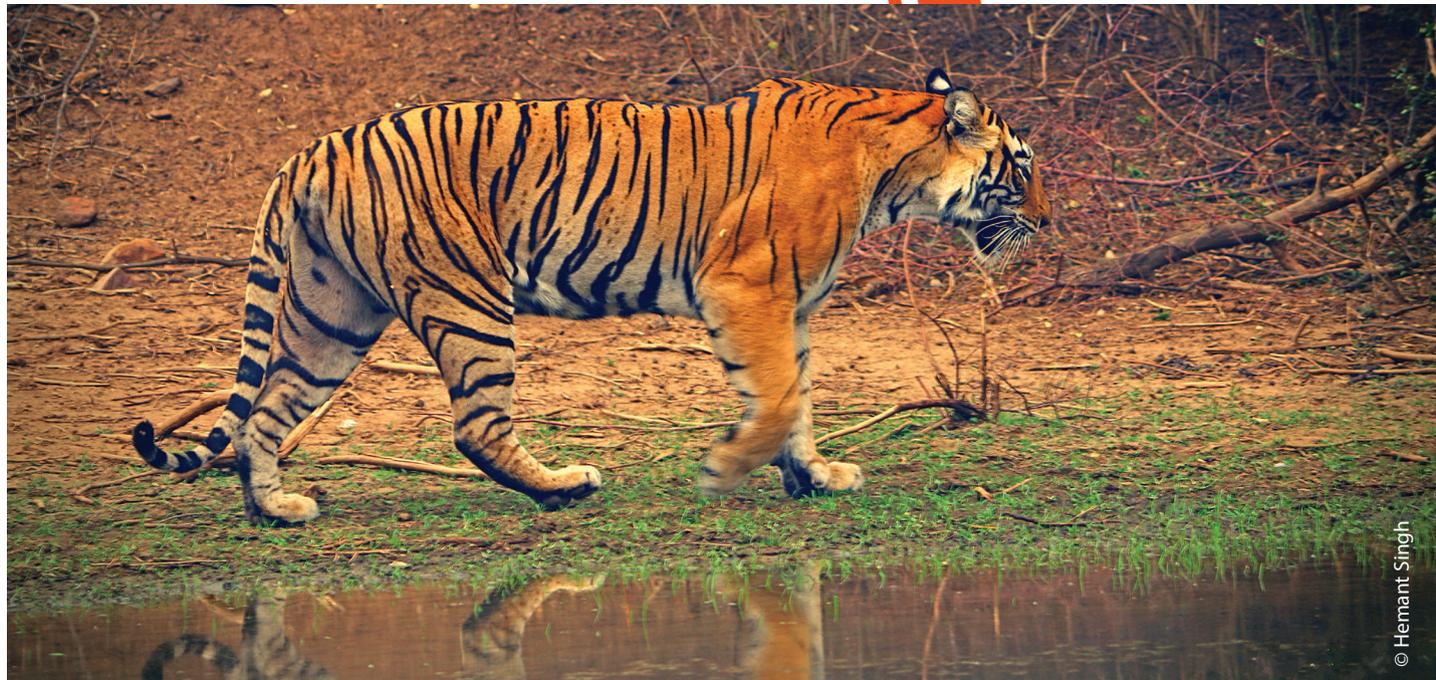
A year after, the Government of India took a pioneering initiative for conserving its national animal, the tiger, by launching the 'Project Tiger' in 1973. The said project is an ongoing Centrally Sponsored Scheme of the Ministry of Environment, Forests and Climate Change which provides central financial assistance to the tiger states for tiger conservation.

2006

The Birth of NTCA



Post 2006, following the Sariska Debacle there was a paradigm shift in the management of Tigers and their habitat. One of such being the creation of the National Tiger Conservation Authority by an amendment of WPA 1972, a statutory body under the Ministry of Environment, Forests and Climate Change.



NATIONAL TIGER CONSERVATION AUTHORITY (NTCA)

NTCA has been fulfilling its mandate within the ambit of the Wildlife (Protection) Act, 1972 for strengthening tiger conservation in the country by retaining an oversight through advisories/normative guidelines, based on appraisal of tiger status, ongoing conservation initiatives and recommendations of specially constituted Committees.

Objectives of NTCA:

- Providing statutory authority to Project Tiger so that compliance of its directives become legal.
- Fostering accountability of Center-State in management of Tiger Reserves, by providing a basis for Memorandum of Understanding with Tiger Range States within India's federal structure.
- Providing for an oversight by Parliament.
- Addressing livelihood interests of local people in areas surrounding Tiger Reserves.



Powers and functions of NTCA

Powers and functions of the National Tiger Conservation Authority as prescribed under section 38O (1) and (2) of the Wildlife (Protection) Act, 1972, as amended in 2006 are as under:-

1. To approve the tiger conservation plan prepared by the State Government under section 38 O (1) (a) of this Act
2. Evaluate and assess various aspects of sustainable ecology and disallow any ecologically unsustainable land use such as, mining, industry and other projects within the tiger reserves
3. Lay down normative standards for tourism activities and guidelines for project tiger from time to time for tiger conservation in the buffer and core area of tiger reserves and ensure their due compliance
4. Provide for management focus and measures for addressing conflicts of men and wild animal and to emphasize on co-existence in forest areas outside the National Parks, sanctuaries or tiger reserve, in the working plan code
5. Provide information on protection measures including future conservation plan, estimation of population of tiger and its natural prey species, status of habitats, disease surveillance, mortality survey, patrolling, reports on untoward happenings and such other management aspects as it may deem fit including future plan conservation
6. Approve, co-ordinate research and monitoring on tiger, co-predators, prey habitat, related ecological and socio-economic parameters and their evaluation
7. Ensure that the tiger reserves and areas linking one protected area or tiger reserve with another protected area or tiger reserve are not diverted for ecologically unsustainable uses, except in public interest and with the approval of the National Board for Wild Life and on the advice of the Tiger Conservation Authority
8. Facilitate and support the tiger reserve management in the State for biodiversity conservation initiatives through eco-development and community participation as per approved management plans and to support similar initiatives in adjoining areas consistent with the Central and State laws
9. Ensure critical support including scientific, information technology and legal support for better implementation of the tiger conservation plan

10. Facilitate ongoing capacity building programme for skill development of officers and staff of tiger reserves
11. Perform such other functions as may be necessary to carry out the purposes of this Act with regard to conservation of tigers and their habitat
12. Statutory backing of the Authority
13. Implement people-centric approaches of tiger conservation in tiger bearing states
14. Mandates of Tiger Conservation Foundations
15. Robust scientific management approach
16. Landscape level management



TIGER RESERVES: CORNERSTONES FOR TIGER CONSERVATION

Currently, tigers occupy around 89,000 km² in India while forest area (potential habitats) within tigers' range is around 381,000 km². Thus, tigers were clearly limited by direct persecution and quality of their habitat (prey depletion). Of the total population of around 3,000 tigers in India 65% were within tiger reserves. Although habitat was the least limiting factor yet, species like tigers can only thrive in legally protected human-free space. Such space in the form of core areas of tiger reserves is the most difficult requirement to secure in a densely populated, rapidly growing country like India.

India has striven to increase areas gazetted as tiger reserves. Under the stewardship of Project Tiger, the initial number of nine tiger reserves (18,278 km²) in 1973 has now expanded to current 53 tiger reserves cumulatively protecting an area of 75,796.83 km² (approximately 2.3% of the country's geographical area) of which approximately 41,499.37 km² is inviolate core.

Currently, in-principle approval has been given by the National Tiger Conservation Authority to eight Protected Areas of India for declaration as Tiger Reserves.



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MAP SHOWING A NETWORK OF 53 TIGER RESERVES IN INDIA

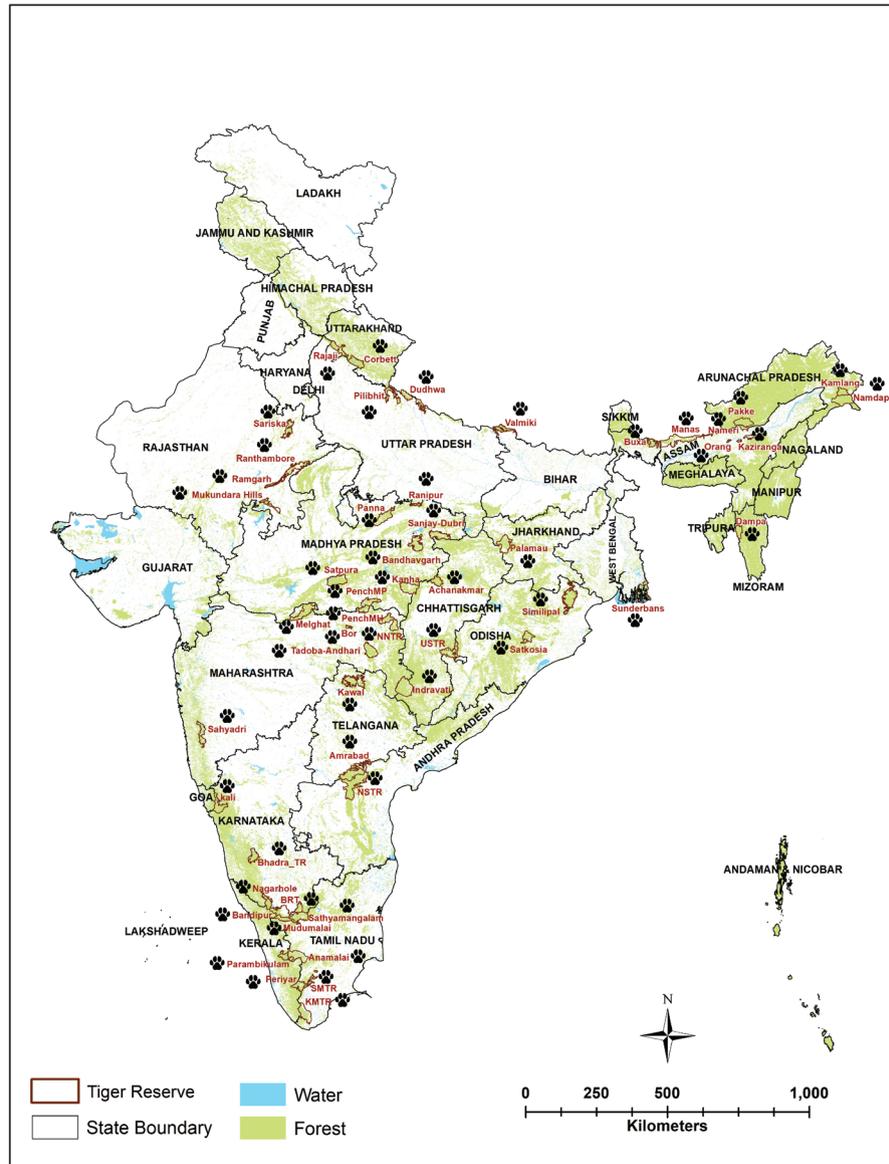


TABLE SHOWING A NETWORK OF 53 TIGER RESERVES IN INDIA

(Source: <https://ntca.gov.in/tiger-reserves/#tiger-reserves-2>)

Sl No	Tiger Reserve (TR)	PA Notification Year	State	TR Notification Year	Core Area	Buffer Area	Total Area
					(sq km)	(sq km)	(sq km)
1	Bandipur	1973-74	Karnataka	2007	872.24	584.06	1456.3
2	Corbett	1973-74	Uttarakhand	2010	821.99	466.32	1288.31
	Amanagarh buffer	–	Uttar Pradesh	2012	–	80.6	80.6
3	Kanha	1973-74	Madhya Pradesh	2007	917.43	1,134.36	2,051.79
4	Manas	1973-74	Assam	2008	526.22	2,310.88	2,837.10
5	Melghat	1973-74	Maharashtra	2007	1,500.49	1,268.03	2,768.52
6	Palamau	1973-74	Jharkhand	2012	414.08	715.85	1,129.93
7	Ranthambore	1973-74	Rajasthan	2007	1,113.36	297.92	1,411.29
8	Simlipal	1973-74	Orissa	2007	1,194.75	1,555.25	2,750.00
9	Sunderban	1973-74	West Bengal	2007	1,699.62	885.27	2,584.89
10	Periyar	1978-79	Kerala	2007	881	44	925
11	Sariska	1978-79	Rajasthan	2007	881.11	332.23	1,213.34
12	Buxa	1982-83	West Bengal	2009	390.58	367.32	757.9
13	Indravati	1982-83	Chhattisgarh	2009	1,258.37	1,540.70	2,799.07
14	Namdapha	1982-83	Arunachal Pradesh	1987	1,807.82	245	2,052.82
15	Nagarjunsagar Sagar	1982-83	Andhra Pradesh	2007	2,595.72	700.59	3,296.31
16	Dudhwa	1987-88	Uttar Pradesh	2010	1,093.79	1,107.98	2,201.77
17	Kalakad Mundanthurai	1988-89	Tamil Nadu	2007	895	706.54	1,601.54
18	Valmiki	1989-90	Bihar	2012	598.45	300.93	899.38
19	Pench	1992-93	Madhya Pradesh	2007	411.33	768.3	1,179.63
20	Tadobha Andhari	1993-94	Maharashtra	2007	625.82	1,101.77	1,727.59

Sl No	Tiger Reserve (TR)	PA Notification Year	State	TR Notification Year	Core Area	Buffer Area	Total Area
					(sq km)	(sq km)	(sq km)
21	Bandhavgarh	1993-94	Madhya Pradesh	2007	716.9	820.03	1,536.93
22	Panna	1993-94	Madhya Pradesh	2007	576.13	1,021.97	1,598.10
23	Dampa	1994-95	Mizoram	2007	500	488	988
24	Bhadra	1998-99	Karnataka	2007	492.46	571.83	1,064.29
25	Pench	1998-99	Maharashtra	2007	257.26	483.96	741.22
26	Pakke	1999-20	Arunachal Pradesh	2012	683.45	515	1,198.45
27	Nameri	1999-20	Assam	2000	320	144	464
28	Satpura	1999-20	Madhya Pradesh	2007	1,339.26	794.04	2,133.31
29	Anamalai	–	Tamil Nadu	2007	958.59	521.28	1,479.87
30	Udanti Sitanadi	–	Chhattisgarh	2009	851.09	991.45	1,842.54
31	Satkoshia	–	Odisha	2007	523.61	440.26	963.87
32	Kaziranga	1974	Assam	2007	625.58	548	1,173.58
33	Achanakmar	–	Chhattisgarh	2009	626.19	287.82	914.02
34	Kali	–	Karnataka	2007	814.88	282.63	1,097.51
35	Sanjay Dhubri	–	Madhya Pradesh	2011	812.57	861.93	1,674.50
36	Mudumalai	–	Tamil Nadu	2007	321	367.59	688.59
37	Nagarhole	–	Karnataka	2007	643.35	562.41	1,205.76
38	Parambikulam	–	Kerala	2009	390.89	252.77	643.66
39	Sahyadri	–	Maharashtra	2012	600.12	565.45	1,165.57
40	Biligiri Ranganatha Temple	–	Karnataka	2007	359.1	215.72	574.82
41	Kawal	–	Telangana	2012	892.23	1,123.21	2,015.44
42	Sathyamangalam	–	Tamil Nadu	2013	793.49	614.91	1,408.40
43	Mukundara	–	Rajasthan	2013	417.17	342.82	759.99
44	Nawegaon Nagzira	–	Maharashtra	2013	653.67	1,241.27	1,894.94
45	Amrabad	–	Telangana	2015	2,166.37	445.02	2,611.39
46	Pilibhit	–	Uttar Pradesh	2014	602.79	127.45	730.25

Sl No	Tiger Reserve (TR)	PA Notification Year	State	TR Notification Year	Core Area	Buffer Area	Total Area
					(sq km)	(sq km)	(sq km)
47	Bor	1970	Maharashtra	2012	138.12	678.15	816.27
48		–	Uttarakhand	2015	819.54	255.63	1075.17
49	Orang	–	Assam	2016	79.28	413.18	492.46
50	Kamlang	–	Arunachal Pradesh	2017	671	112	783
51	Srivilliputhur Megamalai	–	Tamil Nadu	2021	641.86	374.7	1016.57
52	Ramgarh Vishdhari Tiger Reserve	–	Rajasthan	2022	481.9073	1019.9848	1501.8921
53	Ranipur Tiger Reserve	–	Uttar Pradesh	2022	230.31	299.0512	529.3612
				Total	41,499.37	34,297.46	75,796.83



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EXPANDING THE HORIZONS

From the initial number of 9 tiger reserves (18,278 sq. km.) has now expanded to 50+ Tiger Reserves.

18,278 sq. km.

>75,000 sq. km.

9 TIGER RESERVES

50+ TIGER RESERVES

With sustained efforts by the National Tiger Conservation Authority (NTCA) and respective states, the Tiger Reserve network of the country continues to expand.



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TIGER CONSERVATION PLANS

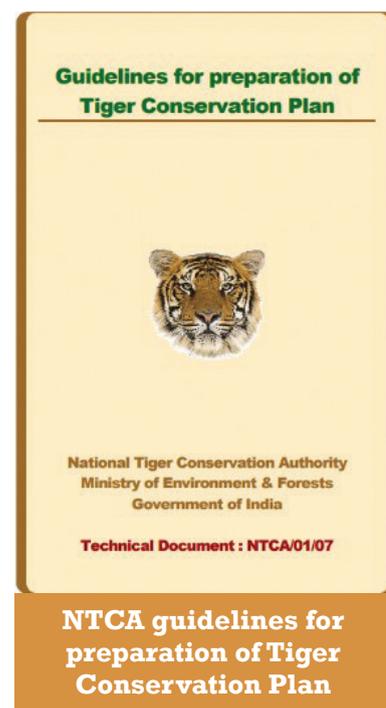
The Project Tiger guidelines made it mandatory that every Tiger Reserve should be managed in accordance with a site specific management plan, which is the road map for managing a tiger reserve. Project Tiger thus became a role model for scientific management of protected areas in India. It laid down the concept of core-buffer zonation, prescribed interventions for protection, habitat improvement, field data collection relating to change in the composition of flora and fauna on account of protection, animal estimation and other aspects.

The Wildlife (Protection) Act, 1972 was amended in 2006, and a separate Chapter (IVB) has been added on the 'National Tiger Conservation Authority', which has replaced Project Tiger. This Chapter, *inter alia*, has enabling provisions (Section 38V) for preparing a 'Tiger Conservation Plan' for the proper management of a tiger reserve, which will also include staff development and deployment plan.

