Biodiversity

the Panacea for Adversities

Chapter 5
Biodiversity – the panacea to adversities

CBD Biodiversity Vision 2050: "By 2050, biodiversity is valued, conserved, restored and widely used, maintaining ecosystem services, sustaining a healthy planet and delivering benefits essential for all people."

Introduction

1.   The term biodiversity derived from "biological diversity" refers to the variety of life on Earth at all its levels, from genes to ecosystems. This includes diversity within species, between species and of ecosystems. Biodiversity includes all ecosystems— managed (plantations, farms, croplands, aquaculture sites, urban parks) and unmanaged (forest, nature preserves, or national parks) and represents the wealth of biological resources available to humankind. The biodiversity of any given region is not evenly distributed. It varies globally and within regions. The various factors that influence biodiversity of a region include temperature, altitude, precipitation, soils and pressures from human activities.

2.   Biodiversity underpins many of the basic goods and services necessary for human society to exist and secure economic and social development. Its importance can be assessed by the fact that the UN has designated 2011–2020 as the United Nations Decade on Biodiversity[1] emphasizing "Living in harmony with nature". Ecosystems are the fundamental source of human existence as they provide fresh air, clean water, food, resources and medicine. The diversity of life on earth is essential for healthy functioning of ecosystems and it is biodiversity that boosts ecosystem productivity. In biodiversity, each organism, no matter how small or how big, has a role to play. Insects and bats, for example, play an essential role in pollinating plants and a great portion of the food we eat depends on animal pollinators. In a nutshell, the multifold values of biodiversity include – environmental values, social value, ecosystem services value, economic value, aesthetic value, productive use value and consumption value[2].

3.   Biodiversity is what allows ecosystems to work and flourish. Over millions of years, many different species of plants and animals have come together to live in the same habitats. Over time, they balance each other and hold the ecosystem together. As species

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[1] https://www.cbd.int/2011-2020/

[2] Implementation of India's Biodiversity Action Plan. New Delhi: MoEFCC; 2019

are lost, so are the ecosystem functions they perform. This may lead to 'tipping points' being reached, beyond which the structure and processes of an ecosystem abruptly, and possibly irreversibly, break down. In the last 50 years, the human population has doubled; the global economy has almost quadrupled and global trade has increased by approximately ten times. This period is also now being recognized as one of irreversible reduction of biodiversity due to displacement or extinction of species. The 2020 Global Living Planet Index[3] shows an average 68% fall in monitored populations of mammals, birds, amphibians, reptiles and fish between 1970 and 2016.

4.   The three greatest proximate threats to biodiversity are habitat loss, overharvesting, and introduction of exotic or invasive species. The first two of these are a direct result of human population growth and resource use. The third results from increased mobility and trade. Invasive species can threaten other species through competition for resources, predation or disease. A fourth cause of extinction is climate change, which is becoming significant. Global climate change is also a consequence of human population needs for energy and the use of fossil fuels to meet those needs.

5.   Deforestation and loss of biodiversity are also linked to several zoonotic diseases which can be transmitted from animals to people, an example being the current CoVID-19 pandemic. It has now been recognized that reduced biodiversity favours particular hosts, vectors and/or pathogens. Ecosystem integrity can help regulate diseases by supporting a diversity of species so that it is more difficult for one pathogen to spill over, amplify or dominate. Addressing zoonotic disease emergence requires addressing its root cause–primarily, the impact of human activities. As the global population approaches 10 billion, it is time to reimagine our relationship with nature and put nature at the heart of decision-making. Even though the biodiversity of many habitats has become threatened, there are many things that can be done to reduce this danger.

6.   Living in harmony with nature has been an integral part of Indian culture. This has been abundantly reflected in a variety of traditional practices, religious beliefs, rituals, folklore, arts and crafts, and in the daily lives of the Indian people from time immemorial. Endorsing this tradition, Article 48 of the Constitution of India mandates that "the State shall endeavor to protect and improve the environment and to safeguard the forests and the wildlife of the country", while Article 51 A (g) makes it a "duty of every citizen to protect and improve the natural environment including forests, lakes, rivers and wildlife and to have compassion for living creatures."

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[3] The Living Planet Report 2020, "Bending the curve of Biodiversity Loss", World Wildlife Fund & Institute of Zoology (Zoological Society of London)

7.   India has framed several national acts and policies to conserve the biodiversity. The Environment (Protection) Act (EP Act) enacted in 1986 paved the way for legal interventions for protection of ecosystems including coastal, riverine and wetlands ecosystems. The Wildlife (Protection) Act, 1972, (WP Act), the Forest (Conservation) Act, 1980 (FC Act), the Biodiversity Act and the Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 (referred to as Forest Rights Act, 2006 hereafter) further strengthen the legal base for conservation and sustainable utilization of biological diversity.