Objectives of Tiger Conservation Plans are to ensure:

- i) Protection and site specific habitat managements for viable population of tigers, prey and co-predators
- ii) ecologically compatible land uses in the tiger reserves and areas linking one protected area or tiger reserve to another for addressing the livelihood concerns of local people.

Tiger Conservation Plans, cognizant of constraints imposed by small reserves embedded in human land uses, aimed to create source populations within tiger reserves with corridor links between sources and to sink habitats. India's core-buffer-corridor strategy is a model for pro-conservation institutions, with strong high-level political support. In 2007, the NTCA developed a framework based on which, a Tiger Conservation Plan (TCP) unique to each Tiger Reserve (TR) can be designed. To further improve the plan, the authority then released a theme-based guideline so as to modify the plans as per the critical and peripheral regions of Tiger Reserve. Also, it takes an account for the data collection and analysis of the prey and predator population of the reserve.



TIGER POPULATION ASSESSMENT AND MONITORING

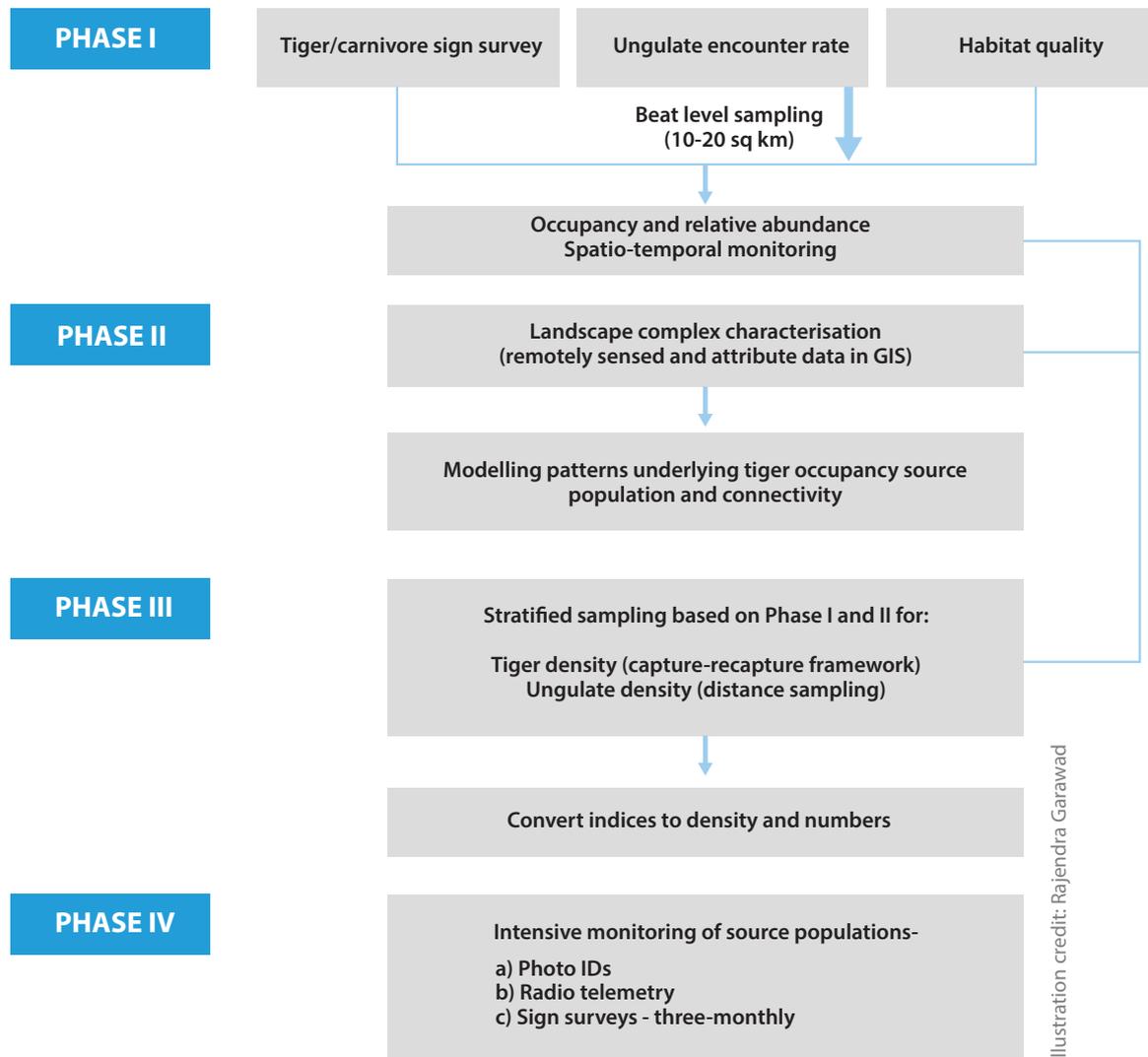
Tiger is a conservation dependent species. For conservation and management of any endangered species such as tiger; its status, distribution, and trends in populations needs to be monitored at regular interval so that the information derived from monitoring process may be used for designing, implementation and evaluation of success of conservation program. Such information is often also crucial for making informed decisions and prioritizing conservation investments.

As mandated by the Tiger Task Force 2005, the quadrennial All India Tiger Estimation (AITE) intends to monitor the status of tigers at pan India level and involves the National Tiger Conservation Authority (NTCA), Wildlife Institute of India (WII) and 18 Tiger Range States (TRS). The four-yearly monitoring of tiger status based on modern animal abundance estimation science commenced since 2006, and covers all potential tiger bearing areas (~381,000 km²) in the country. The monitoring protocol also evaluates status of other co-predators, prey and habitat in tiger landscapes.

Use of best available science, technology and analytical tools in keeping up with “Digital India” has been norms for different cycles of AITE. These include 1) Fecal DNA based species identification and subsequently individual identification of tigers involving DNA extraction, thermocycling (PCR), DNA sequencing, and analysis, 2) GIS and Remote Sensing, 3) Remote heat and motion detection cameras for photographing and censusing wildlife (tigers/leopards, etc.), 3) Artificial Intelligence (neural network) for identification of camera trap photographs to species, 4) Mobile Application (M-STrIPES) for collection of ecological data on tiger/wildlife signs, prey abundance, habitat characteristics, and human impacts (all data digitally recorded, authenticated by a photograph that is spatially geo-tagged by GPS technology), 5) Pattern recognition software (ExtractCompare) for individual tiger and leopard recognition (fingerprinting from stripes and rosettes), 6) Use of Likelihood-based algorithms on R statistical platform that computes Spatially Explicit Capture-Recapture Density for tigers and leopards, 7) Use of Maximum Entropy Models for modeling species distributions using occurrence data and eco-geographical variables obtained from Remote sensing in GIS domain. Fourth cycle of India’s tiger estimation in 2018 has also bagged recognition from the Guinness Book of World Record for being the largest camera trap based wildlife survey in the world and has been recognized as an exercise unparalleled across the globe by conservation experts.

FRAMEWORK OF TIGER MONITORING IN INDIA

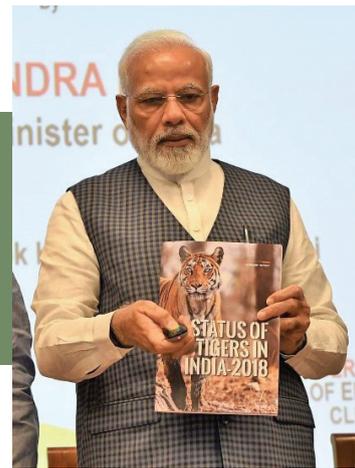
All India Tiger Estimation



The 2018 survey which was accredited as the largest camera trap wildlife survey by the Guinness World Records and was the most comprehensive to date and was conducted digitally using android phones and GPS through M-STripES (Monitoring System for Tigers Intensive Protection and Ecological Status) application with an extensive foot surveys by about 40,000 frontline staff of the forest departments of 18 tiger bearing states in India that covered 522,996 km. Camera traps (remote, thermal and motion sensitive devices that start recording when an animal passes by) were deployed in 26,838 locations at 141 different sites (Tiger Reserves and tiger bearing landscapes) across India and surveyed an effective area of 121,337 km². In total, the camera traps captured over 34 million photographs of wildlife (76,651 of which were tigers and 51,777 were leopards; the remainder were other fauna).



Guinness recognition of all India tiger monitoring exercise 2018

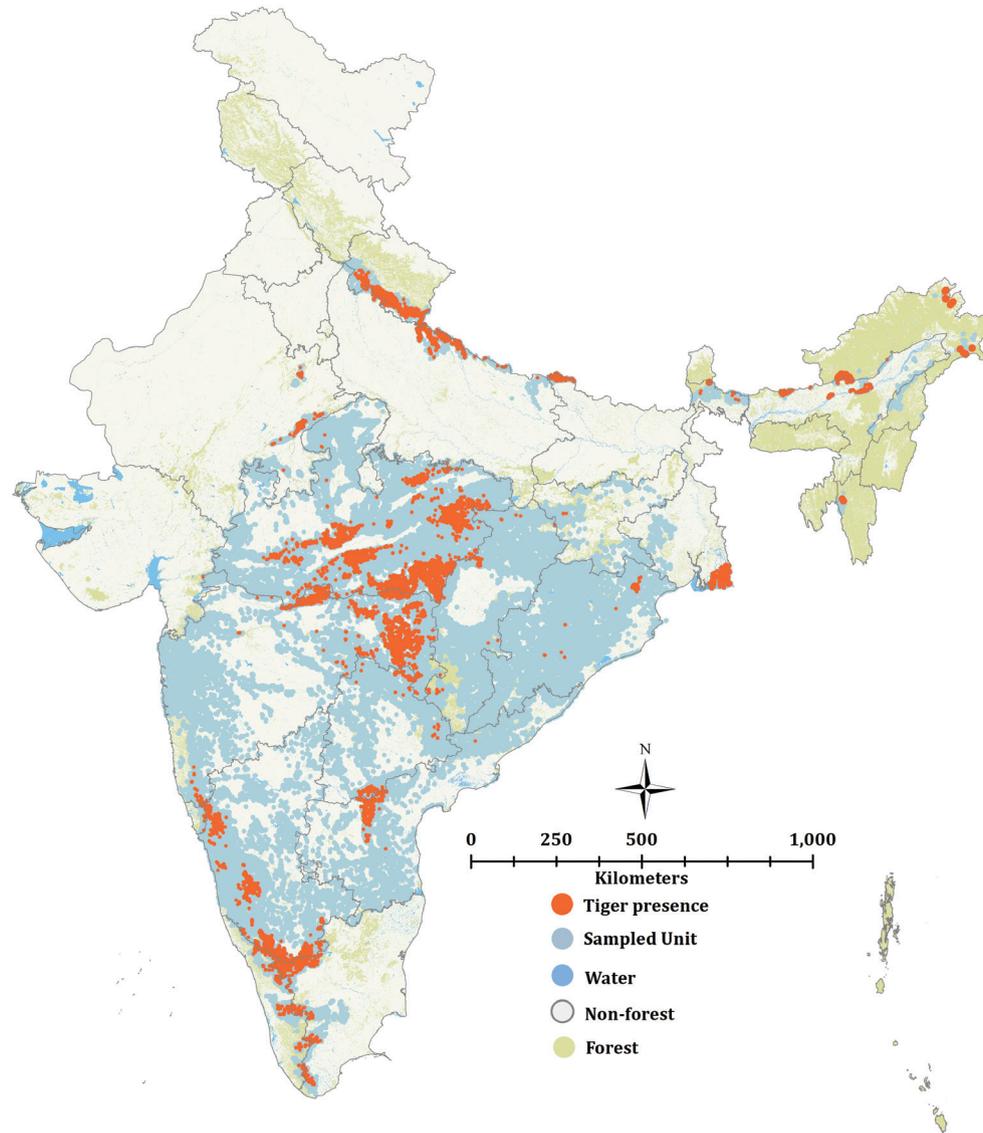


Honourable Prime Minister of India, Narendra Modi, releasing tiger estimation 2018 report

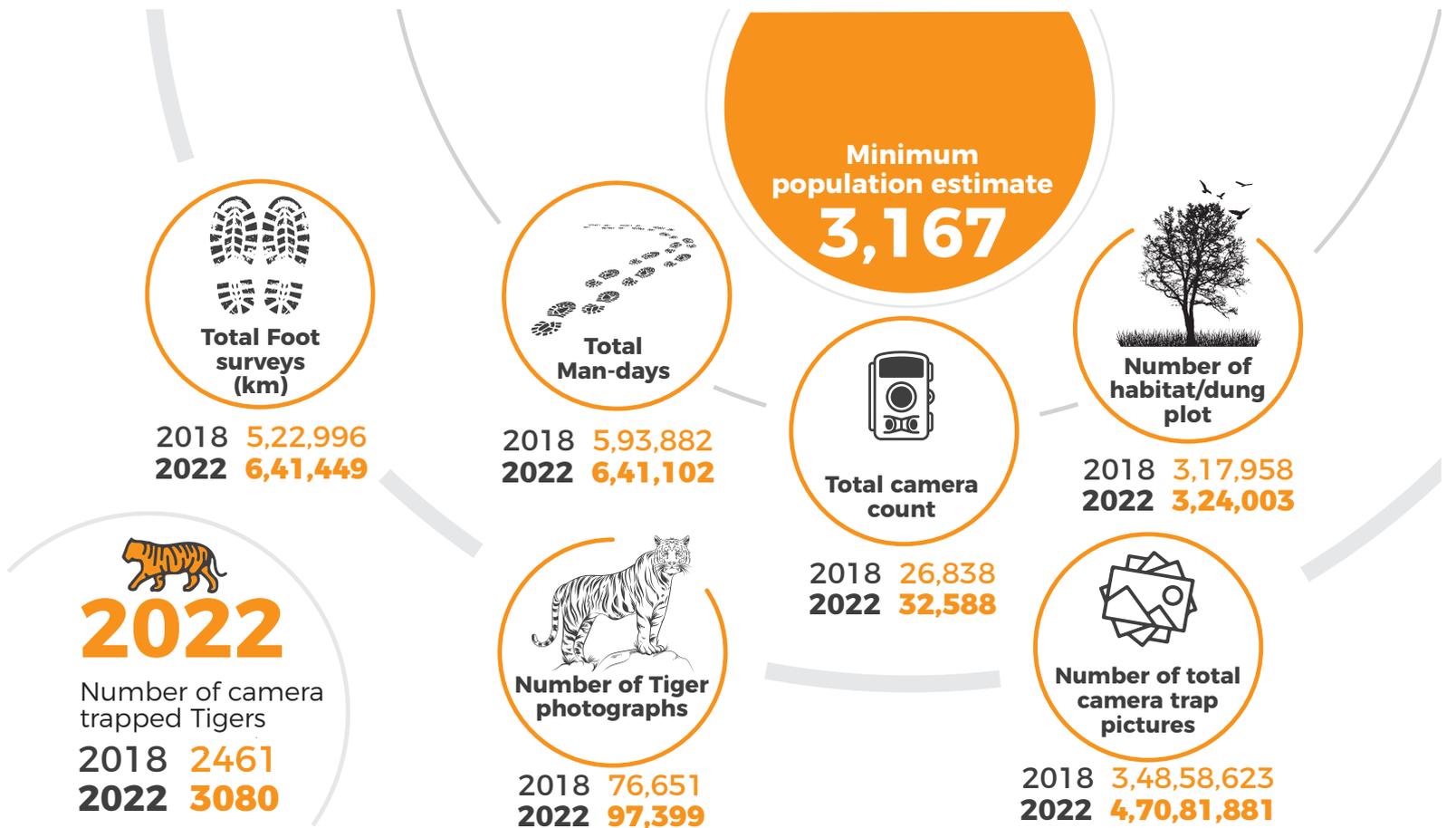
During the 5th cycle of the exercise (2022), data collection was completely digital. The exercise arrived at tiger numbers for the country by analyzing more than 47 million wildlife photographs recorded in camera trapping conducted across 174 sites in India.



SUMMARY OF NATIONAL TIGER ESTIMATION 2022



Spatial Coverage of Sampled forests for carnivore signs, ungulate abundance, habitat characteristics and anthropogenic impacts in 2022. Tiger presence locations are depicted in orange.