8.   Biodiversity encompasses all variety and variability of living organisms. It includes biodiversity within species, between species and diversity of ecosystems. The biodiversity profile of a country at any point of time is a reflection of the presence of this kind of diversity, the consequences of the way it has been utilized and how it has been conserved through legal or other measures. The different aspects of India's biodiversity are discussed in the following sections of this chapter.

Diversity of regions: Biogeographic zones in India

9.   Biogeographic zones are large distinctive units of similar ecology, biome representation, community, and species (e.g., the Himalaya, the Western Ghats). India has 10 identified biogeographic zones[4].
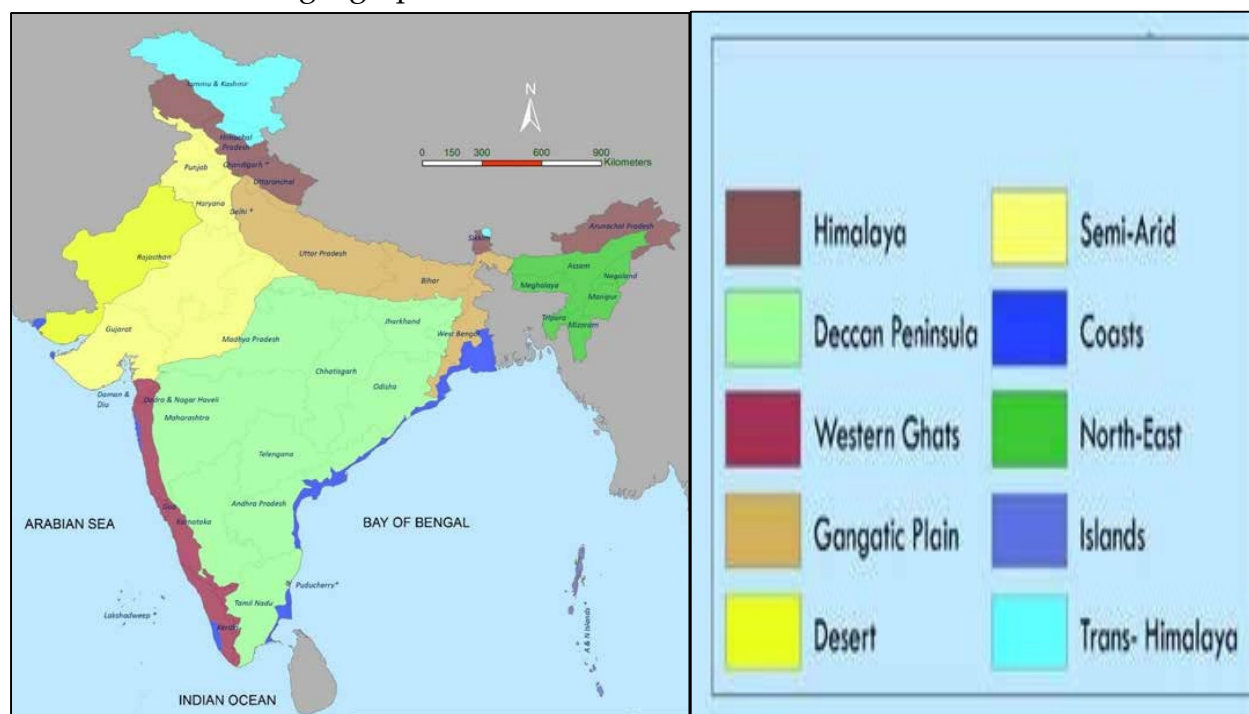
(Executive summary). Wildlife Institute of India, Dehradun.

S. No.	Biogeographic zones	Biotic provinces	Area (sq.km)
1.	Trans-Himalaya	Ladakh mountains, Tibetan plateau	1,74,225
2.	Himalaya	Northwest, West, Central and East Himalayas	2,10,386
3.	Desert	Thar, Kutch	2,13,672
4.	Semi-arid	Punjab plains, Gujarat Rajputana	5,45,686
5.	Western Ghats	Malabar plains, Western Ghats	1,31,490
6.	Deccan Peninsula	Central highlands, Chhota-Nagpur, Eastern highlands, Central Plateau, Deccan South	13,77,363
7.	Gangetic plains	Upper and Lower Gangetic plains	3,55,025
8.	Coast	West and East coast, Lakshadweep	82,182
9.	North-East	Brahmaputra valley, Northeast hills	1,70,937
10.	Islands	Andaman and Nicobar	12,972
	Marine Influenced Area		10,440

Source: Ibid

Biodiversity Hotspots in India[5]

10.   The concept of biodiversity hotspots was coined by Norman Myers in 1988. He defined "hotspots" as high concentrations of endemic species with high habitat loss. A biodiversity hotspot is identified based on two criteria[6]:

    i)   It must have at least 1500 vascular plants as endemics
    ii)   It must have 30% or less of its original natural vegetation.

11.   The first point indicates that the region is irreplaceable and the second point indicates that it is threatened. Around the world, 36 areas qualify to be hotspots. These areas constitute just 2.4% of Earth's land surface, but more than half of the world's plant species and nearly 43% of bird, mammal, reptile and amphibian species are endemic to these areas — i.e., species found no place else. Among the 36 global biodiversity hotspots of the world, 4 are found within India. These hotspots are discussed in the following paragraphs.

The Western Ghats as part of the Western Ghats-Sri Lanka Global Hotspot

12.   The Western Ghats, stretching about 1,600 km from the north of Mumbai to the southern tip of India, hosts a large proportion of the country's plant and animal species; many of which are endemic to India. The Western Ghats are considered as a UNESCO World Heritage Site. There are 39 protected areas including national parks, reserve

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[5] Source: ENVIS Resource Partner on Biodiversity, BSI, MoEFCC
[6] Biodiversity Hotspots - Conservation International

forests, and wildlife sanctuaries present in the region. It also constitutes approximately 27% of the total Indian flora.

Table 1: Key Statistics of the Western Ghats

Hotspot Original Extent (km²)	1,89,611
Hotspot Vegetation Remaining (km²)	43,611
Endemic Plant Species	3,049
Endemic Threatened Birds	10
Endemic Threatened Mammals	14
Endemic Threatened Amphibians	87
Extinct Species†	20
Human Population Density (people/km²)	261
Area Protected (km²)	26,130
Area Protected (km²) in Categories I-IV*	21,259

†*Recorded extinctions since the year 1500. *Categories I-IV afford higher levels of protection.*
Source: ibid

Table 2: Species Diversity and Endemism

Taxonomic Group	Species	Endemic Species	Endemism (%)
Plants	5,916	3,049	51.5
Mammals	140	18	12.9
Birds	458	35	7.6
Reptiles	267	174	65.2
Amphibians	178	130	73.0
Freshwater Fishes	191	139	72.8

Source: ibid

The Nicobar Islands as part of the Sundaland Hotspot

13.   The Andaman and Nicobar Islands are situated south of the Burmese peninsula, in the Bay of Bengal. Nicobar Islands are a part of the Sundaland global biodiversity hotspot. Due to high precipitation and their tropical location, the predominant vegetation type in these islands is evergreen forest. There are 11 major forest types in these islands. The islands, comprising only 0.25% of India's geographical area, are home to more than 10% of the country's fauna species.

Table 3: Key Statistics of the Sundaland Hotspot

Hotspot Original Extent (km²)	15,01,063
Hotspot Vegetation Remaining (km²)	1,00,571
Endemic Plant Species	15,000

Endemic Threatened Birds	43
Endemic Threatened Mammals	60
Endemic Threatened Amphibians	59
Extinct Species†	4
Human Population Density (people/km²)	153
Area Protected (km²)	1,79,723
Area Protected (km²) in Categories I-IV*	77,408

†*Recorded extinctions since the year 1500. *Categories I-IV afford higher levels of protection.*
Source: ibid

Table 4: Species Diversity and Endemism

Taxonomic Group	Species	Endemic Species	Endemism (%)
Plants	25,000	15,000	60.0
Mammals	380	172	45.3
Birds	769	142	18.5
Reptiles	452	243	53.8
Amphibians	244	196	80.3
Freshwater Fishes	950	350	36.8

Source: ibid

North-eastern region as part of Indo-Burma Hotspot

14.   The Northeast region of India comprising of the states of Arunachal Pradesh, Assam, Meghalaya, Manipur, Tripura, Mizoram, Nagaland and Sikkim. The north eastern region has been in focus for its high biodiversity and this region has been a priority for leading conservation agencies of the world. The region is ecologically represented by the Eastern Himalayan biome and is rich in a number of endemic flora and fauna. The Indo-Burma Hotspot has extraordinarily high plant species richness.