Status of Tigers, co-predators and prey in India

2006 - 1411

- Developed and implemented country wide Tiger estimation.
- Management Effectiveness Evaluation Exercise was initiated
- NTCA was established and strategy for the future was created.
- Creation of Tiger Conservation Foundation

2010 - 1706

- Incentivised village relocation
- Better protection with Special Tiger Protection Force
- Implementation of Tiger Conservation Plan
- Reintroduction of Tigers
- Developed and initiated use of MSTRIPES (Monitoring System for Tigers Intensive Protection and Ecological Status)

2014 - 2226

- Corridors Identified and integrated for conservation decision
- Tiger genetics & prey augmentation plan
- Leopard population estimation
- Village relocation intensified
- Tiger reintroduction
- Spatially explicit population model - tiger estimation
- Tourism Guidelines for Tiger Reserves

2018 - 2967

- Artificial Intelligence used in Photo identification of camera trap data
- Voluntary relocation incentive increased to 15 lac/Family
- Developed Water Atlas of Tiger Reserves



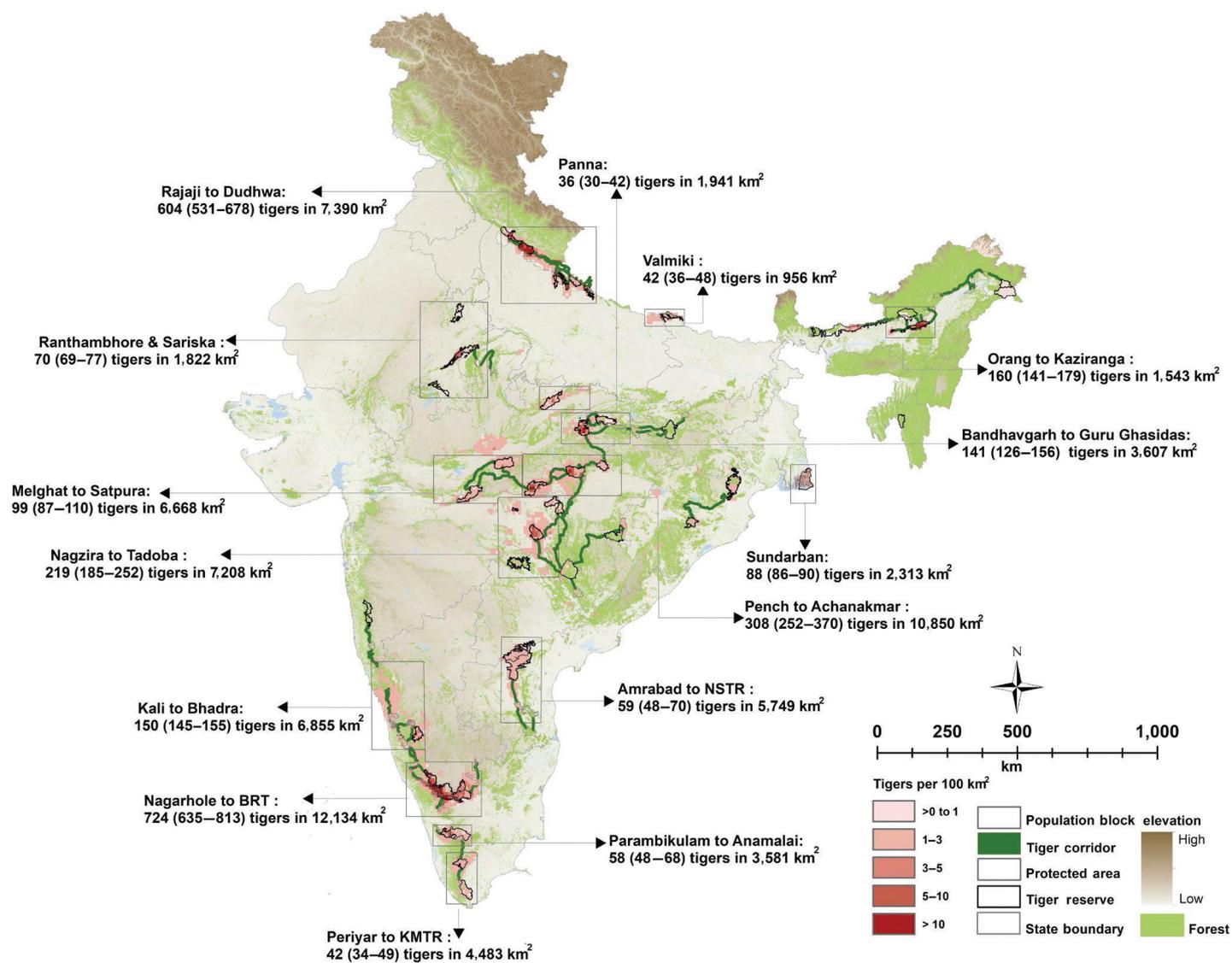
Entire phase - 1 data was collected using the **Mstripes** android application.

Tiger population in India: The first countrywide assessment was done in 2006 and it estimated India's tiger population to be at 1,411 (range 1,165 to 1,675). The second and third assessment were carried out in 2010 and 2014 which estimated India's tiger population to have increased to 1,706 (range 1,520 to 1,909) and 2,226 (range 1,945 to 2,491) respectively. **The tiger population in India in 2018 was estimated to be at 2,967 (range 2,603–3,346).** Considering only the consistently assessed areas for all four population estimation cycles, **the tiger population across India has been growing at a rate of 6 % per annum.**

The success of India in conserving and doubling its wild tiger population in a span of about 12 years, much before the targeted year of 2022 as per St. Petersburg Declaration, is commendable. This is important especially when the country predominantly with an agro-pastoral economy supports a human population of 1.4 billion with 65% of them being rural and majority depending on forest resources for their livelihoods.



© Nilanjan Chatterjee



Tiger populations and density (2018-19) across occupied forests overlaid with corridors

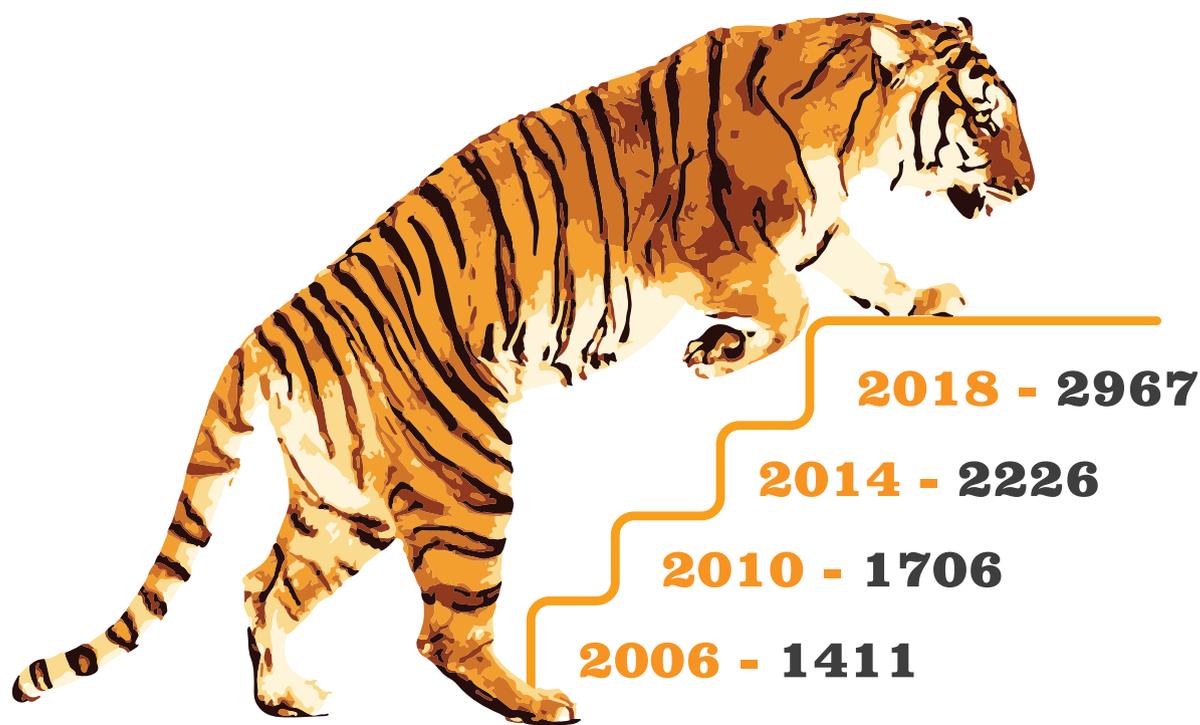
Estimated tiger numbers in different states and landscapes of India. Numbers in parenthesis are one standard error limits of the mean.

*Estimated through Scat DNA

State	Tiger Population			
	2006	2010	2014	2018
Shivalik Hills and Gangetic Plains Landscape				
Bihar	10 (7-13)	8	28(25-31)	31 (26 – 37)
Uttarakhand	178 (161-195)	227 (199-256)	340 (299-381)	442 (393 – 491)
Uttar Pradesh	109 (91-127)	118 (113-124)	117 (103-131)	173 (148 – 198)
Shivalik-Gangetic	297 (259-335)	353(320-388)	485 (427-543)	646 (567 – 726)
Central Indian Landscape and Eastern Ghats				
Andhra Pradesh	95 (84-107)	72 (65-79)	68 (58-78)	48 (40 – 56)#
Telangana	-	-	-	26 (23 – 30)#
Chhattisgarh	26 (23-28}	26 (24-27)	46 (39-53)*	19 (18 – 21)
Jharkhand		10 (6-14)	3*	5
Madhya Pradesh	300 (236-364)	257 (213-301)	308 (264-352)*	526 (441 – 621)
Maharashtra	103 (76-131)	168 (155-183)	190 (163-217)*	312 (270 – 354)
Odisha	45 (37-53)	32 (20-44)	28 (24-32)*	28 (26 – 30)
Rajasthan	32 (30-35)	36 (35-37)	45 (39-51)	69 (62 – 76)
Central India & Eastern Ghats	601 (486-718)	601 (518-685)	688 (596-780)	1,033 (885– 1,193)
Western Ghats Landscape				
Goa	-	-	5*	3
Karnataka	290 (241-339)	300 (280-320)	406 (360-452)	524 (475 – 573)
Kerala	46 (39-53)	71 (67-75)	136 (119-150)	190 (166 – 215)
Tamil Nadu	76 (56-95)	163 (153-173)	229 (201-253)	264 (227 – 302)
Western Ghats	412 (336-487)	534 (500-568)	776 (685-861)	981 (871 – 1,093)

State	Tiger Population			
	2006	2010	2014	2018
North East Hills and Brahmaputra Plains Landscape				
Arunachal Pradesh	14 (12-18)		28*	29*
Assam	70 (60-80)	143 (113-173)	167 (150-184)	190 (165 – 215)
Mizoram	6 (4-8)	5	3*	0
Nagaland	-	-	-	0
Northern West Bengal	10 (8-12)	-	3*	0
North East Hills, and Brahmaputra	100 (84-118)	148 (118-178)	201 (174-212)	219 (194 – 244)
Sundarbans		70 (62-96)	76 (62-96)	88 (86-90)
TOTAL	1,411 (1,165-1,657)	1,706 (1,507-1,896)	2,226 (1,945-2,491)	2,967 (2,603-3,346)



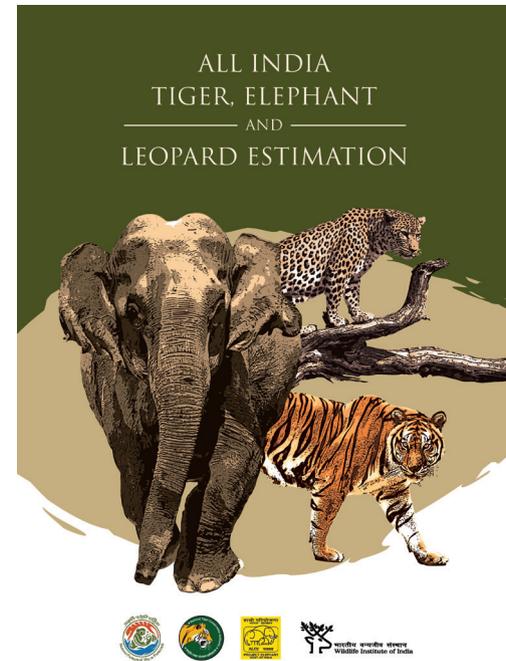


Increase of tiger population in India at an annual rate of 6% since 2006

The information generated by the tiger status evaluation exercises resulted in major changes in policy and management of tiger populations and provided scientific data to fully implement provisions of the Wildlife (Protection) Act 1972, as amended in 2006, in letter and spirit. The major outcomes that were direct or indirect consequence of information generated by the monitoring exercises were 1) Tiger landscape conservation plans, 2) designation and creation of inviolate critical core and buffer areas of tiger reserves, 3) identification and notification of new tiger reserves, 4) recognition of tiger landscapes and the importance of the corridors and their physical delineation at the highest levels of governance, 5) integrating tiger conservation with developmental activities using the power of reliable information in a Geographic Information System database 6) planning reintroduction and supplementation strategies for tigers and to prioritize conservation investments to target unique vulnerable gene pools and 7) creation of a digital database library for forest administrative units. All these provide an opportunity to incorporate conservation objectives supported with sound science based data, on equal footing with economic, sociological, and other values in policy and decision making for the benefit of the society.

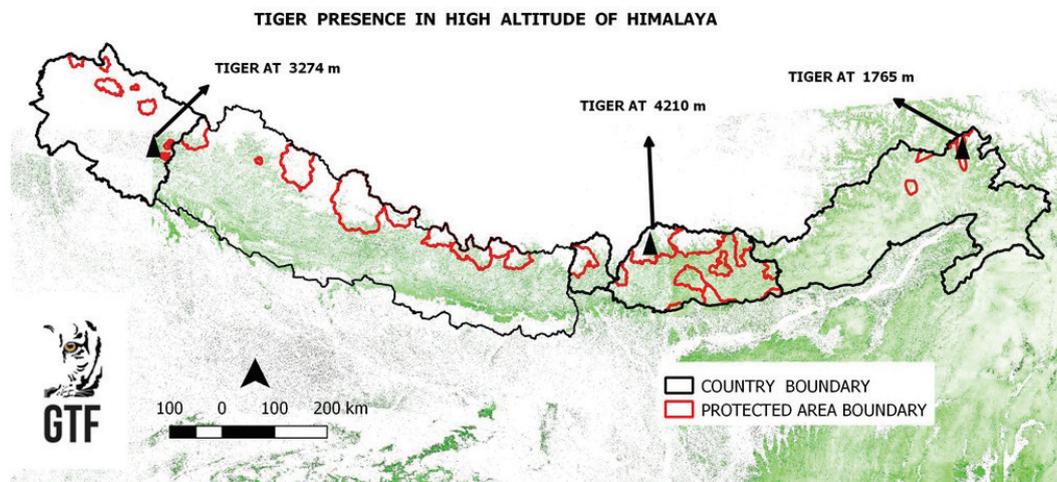
Like tigers, India is the major stronghold for the Asian elephants and one horned rhinoceros. Elephant habitats are all within the range of the tiger and therefore investments made for tiger have been beneficial for elephant conservation as well. Conservation problems that plague tigers also affect elephants, especially demand for illegal wildlife trade, fragmentation of habitat and corridors by rapidly changing land use patterns and conflict with humans. Considering these, Project Elephant Division of Ministry of Environment, Forest and Climate Change and NTCA have decided to merge country wide elephant estimation with tiger monitoring in 2022 based on a pilot study.

A study has been initiated in collaboration with Global Tiger Forum for monitoring of transboundary high altitude tigers. While broadly highlighting the profile of high altitude tiger habitat, its suitability has been appraised for both East and West portions of Himalayas, along with corridor connectivity. The findings are based on representative primary data collection relating to tiger, co-predators, prey, habitat and interface issues relating to local people, supplemented with extensive secondary information. Contours of a futuristic high altitude tiger action plan has also been highlighted



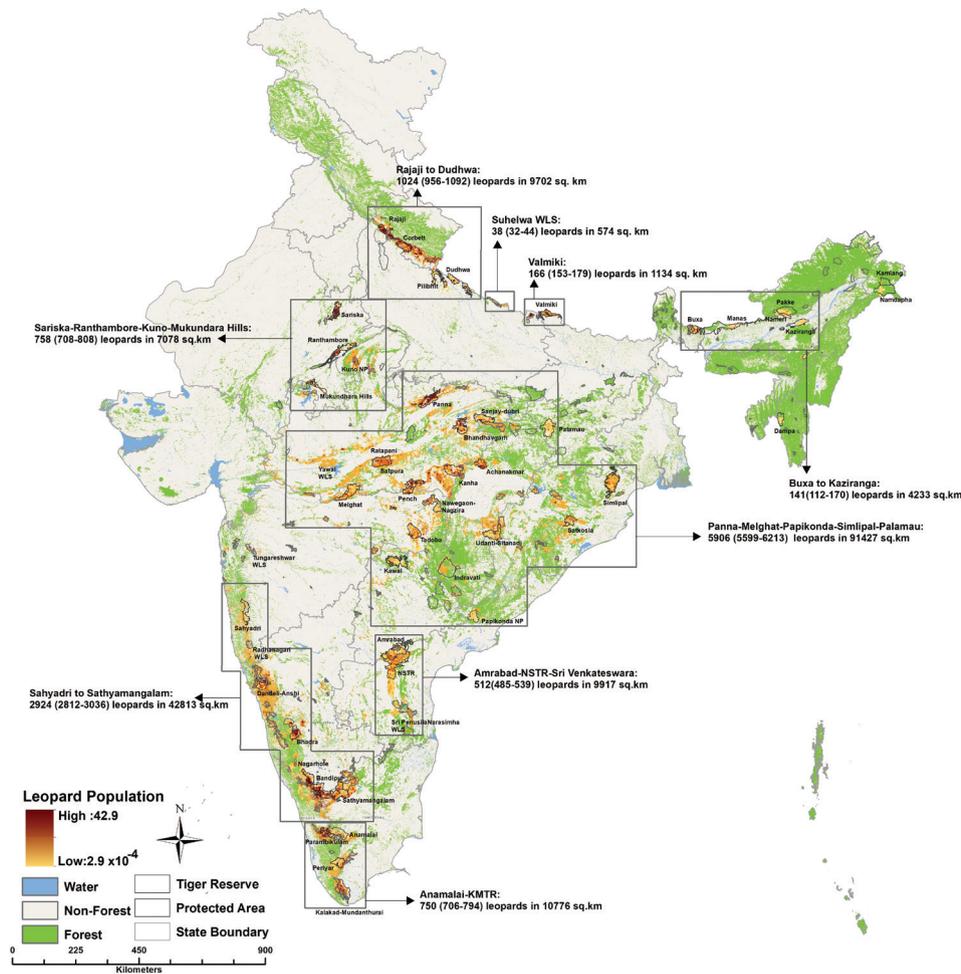
Monitoring of high altitude tigers

Project initiated in collaboration with Global Tiger Forum



ASSESSMENT AND MONITORING OF CO-PREDATORS AND HABITAT

The 2014 tiger monitoring exercise also estimated country wide leopard number for the first time at 7,910 within tiger occupied forests of India. The overall leopard population in tiger range landscape of India in 2018 was estimated at 12,852 (range 12,172 - 13,535).



Leopard distribution, population blocks and density (individuals/100 km²) depicted on a 25 km² grid in India, 2018-19

DISTRIBUTION OF SMALL CATS IN TIGER RESERVES AS ESTIMATED DURING ALL INDIA TIGER MONITORING EXERCISE 2018-19

Often conservation efforts directed for the apex predator in an ecosystem are believed to play an umbrella role for the conservation of entire biodiversity. Indeed, this has been the driving concept of Project Tiger, a flagship conservation initiative by the Government of India since 1973. While tigers in India are at their assured path of recovery, it has been observed that impact of tiger conservation investments also secures micro-niches for other sympatric species such as small carnivores.