Table 5: Key Statistics of the North-Eastern Region

Hotspot Original Extent (km²)	23,73,057
Hotspot Vegetation Remaining (km²)	1,18,653
Endemic Plant Species	7,000
Endemic Threatened Birds	18
Endemic Threatened Mammals	25
Endemic Threatened Amphibians	35
Extinct Species†	1
Human Population Density (people/km²)	134
Area Protected (km²)	2,35,758

Area Protected (km²) in Categories I-IV*	1,32,283

†*Recorded extinctions since the year 1500. *Categories I-IV afford higher levels of protection.*
Source: ibid

Table 6: Species Diversity and Endemism

Taxonomic Group	Species	Endemic Species	Endemism (%)
Plants	13,500	7,000	51.9
Mammals	433	73	16.9
Birds	1,266	64	5.1
Reptiles	522	204	39.1
Amphibians	286	154	53.8
Freshwater Fishes	1,262	553	43.8

Source: ibid

Eastern Himalaya comprising North-eastern Himalayas of India, Bhutan and Nepal

15.   The Himalaya Hotspot is home to the world's highest mountains, including Mt. Everest. The mountains rise abruptly, resulting in a diversity of ecosystems that range from alluvial grasslands and subtropical broadleaf forests to alpine meadows above the tree line. Of the estimated 10,000 species of plants in the Himalaya Hotspot, about 3,160 are endemic, as are 71 genera. The largest family of flowering plants in the hotspot is the Orchidaceae, with 750 species[7]. Nearly 980 birds have been recorded in the hotspot, but only 15 are endemic. About 300 mammal species have been recorded in the Himalaya, including a dozen that are endemic to the hotspot—the Endangered golden langur (Trachypithecus geei) and Critically Endangered pygmy hog (Sus salvanius) among them. The hotspot is home to important populations of numerous large birds and mammals, including vultures, tigers, elephants, rhinos and wild water buffalo.

Table 7: Key Statistics of the Eastern Himalayas

Hotspot Original Extent (km²)	7,41,706
Hotspot Vegetation Remaining (km²)	1,85,427
Endemic Plant Species	3,160
Endemic Threatened Birds	8
Endemic Threatened Mammals	4
Endemic Threatened Amphibians	4
Extinct Species†	0
Human Population Density (people/km²)	123

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[7]CEPF Himalaya. (n.d.). Retrieved from Critical Ecosystem Partnership Fund (CEPF).

Area Protected (km²)	1,12,578
Area Protected (km²) in Categories I-IV*	77,739

*†Recorded extinctions since the year 1500. *Categories I-IV afford higher levels of protection.*
Source: ibid

Table 8: Species Diversity and Endemism

Taxonomic Group	Species	Endemic Species	Endemism (%)
Plants	10,000	3,160	31.6
Mammals	300	12	4.0
Birds	977	15	1.5
Reptiles	176	48	27.3
Amphibians	105	42	40.0
Freshwater Fishes	269	33	12.3

Source: ibid

India – A Mega Diverse Region

16.   A handful of countries, which serve as home to the majority of the world's species, are considered extremely bio diverse. The World Conservation Monitoring Centre recognized 17 mega diverse countries in July 2000. The 17 mega diverse countries of the world are Australia, Brazil, China, Colombia, Democratic Republic of the Congo Ecuador, Indonesia, India, Madagascar, Malaysia, Mexico, Papua New Guinea, Peru Philippines, South Africa, United States, Venezuela. Together, these 17 countries harbour more than 70% of the earth's species. India is one of them. The principle criterion for mega diversity is endemism, first at the species level and then at higher taxonomic levels such as genus and family. To qualify as a mega diverse country, a country must have at least 5000 of the world's plants as endemics and have marine ecosystems within its borders. India qualifies both the criteria.

17.   Situated at the tri-junction of Afro-tropical, Indo-Malayan and Paleo-Arctic realm, India has a wide array of ecozones, namely, the deserts, the high mountains, the highlands, the tropical and temperate forests, the swamplands, the plains, the grasslands, and the islands. India represents great geological, geomorphological, climatic, biotic and cultural diversity. The vast diversity of climatic features and habitats has led to a wide variety of flora and fauna.

18.   India has tremendous species and ecosystem diversity. Over **1,02,161** species of fauna and **49,441** species of flora have been documented in the 10 biogeographic zones of

the country. The total forest cover area in India is 7,12,249 sq. km, which is 21.67% of total geographic area of the country. Considering floral diversity, out of the 49,441 known plant species in India, 11,554 are endemic (**Table 9).**

Table 9: India's Floral Species Diversity and Endemism - 2019

Major Groups	Number of Species	No. of Endemic Species	No. of Threatened Species
Flowering Plants			
Gymnosperms	82	12	12
Angiosperms	18,666	4,303	416
Non-flowering Plants			
Bryophytes	2,780	629	7
Pteridophytes	1,302	66	2
Others			
Virus & Bacteria	1,223		
Algae	7,411	1,924	
Fungi	15,396	c. 4100	1
Lichens	2,581	c. 520	
Total	**49,441**		

Source: Botanical Survey of India, Kolkata.

19.   In the case of fauna, 28,537 species are endemic to the country and account for 28% of the total 1,02,161 species identified so far in India. **Table 10** shows the known faunal species, their endemism and threat status.

Table 10: India's Faunal Species Diversity and Endemism - 2019

Major Groups	Number of Species	No. of Endemic Species	No. of Threatened Species
Protozoans	3,545	640	
Invertebrates	91,800	26,782	135
Chordates	6,816	1,115	540
Of which			
Fishes	3,439	482	228
Amphibia	427	287	75
Reptilia	641	220	54
Birds	1,343	81	89
Mammals	429	45	94
Total	**1,02,161**	**28,537**	**675**

20.   Along with many other countries, India has its own fair share of issues due to Invasive Alien Species. Invasive alien species are species whose introduction and/or spread outside their natural past or present distribution threatens biological diversity.

Some example of the commonly found faunal alien species in India are the African apple snail (Achatina fulica), Papaya Mealy Bug (Paracoccus marginatus), Cotton Mealy Bug (Phenacoccus solenopsis) and Amazon sailfin catfish (Pterygoplichthys pardalis), while commonly found floral alien species in India are Prospis juliflora, Vilayti Kikar, Parthenium hysterophorus, Lantana camara and Water hyacinth (Eichhornia crassipes).

Table 11: Invasive Alien Species of India

Category	Number of Invasive Alien Species
Terrestrial Plants	54
Aquatic Ecosystem	56
Agriculture Ecosystem	44
Island Ecosystem	14
Total	168

Source: National Biodiversity Authority

Taxonomic diversity of India

21.   The Botanical Survey of India (BSI) and the Zoological Survey of India (ZSI) are the two apex organisations of India that have been actively engaged in taxonomic study of all major groups of Indian plants and animals, respectively. Every year, these two organisations collate information on the discoveries during the previous year using the research published by scientists on various aspects of taxonomy including species new to science and new records. Statements on the taxonomic diversity of the States of India, as presented in this publication, have been prepared using the information made available by the BSI, ZSI, National Biodiversity Authority and the State Biodiversity Boards. **Table 12** below gives the phylum-wise details of the taxonomic diversity of India.

Table 12: Number of Fauna and Flora Species in India - 2019

Category		Taxonomic group	Number of Species in India
	Protista		**3,545**
		Phylum Protozoa	3,545
	Animalia		**98,616**
FAUNA	INVERTEBRATA	Phylum Mesozoa	10
		Phylum Porifera	550
		Phylum Cnidaria	1,453
		Phylum Ctenophora	19
		Phylum Platyhelminthes	1,789
		Phylum Rotifera	467
		Phylum Gastrotricha	163
		Phylum Kinorhyncha	10

Category			Taxonomic group	Number of Species in India
			Phylum Nematoda	2,984
			Phylum Acanthocephala	306
			Phylum Sipuncula	41
			Phylum Mollusca	5,227
			Phylum Echiura	47
			Phylum Annelida	1,035
			Phylum Onychophora	1
			Phylum Arthropoda	76,461
			Phylum Phoronida	3
			Phylum Bryozoa (Ectoprocta)	337
			Phylum Entoprocta	10
			Phylum Brachiopoda	8
			Phylum Chaetognatha	44
			Phylum Tardigrada	31
			Phylum Nemertea	6
			Phylum Echinodermata	784
			Phylum Hemichordata	14
			Phylum Protochordata	
		VERTEBRATA	Phylum Chordata	6,816
			Of Which	
			Class Pisces: Fresh water Fishes	3,439
			Class Pisces: Marine and Estuarine Fishes	
			Class Amphibia	427
			Class Reptilia	641
			Class Aves	1,343
			Class Mammalia	429
			TOTAL FAUNAL SPECIES	**1,02,161**
FLORA			Virus/Bacteria	1,223
			Algae	7,411
			Fungi	15,396
			Lichens	2,581
			Bryophytes	2,780
			Pteridophytes	1,302
			Gymnosperms	82
			Angiosperms	18,666
			TOTAL FLORAL SPECIES	**49,441**
			GRAND TOTAL (FLORA + FAUNA)	**1,51,602**

22. Statement on the taxonomic diversity of the States is given in **Annexure 5.1**. A more detailed discussion on the crop diversity and the floral diversity in the forests of India can also be seen in the chapters on croplands and forests in this publication.