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CORE-BUFFER-CORRIDOR STRATEGIES: A LEARNING FROM COUNTRY WIDE TIGER ESTIMATION

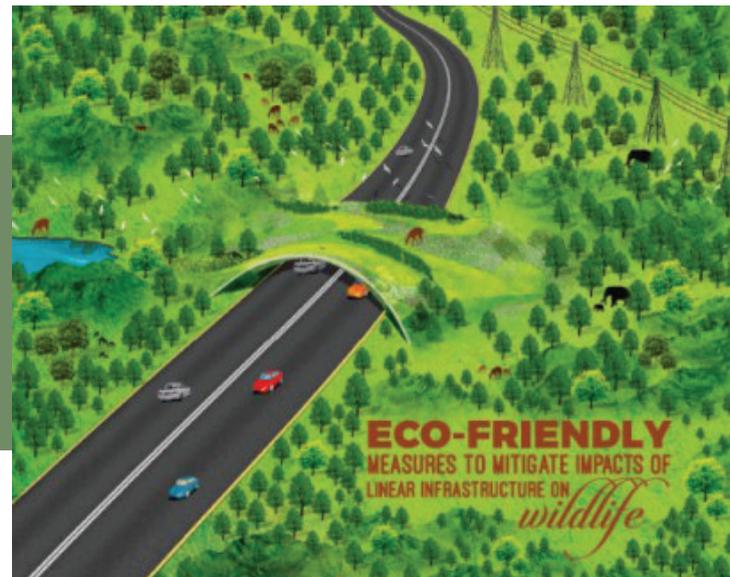
In India, the tiger reserves are constituted on a core/buffer strategy, often delineated based on data generated in different cycles of national tiger estimation. The core areas have the legal status of a national park or a sanctuary, whereas the buffer or peripheral areas are a mix of forest and non-forest land, managed as a multiple use area. The Project Tiger aims to foster an exclusive tiger agenda in the core areas of tiger reserves, with an inclusive people oriented agenda in the buffer.



Based on empirical data, for Indian situations, it has been recorded that an area of 800-1,200 km² of inviolate space (core critical tiger habitat) is required for a viable tiger population (20 breeding tigresses). Tiger is a species of metapopulation, and given its land-tenure/social dynamics, and source-sink interactions, it has also been observed that the inviolate core critical tiger habitat of 800-1200 km² requires an outer buffer/multiple use area of 1,000-3,000 km². The core critical tiger habitats of all tiger reserves, in accordance with extant statutory provisions are Protected Areas (National Park or Sanctuary) which have been notified by respective states, as available, vis-à-vis the geographical delimitation and ownership. Likewise, the buffer areas have also been notified on parcels of Government Land as available. Owing to the same, a classical doughnut model of core-buffer is seldom available, nor the desired area of 800-1,200 km² surrounded by the required area of buffer.

Such tiger populations would remain viable only if they remained connected through habitat corridors as a metapopulation of two or more tiger reserves. All major habitat corridors connecting tiger populations within each landscape were modelled, mapped and made an integral part of the legally mandated Tiger Conservation Plan that contained site-specific prescriptions for management of core, buffer and corridor habitats. Such an NTCA-approved plan was made an essential requirement for each tiger reserve to receive funding support from the centrally sponsored scheme of Project Tiger as part of the tripartite memorandum of understanding. Habitat corridors traverse multiple land cover and land uses, many of which, were not under legal protection. The NTCA, through the legal power of a statutory body, has ensured that any land use change in a tiger corridor that is likely to have a barrier effect, requires approval from the National Board of Wildlife, and if approved, is usually implemented with appropriate mitigation. Linear infrastructure projects of national importance like roadways, railways, canals and pipelines often conflict with corridors and are usually cleared with mitigation measures of animal passage ways

Guidelines of Government of India on mitigation of linear infrastructures in wildlife landscapes



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 800-1000 km².

The tiger land tenure dynamics ensures presence of prime adults in a habitat which act as source populations, periodically replacing old males by young adults from nearby forest areas. A number of production sectors operate in the buffer area of a tiger reserve, which directly (D) or incidentally (I) affect tiger conservation. Therefore, the basic managerial strategy for the buffer area should focus on mainstreaming wildlife concerns amongst such sectors through an Integrated development approach. 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 and
- (c) Providing opportunity to tiger for colonizing new areas through patches of habitats (stepping stones) between isolated populations

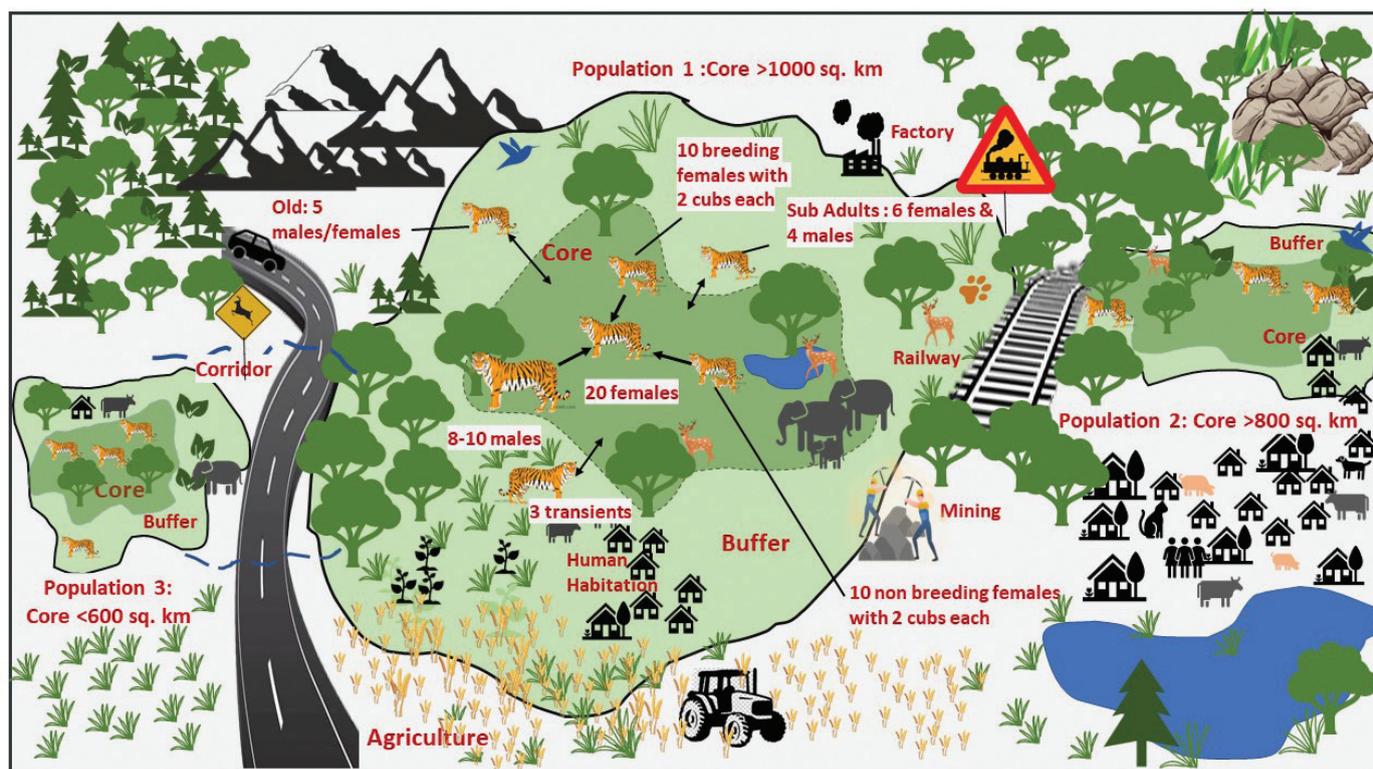


Photo Credit : Swati Saini

Tiger metapopulation dynamics: core-buffer-corridor framework

IDENTIFYING TIGER CORRIDORS: A LANDSCAPE APPROACH FOR TIGER CONSERVATION IN INDIA

To safeguard the investments made by the Government of India and for tiger to continue to survive into the long-term future, it is important that key tiger habitat strongholds (Tiger Reserves) remain connected with each other. To achieve this, tiger corridors (least cost pathway) have been delineated by NTCA with technical backstopping of WII based on real life data on tiger habitat suitability obtained from extensive ground surveys during the country wide assessment of tiger status.

These corridors ensure genetic exchange through dispersal, serve to guard against extinction risks caused by environmental and anthropogenic factors and guide land use planning in consonance with the development agenda

of the country. India is committed to secure the livelihoods of its citizens while simultaneously minimizing its impact on its conservation agenda. Delineated tiger corridors provide a tool to achieve both these targets.



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INCENTIVIZED, VOLUNTARY VILLAGE RESETTLEMENT TO CREATE MORE INVIOULATE CORE AREAS

The Wildlife Protection Act, 2006 amendment, made a provision for Project Tiger to incentivize relocation with a monetary package of 12,000 US\$ (Rs. 10 lakh) per adult in the family to relocate from within the core areas of tiger reserves after the settling of their legal rights. The package was later upgraded to 18,000 US\$ (Rs. 15 lakh) per adult in the family. This was an offer few forest dwellers could spurn, and many forest villages voluntary agreed to relocate outside the core.

Project Tiger has since relocated 19,478 families and spent an average of 12.88 million US\$ (Rs. 106 cores) per year for resettling people from core areas of tiger reserves to create inviolate space for tigers and their ecosystems. This monetary package from Project Tiger is often combined with State funds and other packages offered to poorer sections of the society to provide land for agriculture, housing, electricity, water and basic amenities. Often the tiger reserve managers work with conservation partners that specialize in handholding resettled communities, training them to engage with new livelihood options.



STRENGTHENING PROTECTION

Protection of the Tiger, one of the most charismatic lifeforms in the wild, takes centre stage in the conservation efforts of the country. The Wildlife (Protection) Act 1972 is a very powerful legislation. It provides for penalties of 3–7 years of imprisonment and/or fine of 60 US\$ to 2,500 US\$ (Rs. 5,000 to Rs. 2 lakhs) for the poaching of tigers. Winning over local communities does help in reducing poaching. However, given the fact of international market demand for tiger body parts, the incentive for poaching of tigers remains. Therefore, enforcement of law through patrols on the ground, use of modern technology that helps in apprehension of poachers, recording evidence that would stand the scrutiny of the legal process and result in conviction, are all equally important.

Retired army personnel were engaged to form a Tiger Protection Force for a few tiger reserves with 60% central assistance from NTCA. Equipped with arms and trained in their disciplined use, the Tiger Protection Force brought back the professional respect law enforcement had lost in the recent years. Vacancies were filled on priority within tiger reserves, with a current vacancy of 28.3%, the average ratio is of one management staff for every 6.5 km² area of a tiger reserve.

A mobile phone GPS-based patrolling application M-STrIPES (Monitoring System for Tigers Intensive Protection and Ecological Status), was developed and implemented across all tiger reserves. This application ensured that guards actually patrolled with the required spatial coverage and were incentivized with appropriate recognition for their efforts. The M-STrIPES allowed for optimization of patrols in space by identifying vulnerable areas through analysis of information collected by patrols and ecological evaluation.

Use of technology such as the E-eye (high mast surveillance cameras), a sensor-based system of thermal, and visual cameras deployed along some sensitive borders of high-profile tiger reserves relayed real-time surveillance to tiger reserve managers and acted as major deterrent for poachers. In some tiger reserves surveillance was also done with drones. A pattern extraction and comparison software (ExtractCompare) is used to develop and maintain a photo-database of about 100,500 camera trap tiger photos of about 8,000 individual tigers from the region (India, Nepal, and Bangladesh) since 2008. Tiger skins seized by law enforcement agencies from the illegal market are matched with camera trap images using ExtractCompare to identify poaching hotspots and trade routes. Many tiger reserves have deployed dog squads to effectively nab the offenders.

The effective implementation of law enforcement and interagency coordination within India and abroad orchestrated by the Wildlife Crime Control Bureau led to the deciphering of the illegal wildlife trade nexus. Appropriate training of frontline staff in crime investigation, collection of evidence, maintenance of custody and developing a (secret) network of informants for intelligence gathering were undertaken. National Tiger Conservation Authority

Various protection measures adopted in Tiger Reserves



Patrolling camp



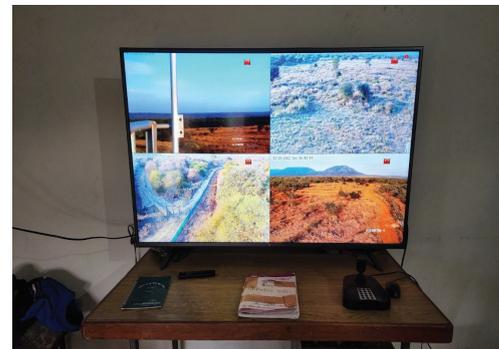
General patrolling



Women protection force



e-eye surveillance & control room



Various protection measures adopted in Tiger Reserves



Patrolling using M-STripES



Drone (UAV) surveillance



Dog squad in Tiger Reserve



Viper: Special Tiger Task Force in Periyar Tiger Reserve having expertise with jungle survival skills



Special Tiger Protection Force

and Wildlife Crime Control Bureau have established an online tiger / wildlife crime tracking / reporting system in tiger reserves.

NTCA has following roles in protection and anti-poaching operations:

- Alerting the States as and when required
- Transmitting backward / forward linkages of information relating to poachers
- Advising the States for combing forest floor to check snares / traps
- Performing supervisory field visits through the National Tiger Conservation Authority and its regional offices
- Providing assistance to States for anti-poaching operations
- Using information technology for improved surveillance (e-Eye system) using thermal cameras launched in Corbett
- Launching tiger reserve level monitoring using camera trap to keep a photo ID database of individual tigers
- Preparing a national database of individual tiger photo captures to establish linkage with body parts seized or dead tigers
- Assisting States to refine protection oriented monitoring through M-STrIPES
- Providing grant through NTCA for patrolling in tiger rich sensitive forest areas outside tiger reserves
- Assisting States to deploy local workforce in a big way for protection to complement the efforts of field staff **[In all, approximately 5.9 million mandays are generated annually with 50% central assistance]**



M-STrIPES

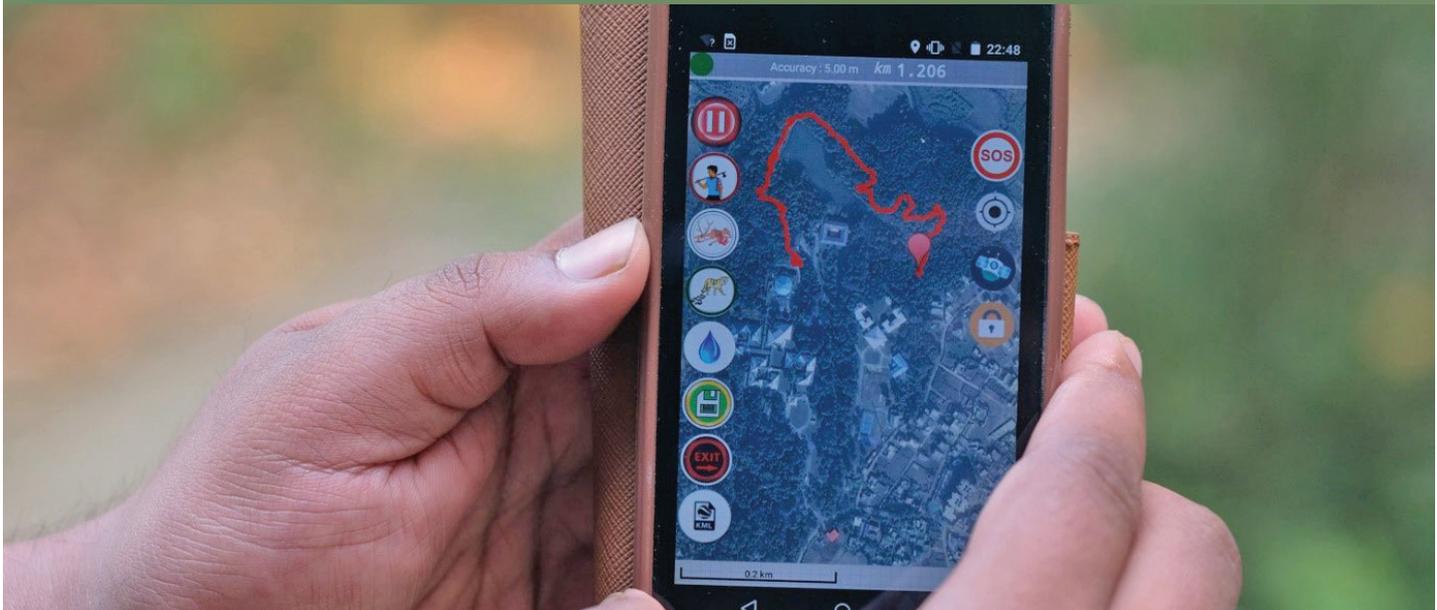
The efforts put to regularly patrol and monitor the remotest of forest in India are globally quintessential. The information brought by the patrolling team of frontline forest staff has built generations of people who now understand the pulse of changing forests and landscape. This same crew of frontline forest staff have been trained in countrywide tiger estimation program since 2006, where after every 4 years they collect information on status of carnivores, herbivores, habitat and human disturbances in the forest. This information reflects the ecological response of forest and wildlife to the changing human influence and crimes. However, this scientific data was never compared with the patrolling done or law enforcement. Lastly, human-wildlife conflicts, which remains a significant aspect of modern day conservation paradigm, is treated in isolation from the protection or wildlife status of the landscape. This has reflected in mitigation measures that are not informed by real-time ecological information or inconsiderate about the vigilance by patrolling teams. A platform that can host, archive and analyse information on these three pivotal dimensions of modern day conservation, while strengthening the existing administrative setup, was a need of hour. Within the ambit of these requirements, India is building one of the largest network on wildlife information using the program M-STrIPES.

M-STrIPES (Monitoring System for Tigers: Intensive Protection and Ecological Status) is a platform where modern technology is used to assist effective patrolling, assess ecological status and mitigate human-wildlife conflict. The program has been specially designed for the Indian conservation context focusing on tiger landscapes. However, it can be effectively used anywhere across the world in any conservation landscape. The program uses GPS, GPRS and remote sensing to collect information from the field, creates a database using modern IT based tools, analyses the information using most advanced GIS and statistical tools to provide inferences that allow practitioners to better manage their wildlife resources.

This GPS aided digital tool for recording and guiding patrols and ecological assessments was first initiated in 2009 as a standalone desktop application. Subsequently, it has evolved to mobile based application having three separate modules a) Patrolling b) Ecological monitoring, and c) Conflict in 10 regional languages. Associated analyses tools are available on a desktop application, which has in-built statistical and GIS tools. The data are now all digitally recorded with photographic evidence stamped with time, date and coordinates. This information is repositied and analyzed at division and state by Forest Departments, and at the country-scale by NTCA and WII. There is also a provisioning of viewing current live patrols across India. This easy to use, quickly accessible information has led to adaptive management in the country. M-STrIPES patrol module is currently being used by more than 5,000 frontline forest staff; while more than 10,000 frontline forest staff are using the ecological module.



Frontline Staff in Similipal Tiger Reserve patrolling using M-STrIPES patrol android mobile application



FRONTLINE FOREST FORCE OF THE COUNTRY

The Forest officers and the frontline field staff proactively shoulder the responsibility of saving the country's green heritage and the teeming biodiversity associated with it. These warriors serve round the clock in the remotest of the wilderness areas having bare minimum facilities to protect these tiger habitats.

Often staying far from their families and loved ones, these unsung heroes risk life and limb everyday as they set out for their field patrols. From chasing and confronting organized wildlife crime mafias, to being at risk of getting attacked by wild animals, the forest frontline staff plays an intricate role in balancing the conservation efforts with that of the demands of fringe dwelling communities and the development needs of the country.

Even in these extraordinary times our forest force continues to put their lives on the line to protect our natural heritage. These behind-the-scenes workers are the real heroes and the actual drivers of this huge conservation effort who deserve much applause.



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Floating Patrolling Camps at Sundarban Tiger Reserve, West Bengal



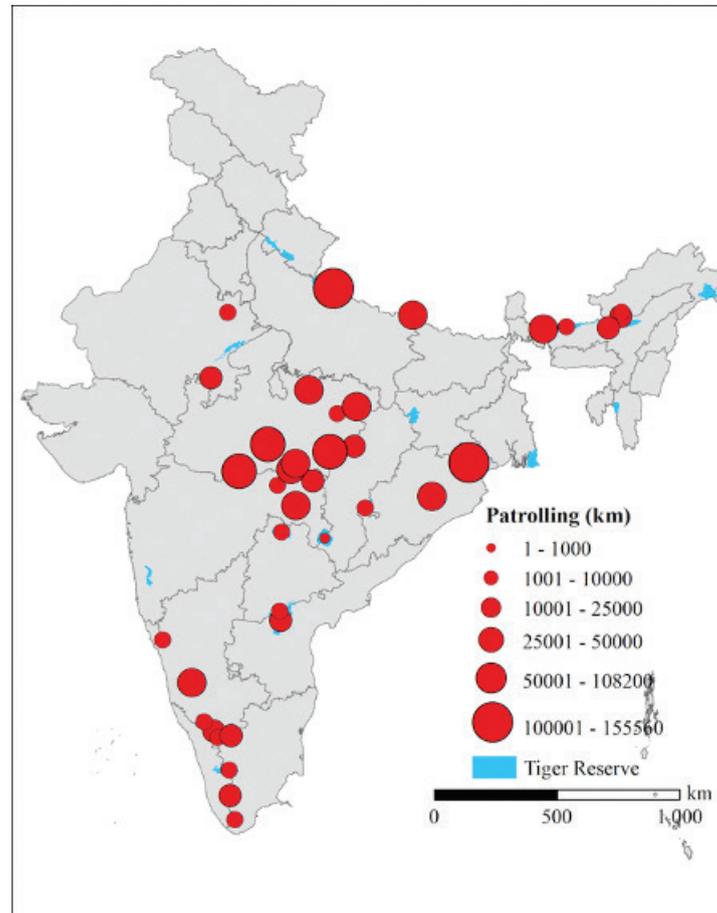
© Pradeep Vyas

Jungle patrol in high tide in Sundarban Tiger Reserve, West Bengal

On Ground Tiger Protection Force and Infrastructure



PATROL EFFORTS (IN KM) INVESTED BY TIGER RESERVES DURING THE COVID -19 PANDEMIC IN 2020



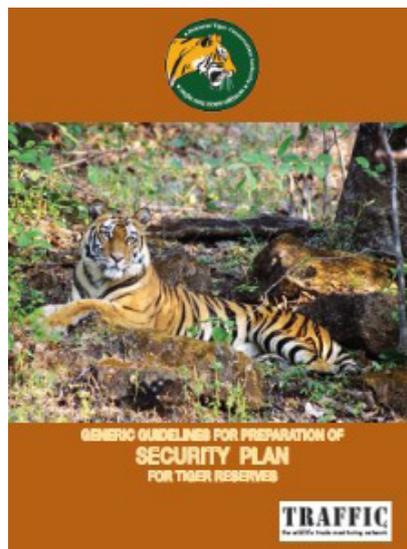
Frontline forest staff in the nation's tiger reserves were confronted with heightened conservation challenges during the 2020 nationwide lockdown to combat the Covid-19 outbreak. Data aggregated from the state-of-the-art M-STrIPES wildlife protection and monitoring program reveals their stellar response.

On an average approximately 200,000 km foot patrolling/month being executed by frontline staff of Tiger Reserves in the country using M-STrIPES.

SECURITY PLAN AND SECURITY AUDIT OF THE TIGER RESERVES

Today, every living wild tiger is under threat, irrespective of where it is found. While the degrees of such threat may vary, the fact is any tiger bearing area must be considered as vulnerable to external threats. Species such as the leopard, elephant or rhino which are prized in the illegal wildlife trade or other prey usually associated with tiger landscapes also add to the threat of poaching. NTCAs have issued a generic guideline for reserve specific security plans, which become parts of their Tiger Conservation Plans. These security plans attempt to provide a roadmap at recognising and evaluating threats to any Tiger Reserve and formulating an appropriate response to such threats.

To further assess the efficiency of our security regimes, a security audit protocol was drafted in 2017. Law enforcement monitoring is a site specific way of keeping track of our Law enforcement efforts. 'Site specific' because every Tiger Reserve is different and its law enforcement needs vary. While results can be compared between different years in the same Tiger Reserve, they cannot be compared between sites. Keeping in mind these, Security Audit Protocol have been developed to assist Tiger Reserve managers in regularly tracking the progress of their enforcement efforts to tackle poaching in their sites. The status assessment is conducted by independent team constituted by NTCAs at regular intervals. 25 tiger reserves have already been assessed for their security protocols through this framework.





MANAGEMENT EFFECTIVENESS EVALUATION (MEE) OF TIGER RESERVES

Survival of tigers is dependent on conservation and management efforts. To gauge the success of conservation efforts as well as to guide management inputs, it is important to assess the effectiveness of management of Tiger Reserves.

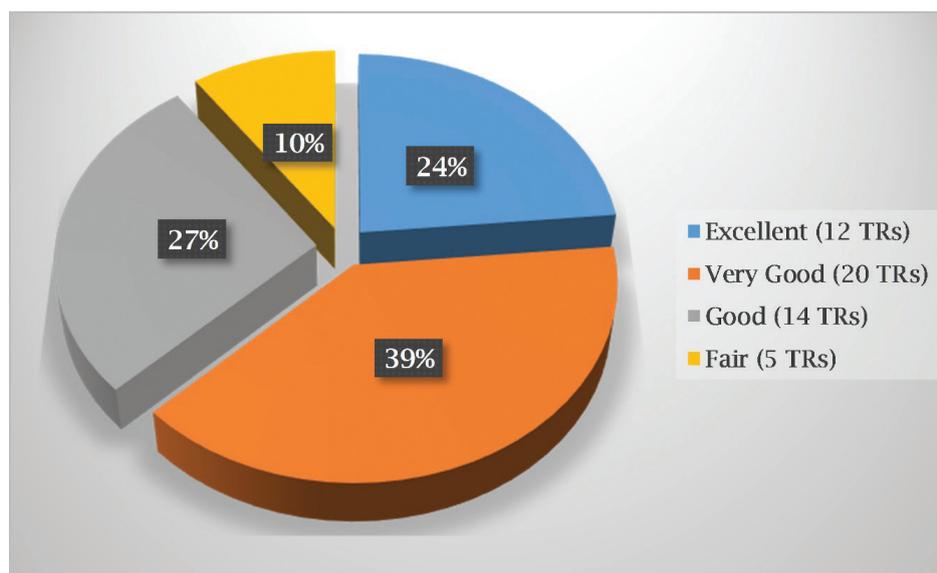
Post the disappearance of tigers in Sariska Tiger Reserve, the Government of India issued a directive to the Office of Comptroller and Auditor General (C&AG) of India and the Ministry of Environment, Forest and Climate Change (MoEFCC), Government of India to conduct an independent audit and place the report in the Parliament.

The Wildlife Institute of India (WII) in close collaboration with global experts and National Tiger Conservation Authority (NTCA) developed a framework for independent evaluation procedure to evaluate Tiger Reserves of the country. The criteria and indicators adopted for conducting the Management Effectiveness Evaluation (MEE) using IUCN's World Commission on Protected Areas Framework for assessing the management effectiveness have been suitably adapted to suit Indian conditions. MEE Framework includes consideration of design issues, the adequacy and appropriateness of management systems and processes and the delivery of protected area objectives including conservation of values.

The 'independent' evaluation of Tiger Reserves in India was initiated in 2006 with 28 Tiger Reserves and till now five cycles of evaluation have been completed with the fifth cycle covering 51 Tiger Reserves. The subsequent cycles of evaluation have enhanced the management perspectives of Tiger Reserves. The MEE exercise helped in achieving management goals by Tiger Reserve Managers across the country. During the latest assessment of MEE 2022, the overall MEE rating increased by 8% and no tiger reserve in the country falling in poor category which indicated that despite all challenges and resource constraints, India has been able to manage its tiger reserves effectively. With the help of MEE exercise, India objectively assessed that our Tiger Reserves are the best managed parks in the country due to various management strengths such as protection strategies, good managerial support, mitigation of human wildlife conflicts, compliance of statutory requirements, professionally prepared Tiger Conservation Plans etc. The Indian MEE exercises in the Tiger Reserves clearly demonstrate that our Tiger Reserves are effectively being conserved and managed through ecologically representative, well-connected and equitably governed systems of protected areas and are appropriately integrated into wider landscapes.



Reports of five cycles (2006-2022) of MEE in Tiger Reserves



Percentage of Tiger Reserves under different categories as observed during 5th cycle of MEE 2022-23

There has been continuous improvement with subsequent cycles of evaluation in MEE score of Tiger Reserves. The overall mean MEE score in second cycle in 2010 was 65%, and 69% in third cycle in 2014, 70% in fourth cycle of evaluation in 2018 and 78% in fifth cycle of evaluation in 2022.

CONSERVATION ASSURED TIGER STANDARDS (CA | TS)

The Conservation Assured Tiger Standards (CA | TS) is a management evaluation tool which is being implemented in tiger occupied areas outside tiger reserves to improve quality of management interventions in these areas and finally lead to certification. The Government of India has now decided to implement the CA | TS framework across all tiger reserves for international accreditation and 23 Tiger reserves have already been accorded with the accreditation.



CA | TS Manual
Version 2 | June 2018



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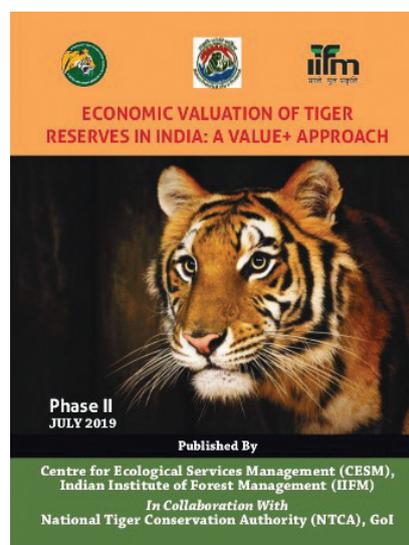
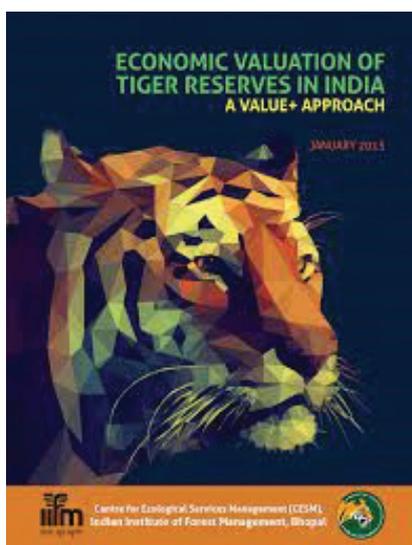
VALUATION OF ECOSYSTEM SERVICES AND CLIMATE CHANGE MITIGATION MEASURES

Economic Valuation of sixteen tiger reserves done in collaboration with the Indian Institute of Forest Management to assess value of the ecosystem services they provide and their potential role in climate change mitigation. These tiger reserves were evaluated for their tangible economic value based on standing crop, carbon sequestering, employment generation, direct profits and ecosystem services, amongst other values that could be monetized.

As per the recent reports, the value of annual flow of benefits from a tiger reserve ranged between 76,900 and 292,300 US\$/km². Tiger Reserves also conserves a carbon stock between **1.95 billion US\$ to 13.08 billion US\$**. **Approximately 571 million US\$ to 1,801 million US\$ annually** monetary benefit is derived from the forest ecosystem services. All Tiger Reserves will be covered under this project and economic valuations will made.

Following a VALUE+ approach, the project highlights interrelationship between health and forest areas of tiger reserves. The project makes a pioneering attempt at using IPBES (Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services) protocols for highlighting cultural uniqueness of each tiger reserve in the form of case studies, narratives and anecdotes.

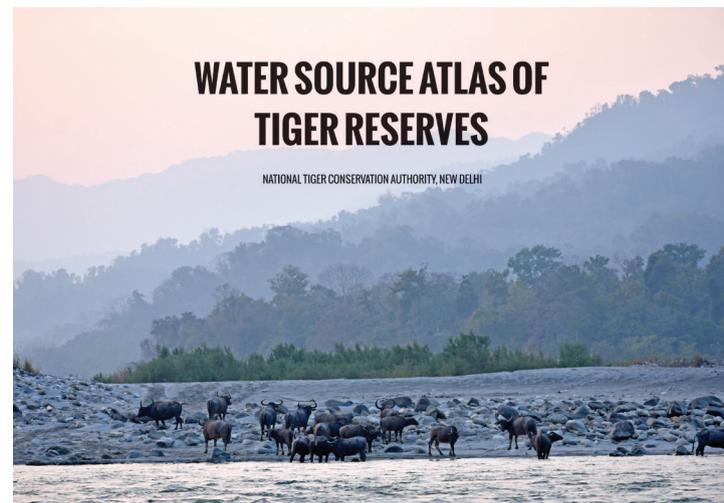
A pilot project has been initiated in collaboration with The Energy and Resources Institute (TERI) on monetizing carbon sequestration to benefit Tiger Conservation Foundations and locals.



WATER ATLAS FOR TIGER RESERVES

Tiger reserves are effective tools of conservation of natural forest and wilderness areas. Besides conserving tigers, they are vital to ensure perpetuity of natural evolutionary processes and also support ecological processes responsible for providing a range of various associated economic, social, cultural and spiritual benefits. Forests contribute significantly in balancing the hydrological balancing of watershed ecosystem and maintain high quality water. These reserves have many important rivers, streams and natural wetlands. Approximately 350 rivers originate from India's Tiger Reserves. Forests and water bodies capture water during monsoon and can be a source of water throughout the year. These reserves play critical role in not only regulating and ensuring water security but mechanism to provide natural water purification systems and enhance watershed functions. The reserves have many reservoirs, important for irrigation and power supply. A recent study based on VALUE+ approach indicated that monetary value for provisioning of water from ten Tiger Reserves varied in between 4.6 million US\$ to 847.6 million US\$ annually. Therefore, it is needless to mention that maintenance and protection of these natural water sources and their catchment areas are of paramount management importance to ensure water security in the country.

Water sources in the tiger reserves generally feature in their respective conservation management plans. Considering the global and national level significance of the tiger reserves, it is pertinent to have a consolidated document mapping the water sources in tiger bearing forested areas of the country. In light of this, a national water atlas is thus prepared by NTCA using the freely available remote sensing data and Geographic Information System (GIS) to map all the water bodies within tiger reserves to provide a baseline information for the forest managers to have a synoptic view of water sources present in the region to further plan on ground management and conservation strategies.



TRAINING AND CAPACITY BUILDING OF FRONTLINE STAFF

The following thematic areas are important for capacity building of frontline staff in an ongoing manner and regular training and capacity building is done on these.

1. Basic knowledge of field craft, wild animal evidences and their identification/collection
2. Knowledge of local flora/fauna, floral associations, inter-specific associations amongst wild animal species, internecine combats amongst larger cats like tiger and anti-predator strategies for wild ungulates, vocalizations, advertisements, wildlife techniques and data collection, jurisprudence, use of GPS/Camera trap/range finder and related basic tools.
3. Basics of self-defence, anti-poaching operations, day to day regimen for physical fitness
4. Making opportunistic observations of wild animals, crime scene analysis and evidence collection, use of forensic kits and basics of sample collection/packaging
5. Tiger monitoring based on camera trap IDs, other evidences, mapping of resident tigers leading to spatio-temporal forecasting, monitoring of livestock kills
6. Use of fire arms, their maintenance and police attachment in an ongoing manner
7. Innovative techniques for wildlife crime related information gathering, surveillance and sharing of intelligence
8. Fundamentals of fire protection, forest road repair and minor civil works
9. Monitoring the health status of wild animals, prophylactic immunization, testing quality/contamination of artificial waterpoints
10. Exposure to chemical immobilization, rescuing wild animals causing distress and wild animals in distress (barring natural prey-predator/internecine interactions), use of BOMA technique, maintenance of rapid response teams



Glimpses of Training and Capacity Building for Frontline Staff

PARTICIPATORY INITIATIVES IN TIGER CONSERVATION

Since public awareness and participation plays a vital in biodiversity conservation and reducing crimes. Therefore, the authority regularly conducts various awareness programmes at the national level. As a part of engaging indigenous communities to gain their support and promote their participation, 'Integrated conservation Approaches' are adopted. Various Tiger Reserves has successfully executed awareness drives to motivate, educate and involve locals in protecting the biodiversity. To strengthen the local communities, a number of Self Help Groups and Eco-Development Committees were established to promote regional art and culture. Currently, the country is having almost 2,900 eco-development committees spread across Tiger Reserves. Also to provide them alternate employment opportunities, locals are hired as watchers, guards etc. to generate alternate employment opportunities which in-turn discouraged illegal activities within the Tiger Reserve Network. Unique approach has been adopted for involving fringe area communities in park management systems and securing alternate livelihood options for them.



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Community participation for tiger conservation



Patrolling



Habitat management



Fire fighting



Hospitality management



Community based ecotourism

Credibility services for communities: village ecodevelopment



Cattle proof trenches



Solar light and pump



Livestock immunization program by forest department



Medical camps run by forest department



Bio gas plant



Village School

Income generation activities: sustainable alternative livelihoods



Vermicomposting



Promoting regional crafts from Lantana



On farm activities



Souvenir shop

Skill development training programs conducted by forest department



Driving



Furniture making



Hospitality management



Traditional jewellery making



Private security guards



Masonry

Community sensitization programs conducted by NTCA and forest department



TIGER CONSERVATION FOUNDATIONS

The Tiger Task Force recommended that revenues generated from the tiger reserve by the Government as well as by the tourist industry should be shared with communities residing in the buffer zone. The prior practice was that all gate receipts were deposited with the State treasury and unavailable to the tiger reserve for its management. To circumvent this limitation Tiger Conservation Foundations were created for tiger reserves. Gate receipts, donations, funds for antipoaching activities (secret funds) could now be deposited with the tiger conservation foundation that were administered by a local committee with the Field Director of the tiger reserve as member secretary and representatives of local communities as committee members.

Most of the Tiger Conservation Foundations seek to generate revenue through ecotourism and other alternative opportunities to sustain the Tiger Reserves. However, there lacks a uniformity in financial competence of these foundations since many parks are too remote and unstable to attract tourists thereby earning very less revenue. Currently tiger conservation foundations are functional in 46 tiger reserves out of the 53 tiger reserves, with the past five-year average annual income of each tiger conservation foundation amounting to 287,000 US\$. Of this, on an average 40% of revenues generated by the tiger conservation foundations were to be used for buffer zone community welfare activities. Another 40% were used by the tiger reserve for enhancing protection. As mentioned earlier, Tiger Conservation Foundations of all tiger reserves are not equally resourceful as some world renowned tiger reserves attract more funds (e.g. Ranthambhore Tiger Reserve in Rajasthan averages at 2.5 million US\$ [Rs. 20 crores] income per year) compared to other tiger reserves. In 2018-19, Parambikulam Tiger Reserve in Kerala earned approximately 0.6 million US\$ (Rs. 5 crores) by way of entry fees, various accommodation packages, vehicle safari, dormitory, Eco shop sale, revenue by way of check post receipts, rent, bank interest etc. of which an amount of approximately 0.59 million US\$ (Rs. 4.8 crores) was spent for the various activities such as wildlife surveys and training and capacity building of frontline staff and local communities. At the discretion of the State Chief Wildlife Warden and the tiger conservation foundation committees, the surplus funds from better-resourced tiger conservation foundations could be used for activities in the buffer zones of other tiger reserves within the State. These additional resources directly emanating from tiger reserves to communities provide the required incentives to support the conservation initiatives and convert hostile neighbours into supporters.

Tiger Conservation Foundation (TCF) is an innovative mechanism mandated under the Wildlife (Protection) Act, 1972 for facilitating tiger conservation by involving local communities through eco-development process. TCFs are expected to take up a variety of roles which require professional inputs and expertise. These may range from identifying and understanding the underlying socio-economic and ecological dynamics in the landscape,

monitoring of various attributes of the Tiger Reserve, ensuring the constitution and sustainability of various eco-development activities, preparation of specific project proposals, conducting capacity building and skill enhancing programs for staff and villagers mobilizing resources; management research etc. The Foundation has to imbibe the good characters of both government and NGO, thereby amalgamating the virtues of both-authority and flexibility respectively.



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WELFARE OF FRONTLINE STAFF

Various staff welfare measures, *inter-alia*, include:

1. Insurance coverage for accidents, death
2. Institutionalizing special ex-gratia system for the nearest kin of deceased staff from the tiger conservation foundation
3. Organizing health camps of annual health check-up and treatment
4. Providing fair priced mobile outlets for staff posted in remote camps
5. Ensuring safe drinking water and other amenities to staff posted in patrolling camps
6. Providing essentials of the household at concessional prices for the staff posted at remote locations
7. Construction of hostels in nearby towns to provide accommodation to children of frontline staff
8. Institutionalizing e-learning to benefit children of frontline staff in collaboration with government and like-minded organizations
9. Interest free soft loans



In October, 2022, NTCA signed a Memorandum of Understanding with AID FOR MANKIND, New Delhi on cooperation in providing basic life support training and healthcare to the frontline forest staff of the Tiger Reserves in India.

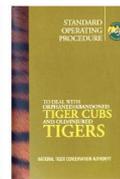
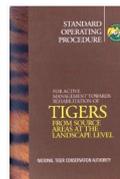
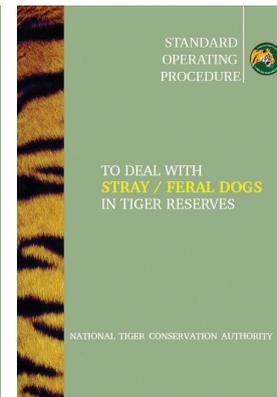
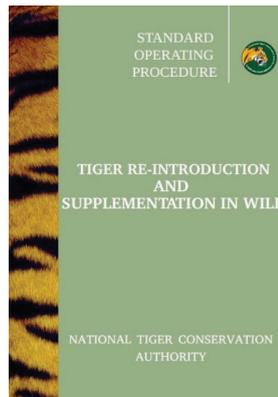
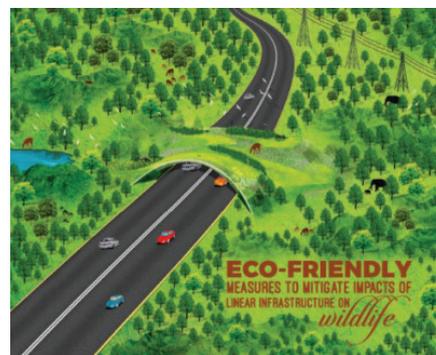
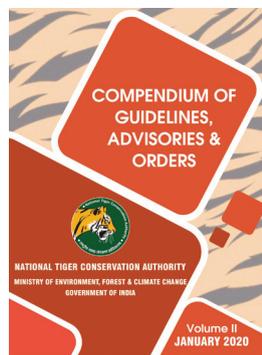


TECHNICAL SUPPORTS PROVIDED BY NTCA

Along with this the authority has released and actively implemented various Protocols and Standard Operating Procedures as accord to the time and situation. The technical support is provided in the following aspects of tiger conservation and management:

- Approval of Tiger Conservation Plans
- Formulation of normative standards for tourism activities and guidelines
- Approve, coordinate research and monitoring of tiger, co-predators, prey and habitat
- Assessment of infrastructure/ developmental projects within the tiger reserves
- Capacity building and skill development of tiger reserve officials and staff
- Standard Operating Procedures for managing the conflict situations, tiger mortality, active management and other thematic areas.
- Special guidelines in light of Covid 19 pandemic.





Normative guidelines and SOPs issued by NTCA



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FINANCIAL SUPPORT PROVIDED BY NTCA

For fulfilling the objectives of tiger conservation, the Project Tiger, an ongoing Centrally Sponsored Scheme (CSS-PT) provides funding support to the tiger reserves under two broad categories namely: the 'Non Recurring' and Recurring' activities. Funding is generally provided under Central Government Schemes such as 'Project Tiger' and 'Integrated Development of Wildlife Habitats'.

Some of the activities covered under 'Non Recurring' category are: strengthening of protection, deployment of armed squads in tiger reserves, creating basic infrastructure for management, roads, wireless, civil works, habitat development, augmenting water resources, compensatory ameliorative measures for habitat restoration, eco-development, village relocation etc. The 'Recurring' activities considered for funding are: creation / deployment of local work force for patrolling/barriers, habitat improvement, providing salt licks, water facility, fire protection measures, maintenance of various assets, publicity and extension and legal assistance.

In case of North Eastern and Himalayan states, the funding pattern is 90:10 wherein the 90% of the scheme cost is provided by the Government of India as central assistance through NTCA and remaining 10% of the cost will be contributed by the State Government. For rest of India, the cost of the scheme (CSS-PT) for recurring activities is shared as 50:50 basis and 60:40 basis for non-recurring activities by Central Government and State Governments.

The tiger reserves submit their proposals for funding through Annual Plan of Operations (APO) to NTCA through State's Chief Wildlife Warden (CWLW). The APOs are scrutinized at NTCA by taking into account the management prescriptions given in the 'Tiger Conservation Plan (TCP) of respective Tiger Reserve. After vetting of the APO at various levels, funds are released from NTCA to the tiger reserves through State Governments. Financial assistance is now being provided to tiger bearing areas outside tiger reserves.

A Tiger Conservation Authority Fund has also been operationalized to elicit funding under corporate social responsibilities (CSR).



SOCIAL OUTREACH BY NTCA

NTCA has an interactive, user friendly website (www.ntca.gov.in) where all relevant information on tiger conservation governance has been provided. Regular updates are made to appraise the public about different activities being taken up by the authority. Updates are also made in the authority's official twitter handle (https://twitter.com/ntca_india) to sensitize public about different facets of tiger and wildlife conservation.

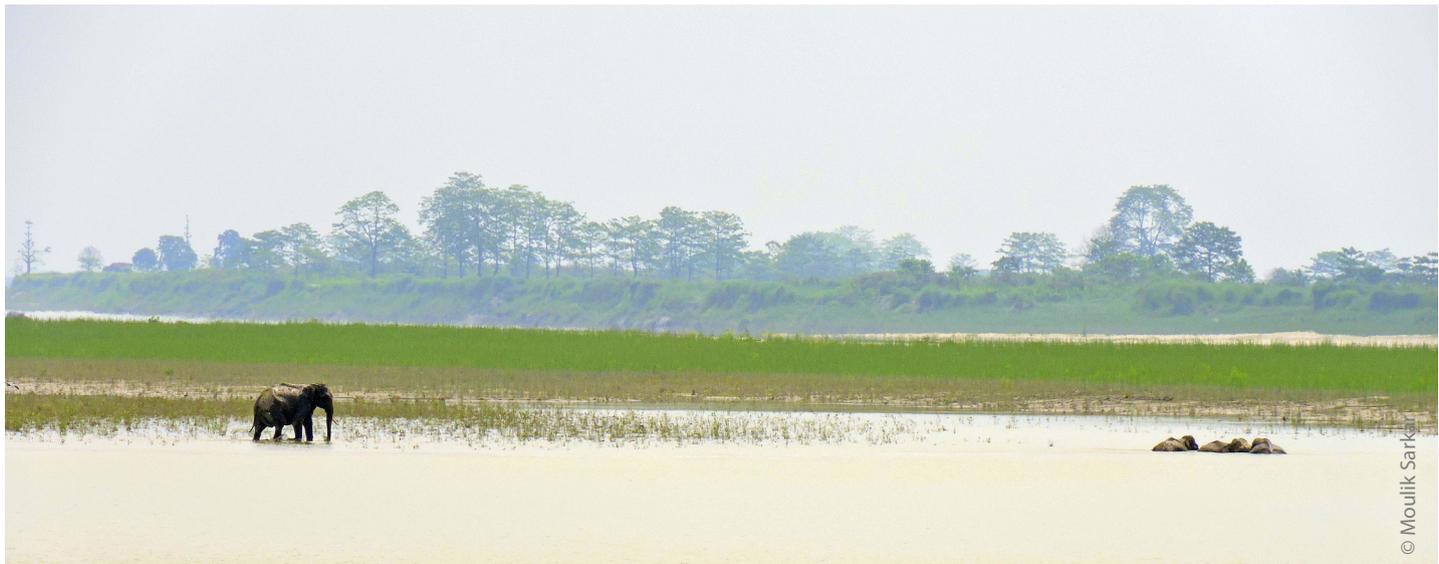
The collage consists of six screenshots from the NTCA's Twitter account:

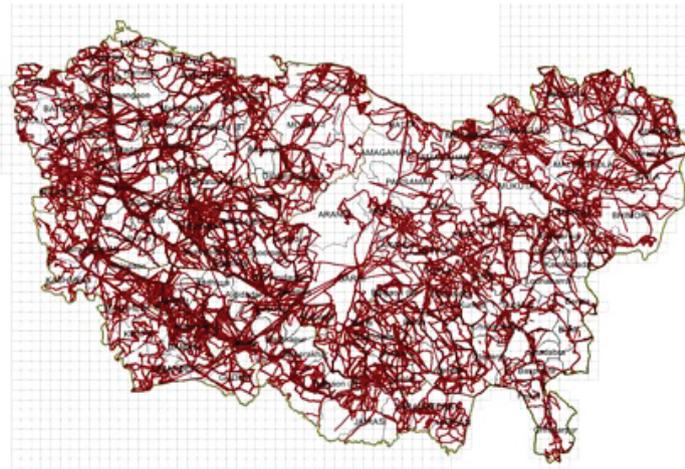
- Top Left:** A tweet from Jan 31 about the Panna Tiger Reserve, featuring a photo of a tiger and a caption mentioning the reintroduction of tigers.
- Top Middle:** A tweet from Jan 14 about 33 reptile species found at Dampa Tiger Reserve, Mizoram, with a grid of four photos showing various snakes.
- Top Right:** A tweet from Mar 6 about a bilateral meeting between India and Cambodia on tiger conservation, with a photo of officials.
- Middle Left:** A tweet from Jan 14 about the arrival of cheetahs at Kuno National Park, featuring a photo of a cheetah in a forest.
- Middle Right:** A tweet about the ban on single-use plastics (SUP) by MoEFCC, with a graphic titled "PLANET OR PLASTIC?" and the slogan "Stop Single-Use Plastic pollution!".
- Bottom Left:** A tweet from Sep 19, 2022, about cheetah images as they are set to arrive in India, with a photo of a cheetah in a cage.
- Bottom Right:** A tweet from Jul 1, 2022, about the ban on single-use plastics, with a graphic similar to the one in the middle right.

ADAPTIVE MANAGEMENT

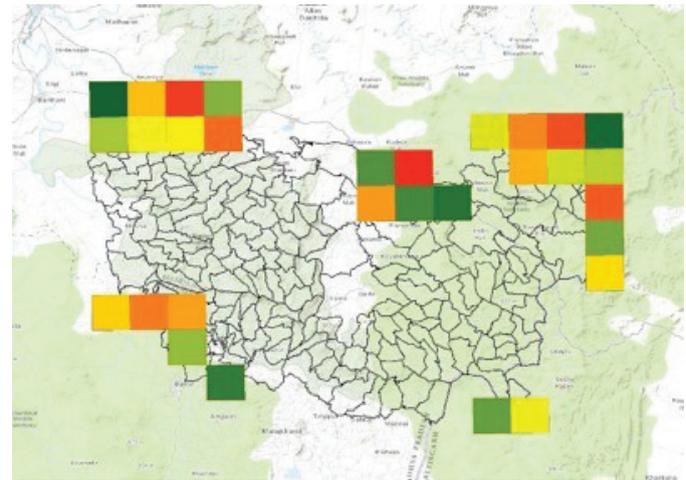
Adaptive management in wildlife conservation emerged from the wildlife profession's search for better solutions to increasingly complex conservation challenges. Adaptive management is an effective process for wildlife managers to employ to (1) deal with uncertainty in the management system, (2) learn from their management actions, and (3) achieve desired results. Being adaptable or flexible in management approach is not the same as managing adaptively or conducting adaptive management. Adaptive management requires adhering to a stepwise process and fully executing each step. A critical step is rigorous monitoring and assessment of management interventions. Without this, wildlife managers cannot achieve the essence of adaptive management, which is the explicit goal of learning more about the management system after each management action.

Efficient management of tigers and tiger habitats relies on the regular monitoring and capacity building of forest frontline staff to manage tigers, their prey species and habitat. Along with this, it is required to use adaptive management practices and modern, innovative science, tools and technologies. India has excelled in the field of monitoring tigers through camera trapping and now, the country has evolved by using modern application based wildlife monitoring tool called, M-STrIPES. It is used to assist effective patrolling, assess ecological status and mitigate human-wildlife conflict in and around the reserves. This program uses Global Positioning System (GPS), General Packet Radio Services (GPRS), and remote sensing, to collect information from the field, create a database using modern Information Technology (IT) based tools, analyses the information using GIS and statistical tools and drones etc. which further facilitates the improved management and monitoring of the reserves.





Patrols tracks



Illegal activities



Where to patrol next?

Adaptive management framework based on M-STrIPES. Based on information generated through smart patrolling, the program automatically optimizes patrol paths to maximize field impacts to control wildlife crime.

HARMONIZING DEVELOPMENT WITH TIGER CONSERVATION

As India is witnessing rapid economic development and growth, the natural resources and forest areas are under immense pressure. Nevertheless, our commitment towards sustainable future is uncompromising. Roads, railway tracks, power transmission lines and other linear infrastructure have become a pervasive component of the natural landscapes in India and their rapid expansion has the potential to radically transform these landscapes. 'Development without Destruction' is the key facet of working of the Government of India and 'faster clearance but rigorous compliance' is the operational focus of Ministry of Environment, Forest and Climate Change and NTCA. The challenge currently faced by the Government of India is to promote efficient and green infrastructure that facilitates economic growth and development, minimizes environmental impacts and protects biodiversity and ecosystem functions. In order to respond to this challenge of bridging the conservation-development divide, India has adopted policies and strategies by offering smart solutions to 'promote development with caution' in wildlife habitats within integrated landscapes.

Both conservation and development can happen in a mutually complementary manner. India needs to prosper both economically and environmentally. We have to be both, smart and sensitive, and create a healthy balance of environmental sustainability and economic growth. Wildlife sensitive development and retrofitting of linear infrastructure will ensure the fulfilment of the commitment our Honourable Prime Minister made on International Tiger Day while releasing the Status of Tiger in India 2018; "Development along with Conservation". This commitment made the Nation proud and paved the way for the need to safeguard our precious biological heritage while walking the path toward modern development.



INTERNATIONAL OUTREACH FOR TIGER CONSERVATION

India has been at the forefront of tiger conservation by virtue of having the single largest population of free ranging wild tigers in the world. With the objective of fostering international collaboration, co-operation, exchange of best management practices and capacity building, India has entered bilateral instruments and Memorandum of Understanding with Tiger Range Countries.

Besides managing and monitoring the tiger population, prey density and combating with wildlife crimes within the country, it is also important to collaborate with transboundary countries in such regard. Also, as per St. Petersburg declaration, it was decided that the transboundary countries shall work in coordination to facilitate the movement of tigers across the borders as part of the larger tiger conservation landscape. India has actively collaborated with other tiger range transboundary countries such as Bangladesh, Myanmar, China and Bhutan. Following the declaration, the country has already signed an MoU with four countries namely, Bangladesh in 2011, Russia in 2018, Myanmar in 2020 and Bhutan in 2021. Also, India already has an MoU with China signed in 1995 and is in advanced stage to sign an MoU with Nepal. These bilateral MoUs build up the international collaboration, coordination, and communication of India with several countries. We have recently signed an MoU with Namibia for biodiversity conservation which enabled introduction of cheetah in India. An MoU has been signed between India and Cambodia in November 2022 for cooperation on biodiversity conservation with special focus on tiger reintroduction in Cambodia.

Some of the key initiatives undertaken so far are:

1. Capacity building workshops have been carried out with Thailand, Malaysia, Bangladesh, Bhutan and Cambodia in the field of tiger conservation planning.
2. Field visits of Russian, Malaysian, Cambodian and Chinese officials have been conducted in tiger reserves of India for demonstrating tiger conservation practices first hand.
3. Tiger re-introduction experiences have been shared with Cambodia and Russia.
4. Hosted 3rd Asia Ministerial Conference (3rd AMC) in New Delhi from 12th to 14th April, 2016.
5. Hosted the 1st and 3rd Stock Taking conferences on tiger conservation in 2012 and 2019 respectively to view progress of Tiger Range countries vis-a-vis the Global Tiger Recovery Programme (GTRP).
6. Protocol on Conservation of the Royal Bengal Tiger of the Sunderban between the Government of India and Government of Bangladesh.

7. Protocol on conservation of the tiger between the Government of the Republic of India and the Government of the Peoples Republic of China.
8. Memorandum of Understanding between the Republic of India and the Union of Myanmar for cooperation on combating timber trafficking and conservation of tigers and other wildlife.
9. A tripartite MoU between the National Tiger Conservation Authority, Wildlife Institute of India and A.N. Severstov Institute of Ecology and Evolution, Russian Academy of Sciences, Moscow, was agreed upon and signed for cooperation in the field of conservation genetics, disease dynamics in wild tigers besides others.
10. Technical support to Land of Leopard National Park, Russia for implementing CaTRAT and developing a photo database for Amur leopards and tigers.
11. Hosted pre-summit meeting of Tiger Range countries in New Delhi in August 2022 prior to 2nd international tiger forum held at Vladivostok.
12. Hosted meeting of tiger range countries at New Delhi in November 2022 for determining new targets and commitments of the Global Tiger Recovery Program (GTRP) for 2022-2034.
13. Bi-lateral, reciprocal consultations with delegation of Clemson University, USA in a region of India to strengthen the on-going partnership with NTCA, Global Tiger Forum and Global Tiger Initiative to address real-world issues related to conservation.



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MoU with Namibia



MoU with Cambodia



India-Russia, Bilateral Sep 25, 2018, Vladivostok, Russia



Meeting between Dr. S.P.Yadav, Member Secretary (NTCA) & Dr. Say Sam Ai, Hon'ble Minister of Environment, Cambodia



India-Bangladesh, Bilateral Jan 28-29, 2016, Sundarbans, India



Transnational Collaborative Consultation GTF-Mission, India-Malaysia



Meeting with Cambodia (Feb 28, 2023) for providing technical assistance to tiger recovery

Important transboundary engagements



India hosted Pre-Summit meeting of Tiger Range Countries at New Delhi in August 2022 as a prelude to the Tiger Range Countries Summit held at Vladivostok, Russia



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MEETING ON TRANSBOUNDARY CONSERVATION OF TIGERS IN SUNDARBAN LANDSCAPE IN INDIA AND BANGLADESH

The bilateral meeting on Transboundary Conservation of Tigers in Sundarban Landscape of India and Bangladesh was held at Kolkata on 14th February, 2023.

Agenda Discussed

- Declaration of Sundarbans as a Transboundary Protected Area that will ensure a minimum commonality and synergy in Management of Sundarban Landscape.
- Mapping of the Corridor along the Indian and Bangladesh Sundarban Forest and assessment of biodiversity and subsequent preparation of Management Plan
- Elaborate studies of Existing Flora and Faunal Biodiversity with emphasis on Major Species
- Exploring the possibilities of Mutually agreed SOP of Joint Patrolling in Vulnerable areas along the International Boundary
- Study of different ecological parameters including research and management in the landscape with reference to the changing Scenario considering the impact of Climate Change
- Explore the possibilities of Incorporating issues of Forest and Wildlife Management in the formal border meets
- Sharing of the knowledge on Biodiversity conservation, livelihood improvement, disaster management, mitigation of Human Animal Conflict, Pollution Control including the involvement of the community
- Training and Capacity Building of Field level Forest Officials



SUSTAINABLE FINANCING FOR TIGER CONSERVATION

Furthermore, as per the declaration it was decided to explore and mobilize domestic funding, including new financing mechanisms based on forest carbon financing including REDD+, payment for ecosystem services (PES), ecotourism, and private sector, donor, and nongovernmental organization partnerships. To facilitate funding for environment, in February 2015 the Parliament of India passed tax reforms that include the channelling of about US\$6 billion/year of tax revenues as incentives for forest conservation. Also, the ‘Technical Assistance Consultant’s Report, 2017’ by the Asian Development Bank, summarizes a study, which showed that the effective GDP or total source of livelihood of rural and forest-dwelling depending poor households, show a marked different in proportions of income sources. In India the proportion of contribution of this natural capital increased from 17% to 47%. Furthermore, India was the first country in the world to commit to developing green national accounts, and work is underway to deliver this ambition.

It is also important to appeal commitment from international financial institutions, such as World Bank, Global Environment Facility, Asian Development Bank, bilateral and other donors and foundations, CITES Secretariat, non-governmental organizations, and other conservation partners can also provide or mobilize financial and technical support for tiger conservation. In this regard, the World Bank hosted the GTI Secretariat until July, 2015 and acted as a convener of a global network working to save wild tigers and snow leopards from extinction. The Secretariat helped with the strategic imperatives agreed to in the St. Petersburg Declaration on Tiger Conservation and the Global Tiger Recovery Program.



CELEBRATION OF GLOBAL TIGER DAY

As a part of building tiger conservation awareness, a Global Tiger Day is declared to be celebrated 29th of July every year. Since the St. Petersburg Declaration in 2010, the Global Tiger Day is celebrated annually. India celebrates the Global Tiger Day every year on a larger scale where each of the Tiger Reserve participate actively and also conducts a number of educational and awareness activities.



3RD STOCKTAKING CONFERENCE ON TIGER CONSERVATION

The 3rd Stocktaking Conference on tiger conservation was held on 28-29 January 2019 in New Delhi. This was organized by the Global Tiger Forum, as an implementing arm of the Global Tiger Initiative Council (GTIC), in collaboration with the National Tiger Conservation Authority and other conservation partners.

The two-day conference included country updates on the Key Performance Indicators (KPIs) of Tiger Range Country specific National Tiger Recovery Program (NTRP), and technical presentations on themes such as protection, habitat/ prey/ tiger recovery, management of human wildlife interface issues, smart green infrastructure, habitat, field management, conservation finance and partnerships. Apart from this, there were four Side Events, viz. reviewing of the Sub continental level Tiger estimation for India, Bangladesh, Bhutan, and Nepal. Maximizing synergies of partnerships for tiger conservation, combating wildlife trafficking issues and a discussion on contours of strategy for conventions (CITES).

Tiger-range governments agreed on the urgent need to address critical gaps across the tiger range through a set of recommendations.



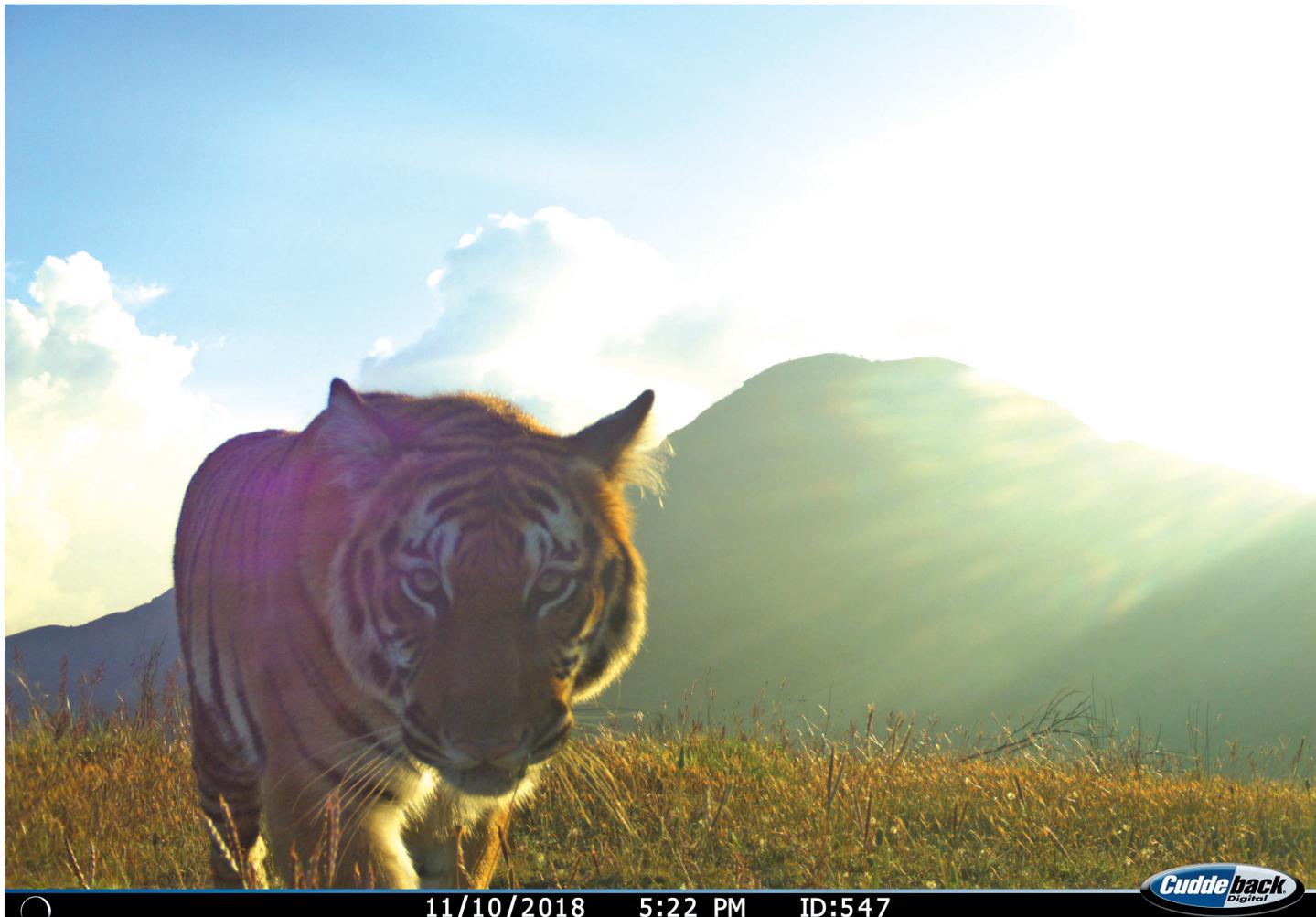
3RD ASIA MINISTERIAL CONFERENCE IN INDIA

The 3rd Asia Ministerial Conference (3 AMC) was organized in New Delhi from 12-14 April 2016. Inspired by the statement of Prime Minister of India, Narendra Modi, during this conference that “conservation of tigers is not a choice, it is an imperative”, to achieve the concrete results of ensuring the conservation of tigers in the wild and their habitats by 2022, the representatives of the Governments of the Tiger Range Countries resolved to:

- Accelerate implementation of the Global Tiger Recovery Programme (GTRP)/ National Tiger Recovery Programme (NTRP) and agreed actions from the above-mentioned declarations, review and update priority and differentiated action plans, and track progress through mutual and systematic reporting and evaluation.
- Align development and tiger conservation in a mutually complementary manner by re-orienting development strategies to mainstream the concerns of tiger conservation, such as by integrating tiger and wildlife safeguards in infrastructure at the landscape level, developing partnerships with business groups, and strong engagement with local stakeholders.
- Leverage funding and technical support from international organisations, bilateral and multilateral financial institutions, foundations, civil society organisations, private sector, and climate funds, in addition to TRC governments.



- Recognise and enhance the importance of tiger habitats by promoting them as providing ecosystem services, as engines of economic growth and helping to address climate change.
- Emphasize recovery of tiger populations in areas with low tiger densities and restoration in areas from which they have been extirpated by using successful programs of tiger reintroduction and rehabilitation of their habitats and prey.
- Strengthen co-operation at the highest levels of government to combat wildlife crime, address the demand for tiger products, and increase formal and informal transboundary coordination.
- Enhance knowledge sharing and capacity development for all stakeholders and increase the use of technology, including smart tools, monitoring protocols, and information systems, to improve management effectiveness.



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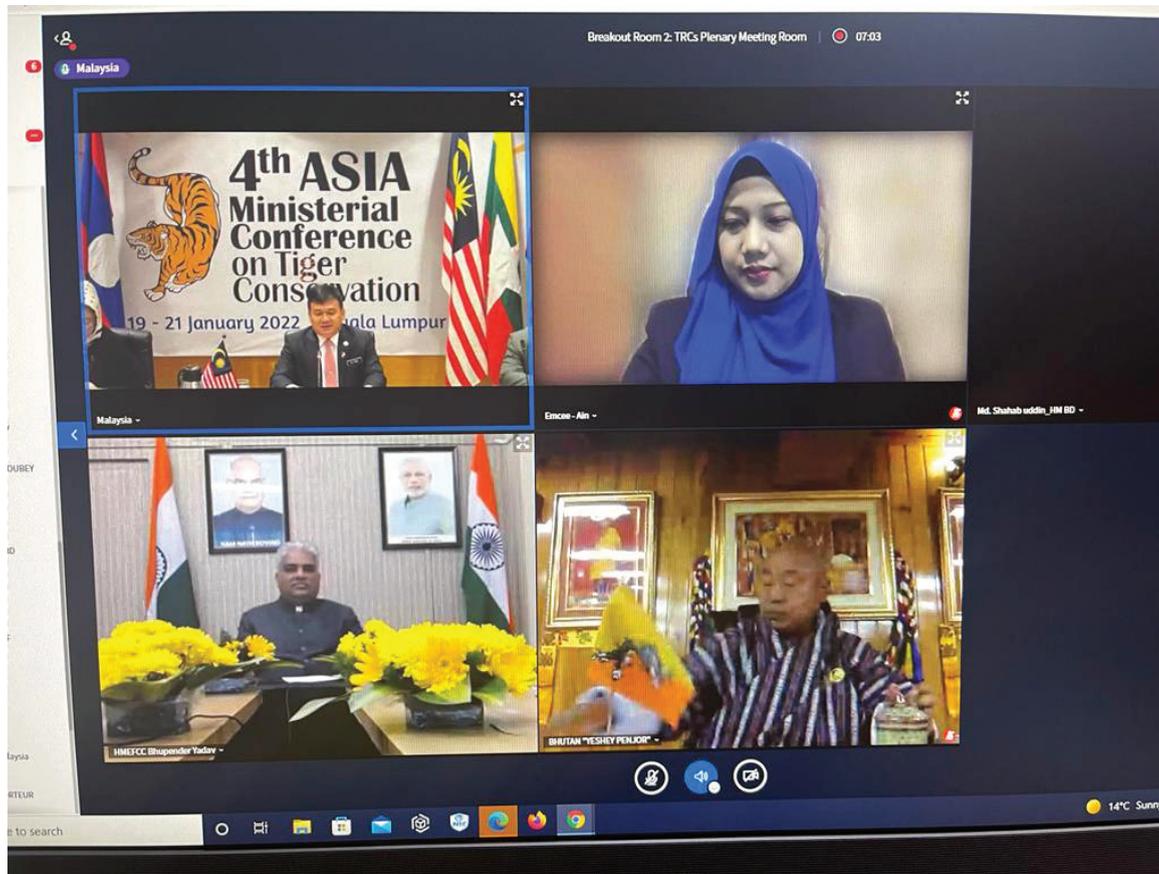
Camera trap photograph of golden phenotype of tiger coat color from Kaziranga Tiger Reserve, Assam.

The tiger reserves of Similipal and Satkosia in central Indian state of Odisha represent a unique lineage of tigers. It is in this population that occasional melanistic tigers occur.



4TH ASIA MINISTERIAL CONFERENCE IN MALAYSIA

The 4th Asia Ministerial Conference (AMC) on Tiger Conservation culminated on January 21, 2022 with the adoption of the *Kuala Lumpur Joint Statement*, listing a number of actions that will need to be taken in order to effectively recover the species across Asia. The 4th AMC was jointly organized by the Malaysian Government and Global Tiger Forum, with the support of local and international partners. India reaffirmed that the natural resources dependent community is an important aspect of tiger conservation and the 'people agenda' ranks prominently in India's 'tiger agenda'.



2ND INTERNATIONAL TIGER FORUM AT VLADIVOSTOK, RUSSIA

The 2nd International Tiger Forum held at Vladivostok, Russia on September 5, 2022. The meeting was attended by Tiger Range Countries including India and the summit reaffirmed collective commitment to the principles and actions of the Hua Hin Declaration on Tiger Conservation (2010), the St Petersburg Declaration on Tiger Conservation (2010), the Thimphu Affirmative Nine-Point Action Agenda (2012), the Dhaka Recommendations (2014), the New Delhi Resolution on Tiger Conservation (2016), and the Kuala Lumpur Joint Statement on Tiger Conservation (2022). **Vladivostok declaration** committed to undertake:

1. Adopt and implement the next Global Tiger Recovery Programme (2022-2034) and the revised National Tiger Recovery Programmes (NTRPs) with measurable and timebound indicators;
2. Develop updated National Tiger Reintroduction Programmes for the next 12-year period for countries where required;
3. Strengthen community stewardship for tiger conservation through enabling policy regimes leading to equitable benefit-sharing mechanisms (including Payment for Ecosystem Services), mitigating and managing human-tiger conflict, developing alternative and sustainable livelihoods (including green skills development) for enhancing their economic status and social well-being;
4. Address identified financial gaps through creating incentive mechanisms and leveraging conventional and innovative sources of funding, including government/sovereign funding, bilateral funds, private sector funding, endowments/trust funds, tiger bonds, etc. for long-term conservation of tigers;
5. Support the implementation of the South East Asia Tiger Recovery Action Plan (STRAP) based on agreed priorities, better coordination among countries, and setting up a well-resourced institutional structure;
6. Protect tiger habitats and prevent any further loss and degradation, including by increasing various forms of Protected Areas in prioritised tiger habitats;
7. Ensure adequate prey-base for tigers through better protection, recovery of habitats and populations and reintroduction where necessary;
8. Promote landscape-level conservation of tigers including the integration of ecological corridors in land-use policies, and implementation of climate-smart practices and green infrastructure in tiger habitats and corridors;
9. Strengthen law enforcement through enhancing numbers and professionalization of frontline staff/rangers, involvement of other enforcement agencies, establishing national database systems, harmonizing laws across countries (through bilateral instruments) and coordinated border patrols;

10. Strengthen the collaboration and sharing of information on wildlife crime among existing law enforcement agencies and regional networks (SAWEN, ASEAN-WEN) through adequate capacity and resourcing by the TRCs and donors;
11. Adopt the One Health approach to ensure sustainability of tiger landscapes and safeguard against zoonotic disease transmission;
12. Set up mechanisms and supportive policies to enable the mainstreaming of ecosystem services in development agendas;
13. Carry out regular monitoring of tigers and assessment of prey-base and habitats using best practices and enhance law enforcement monitoring as well as management assessment using tools such as SMART, M-STripES, MEE and CA | TS;
14. Conduct ongoing, cutting edge and inter-disciplinary research through institutional partnerships to ensure that tiger conservation is informed and driven by robust science;
15. Promote and strengthen Communication, Education and Public Awareness (CEPA), including citizen science approaches to garner civil society support for tiger conservation.



India released a postal stamp to commemorate the summit where Tiger Range Countries reaffirmed their commitment to tiger conservation.



INTERNATIONAL CONSULTATIVE WORKSHOP ON CHEETAH MANAGEMENT

NTCA in association with Madhya Pradesh Forest Department organized one-day International consultative workshop on cheetah management at Shivpuri on February 20, 2023. The deliberations & outcome of workshop will be crucial for establishing cheetah meta population successfully in India.



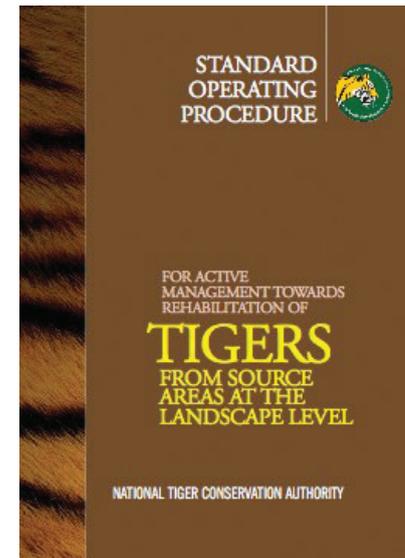
ACTIVE MANAGEMENT

Though there is no specific definition for “active management” in the context of wildlife conservation, it can be explained as just opposite of the “reactive” approach of the management of any protected area to routine or day-to-day issues. The active approach appeals to the “important” rather than the “urgent”. This approach is futuristic and looks beyond the routine, and encompasses deep thinking and the knowledge of the wildlife ecosystem, team efforts, serious deliberations, systematic planning and preparations, and collective responsibility to achieve goals that seemed to many rather atypical and nonconforming. Practitioners of active management also have to step out of the comfort zone of dealing with the routine and the mundane. Understandably, the approach also carries some risk that may question the professionalism of conservation practitioners in the end, if the desired goal is not achieved, or the achievement does not fare well in the typical cost-benefit analysis. Actually, the more ambitious the goal, the higher the risk involved.

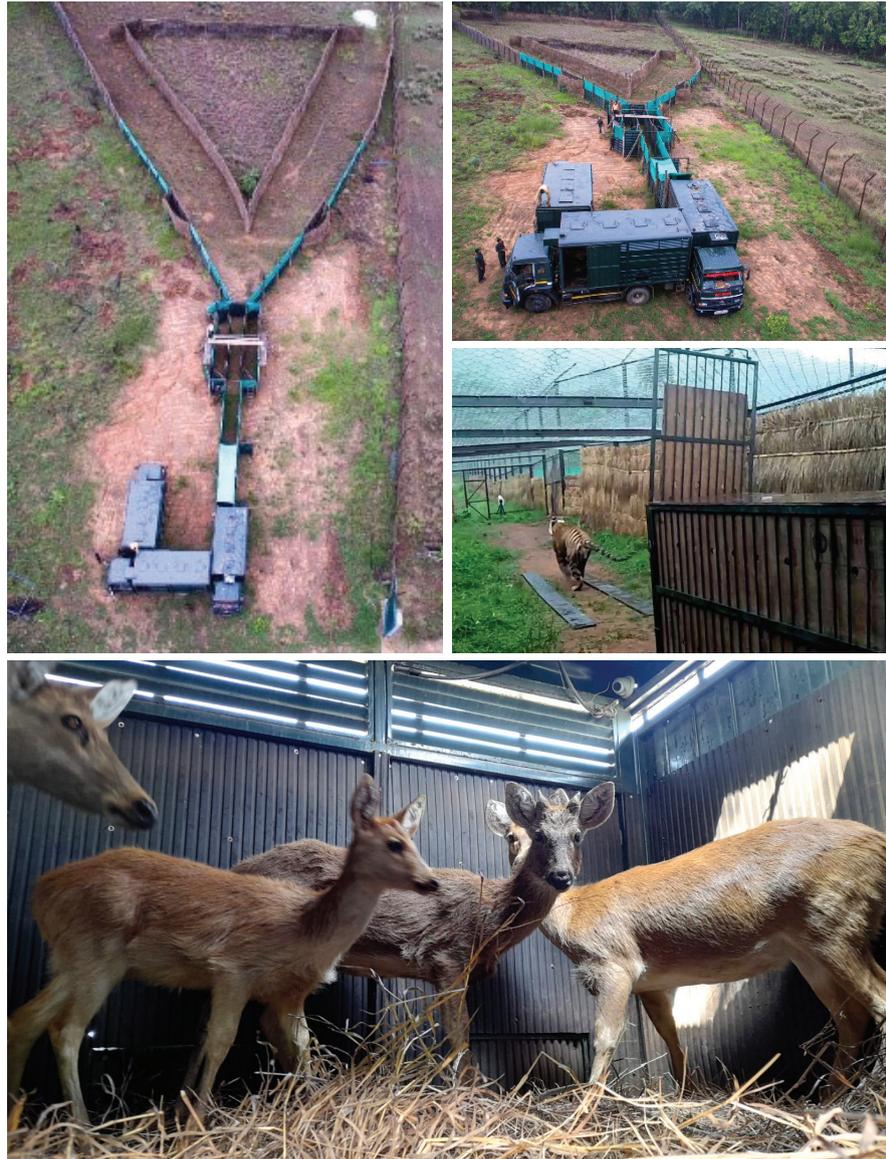
With the increase in tiger numbers in India, there are several areas where dispersing tigers move through human dominated landscapes and at times result in human-tiger conflict. Conservation in such areas depends on quick, timely and appropriate mitigation of these conflict situations. Often tigers involved in conflict or tigers that come into human dominated landscapes may need to be captured. If such tigers are not dangerous to human life, then they are captured to release them back into the wild in areas of low tiger density (or no tigers but have recorded tiger presence in the historical range), which have good habitat and prey populations. However, care taken to ensure that such relocations are done within population clusters that share a recent common gene pool.

Various active management initiatives undertaken for tiger conservation include:

- Tiger translocations in Sariska, Panna, Rajaji, Satkosia, Sanjay Dubri, Satpura, Mukundara Hills Tiger Reserves, Nauradehi Wildlife Sanctuary and Madhav National Park
- Rewilding of rescued and rehabilitated orphaned tiger cubs and release into wild
- Release and augmentation of prey in low density areas
- Human-wildlife conflict mitigation



The successful reintroduction of wild tigers in Panna is a unique example and one of a kind in the world as the rewilded and reintroduced tigresses are breeding.



**Glimpses of tiger and prey translocations
(PC: Sanjay Shukla and Field Director, Satpura Tiger Reserve)**



Release of tiger in natural habitats from soft release enclosure



PROJECT CHEETAH: A FLAGSHIP PROGRAM OF CHEETAH INTRODUCTION IN INDIA

It was a rejoicing moment and matter of pride for India when on 17th September, 2022, decades after extinction of their Asiatic counterparts in India, eight African cheetahs (*Acinonyx jubatus jubatus*) from Namibia scurried into Kuno National Park in central India's state of Madhya Pradesh by Honourable Prime Minister, Narendra Modi. These eight cheetahs – five females and three males – represent a big feather in India's cap for restoring natural treasures. The entire project was implemented by NTCA under meticulous supervision of the expert team consisting of Government officials, Scientists, Wildlife Biologists and Veterinarians belonging to both Namibia and India. This was the first inter-continental wildlife translocation ever attempted anywhere in the world. With this, India has proved the economic ability and technical competence to consider restoring its lost natural heritage for ethical as well as ecological reasons. Bringing the cheetah back to India, important in itself by undoing our ecological wrongdoings, would have equally important conservation ramifications. While tiger has served as a flagship and umbrella species for forest ecosystems, cheetah will fill this void for savannah, open and grassland ecosystems.





Initially, the individuals were released into quarantine bomas. Based on their continuous monitoring, it was observed that they acclimatized well with Indian climatic conditions. Post the mandatory quarantine period, all eight individual cheetahs have been released into the larger enclosure in between December 2022 and January 2023 in staged manner. Individuals are slowly acclimatizing and started predation on wild ungulates.



CHEETAH INTRODUCTION FROM SOUTH AFRICA

Earlier in 2023, the governments of South Africa and India signed a Memorandum of Understanding (MoU) on Cooperation on the Re-introduction of Cheetah to India. The MoU facilitates cooperation between the two countries to establish a viable and secure cheetah population in India; promotes conservation and ensures that expertise is shared and exchanged, and capacity built, to promote cheetah conservation. This includes human-wildlife conflict resolution, capture and translocation of wildlife and community participation in conservation in the two countries.

Accordingly, on February 18, 2023, Union Minister for Environment, Forest and Climate Change Bhupender Yadav released 12 cheetahs brought from South Africa at Kuno National Park, Sheopur, Madhya Pradesh in the presence of Madhya Pradesh Chief Minister Shivraj Singh Chouhan and Union Agriculture and Farmers Welfare Minister Narendra Singh Tomar. Indian Air Force's C-17 Globemaster aircraft flew for almost more than 7,900 km in between South Africa and India to bring the cheetah in Kuno. The individuals were released into quarantine boma as suggested by Cheetah Action Plan and with that cheetah population in Kuno has increased to 20 individuals.





On the occasion of National Philatelic Exhibition, AMRITPEX 2023, Special Cover on National heritage of India depicting the 'Introduction of Cheetahs back to India' have been released by India's Postal Department.



RELEASE OF CHEETAH IN WILD (FREE RANGING CONDITION)

On March 11, 2023; two cheetahs (one male and one female) were released for the first time in the free ranging soil of Kuno National Park, India. On March 22, 2023; two additional males have been released in the wild. Dedicated teams of wildlife biologists, frontline staff and veterinary experts are monitoring them round the clock with the help of radio-telemetry to understand their colonization ecology.





During last week of March, 2023; one of the Namibian cheetah has given birth to four cubs proving that population is doing well in India. It also demonstrates successful implementation of the Project.

***'AMRIT KAL KA'* VISION PLAN FOR TIGER CONSERVATION (VISION PLAN AT THE JUNCTURE OF INDIA'S 75 YEARS OF INDEPENDENCE)**

India continuously strives towards achieving the objectives of the Global Tiger Recovery with a Vision Plan. The plan is an essence of future perspectives towards the common goal of tiger conservation. The framework is designed to manage the 'source' population of tigers through adopting management interventions such as managing 'source-sink' dynamics, habitat management and landscape level management. The development and implementation of the 'Tiger Conservation Plan' is based on the Zonation concept for each of the reserve. Besides, improving protection regimes is planned through training of frontline staff, using latest monitoring tools and innovative protection measures. Effective 'Anti-Poaching' measures and 'Patrolling Strategy' will in turn help in checking on the wildlife related crimes in each of the Tiger Reserve. Further, analysing gaps is suggested through management challenges and advocated changes in existing budget, funding resources and future perspectives. Also, the authority encourages community participation, stewardship and gainful engagements through Integrated Conservation Approaches, Eco-Development Communities, Self Help Groups and promoting Voluntary Village Relocations. Procuring funds through Corporate Social Responsibility can also become a useful channel to enhance funding for tiger conservation.



The *Amrit Kal* tiger vision envisages a paradigm shift in conserving of wild tigers. As a shared responsibility between the centre, tiger states and civil society, India's ongoing tiger efforts have resulted in many good practices. The future success of tigers would largely depend on syncing tiger dynamics with its landscape dynamics. This warrants a centrifugal approach to look beyond the portals of a tiger reserve. Thus, a landscape strategy has been envisioned with its scale determined by the 'zone of influence' of wild tigers on the surrounding human dominated environ and vice versa. This also calls for recognizing all land uses within such zone, and prescribing a mutually gainful, engagement with all stakeholders, including community stewardship. Engagement with sectors of development would change the perspective of tiger being a drag on development, while ensuring necessary safeguards in the context. Likewise, innovative business models emanating from engagement with corporates and business groups would factor in tiger concerns in such sectors, where tiger is not the goal. Overall, *Amrit Kal* tiger roadmap would result in tiger being a multidimensional surrogate indicator for biodiversity, syncing with the CBD goals.



TAKE AWAY

Tiger is a conservation dependent species and an apex predator, that requires vast habitat to harbour viable populations and by virtue of this serves as an umbrella species for conserving Asia's forest systems ensuring viable populations of other endangered species. Tiger is important for the food chain and helps in maintaining the ecological viability of the entire area, habitat, water, and climate security of the region. However, the rise in organized poaching driven by an international demand for tiger parts and products, depletion of tiger prey and habitat loss have led to largely disconnected fragmented populations in southern, northern, and south-eastern Asia.

India has been a global leader in tiger conservation. Tiger being national animal for the country is a pride for the society and historically intricately enthralled in India's art, culture, sculpture and literature. With a current population of about 2967 tigers, India harbours approximate 70% global wild tiger population and the population is increasing at an annual rate of 6%. The success of India in conserving and doubling its wild tiger population in a span of about 12 years (much before the targeted year of 2022 as per St. Petersburg Declaration) is commendable especially when the tiger is highly threatened globally due to the high illegal demand of its body parts.

Taking cognizance of dire situation facing India's wild tiger survival after independence, the first salvo for country's tiger conservation was initiated by Government of India in April, 1973 with launching of ambitious Project Tiger in nine tiger reserves of the country covering 18,278 km² area. Centrally sponsored Project Tiger is one of the largest species conservation initiatives in the world. Since then, the Project has helped in restoring the population and strengthening conservation efforts for tigers. India's tiger reserve network has now expanded to current 52 tiger reserves cumulatively protecting an area of 74,724.89 km² (approximately 2.4% of the country's geographical area) of which approximately 41,269.06 km² is inviolate core. These tiger reserves are repositories for biodiversity conservation in the country ensuring regional water security and carbon sequestration thereby contributing in accomplishing India's climate change mitigation targets.

With need of time, Project Tiger has been converted into a statutory authority, National Tiger Conservation Authority (NTCA) under enabling provisions in the Wild Life (Protection) Act, 1972 through an amendment, via Wild Life (Protection) Amendment Act, 2006. The NTCA addresses ecological and administrative concerns for conserving tigers. It provides a statutory basis for the protection of tiger reserves and provides strengthened institutional mechanisms for the protection of ecologically sensitive areas and endangered species. The Government of India is actively taking initiatives to conserve and protect tigers in the country. Budgetary

allocation under CSS-Project Tiger until 2014 was 23.5 million US\$. The allocation for Tiger conservation was significantly increased to 47.1 million US\$ and above from 2016 onwards.

Tigers are being monitored countrywide every four years since 2006 with best available scientific tools and techniques. Tiger Reserves are regularly evaluated for their management effectiveness. Tiger Conservation Plans, cognizant of constraints imposed by small reserves embedded in human land uses, aimed to create source populations within tiger reserves with corridor links between sources and to sink habitats. Metapopulation management enhanced occupancy and long-term viability of tiger populations. Tiger Protection Force and digital India technologies like M-STrIPES, E-eye and drones effectively reduced poaching. Recently, to curb poaching of wildlife, the Government has been motivating and generating awareness among people in the northeast to voluntarily surrender their airguns. Tiger Conservation efforts in the Indian context require the combined efforts of the government and the community at its centre. Both require each other, and continuous efforts are being made for the involvement of local communities in protection and eco-tourism activities. Community support was attempted through profit sharing, mitigating human-tiger conflict with a fast, fair and transparent compensation process and removal of problem tigers. Reintroduction and reinforcement of tigers and prey assisted natural recovery. Success of tiger conservation in India has resulted into expansion of mandates of NTCA into conservation and management of other big cats in the country.

In the Anthropocene it is unlikely that tigers will survive without targeted conservation investments. Political commitment and resources can become available for conservation when people and tigers benefit simultaneously. Conscious balance by governments between development for rapid economic prosperity and long term ecological security will ensure that wild tigers and their intact ecosystems will survive for future generations.

Some endangered co-predators and prey found in Tiger Reserves in India









PROJECT
TIGER

50
YEARS
OF TIGER
CONSERVATION
IN INDIA



Cover: Sudhir Mishra
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Design: Paritosh Bharti