India's pride –Tiger and Elephant

23. Large animals need large areas. When these areas are protected, thousands of other plants and animals also benefit from this protection. Failing to protect them can lead not only to the extinction of these species, but the loss of many other plant and animal species that make up the ecological community of their habitat. This loss of species and genetic level biodiversity also impacts ecosystem functions and makes ecosystems less resilient to environmental shocks and change (including climate change). This also threatens the supply of future ecosystem services. These considerations are reflected in India's long standing and successful track record of protecting its tigers and elephants.

24. Sitting at the crown of the food-chain, the tiger is the apex predator in the Indian jungle. The tiger is vitally important in culling its prey-base in a sustainable manner. If it didn't, the prey-base would breed exponentially with no natural control and the forest would not be able to provide the prey base with sufficient fodder.

25. A lesser known fact is that tiger habitats help to store more carbon on an average as compared to the other forests in the region, and therefore help to stem the tide of global warming and climate change. In fact, according to WWF, there is significant evidence to prove that eliminating a large carnivore population has a severe anthropogenic impact on nature.

26. Elephants, on the other hand, are known for their nomadic behaviour, and the daily and seasonal migrations they make through their home ranges are immensely important to the environment. They are landscape architects, creating clearings in the forest, preventing overgrowth of certain plant species and allowing space for the regeneration of others, which in turn provide sustenance to other herbivorous animals.

27. These are some of the reasons why the Elephant and Tiger are regarded as the "National Heritage" Animals of India. Both the Elephant and Tiger are accorded highest protection under Schedule I species of Wildlife (Protection) Act, 1972 and listed as endangered species by International Union for Conservation of Nature (IUCN). Around 50-60% of the estimated world Asian elephant's population is in India, which is also home to 60% of the global tiger population, reflective of the conservation initiatives.

28.   According to most recent all India elephant estimation (2017), the elephant population in the country is estimated to be 29,964 and captive elephant population (2018) is 2,675 (as reported by States). The overall tiger population in India was estimated at 2,967 (Standard Error range 2,603 to 3,346).

29.   The status of tiger reserves and their population in India (for the year 2018-19) is given in Statement 5.1, while that for the elephant reserves of India (as on 16.08.2018) is given in Statement 5.2. The estimated tiger numbers in States and Landscapes of India are given in Statement 5.3 and the region wise population estimation of elephants in India, 2017 is given in Statement 5.4.

30.   India's national tiger assessment is the largest biodiversity survey being carried out anywhere in the world. To aid conservation of these two species, Project Elephant (initiated in 1991-92) and Project Tiger (initiated in 1973) are being carried out in India, some highlights of which are given in the following paragraphs.

Project Tiger[8]

31.   Project Tiger aims to harness the functional role of the tiger and its charisma to garner resources and public support for conserving representative ecosystems. It was initiated in 1973 with nine tiger reserves (around 18,278 km^2), and has now expanded to cover 50 tiger reserves (72,749 km^2) covering about 2.21% of India's geographical area. The National Tiger Conservation Authority (NTCA) in collaboration with the State Forest Departments, Conservation NGO's and coordinated by the Wildlife Institute of India (WII), conducts a National assessment for the "Status of Tigers, Co-predators, Prey and their Habitat" every four years since 2006.

32.   Primary data collection for occupancy, habitat assessment, human impacts and prey assessment are done by the frontline staff of the forest departments of the 20 tiger states. Since the field methodology being used for the status assessment has essentially been the same since 2006, the competency of the wildlife managers in conducting these exercises has increased significantly over the years. Now camera traps are regularly used by the management staff of all tiger reserves each year to estimate the minimum number of tigers. Some wildlife managers have been trained and have acquired skills for designing, implementing and analyzing capture-mark-recapture and distance sampling based studies.

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[8]Jhala, Y.V., Qureshi, Q. and Nayak, A.K. (eds) 2020. Status of tigers, copredators and prey in India, 2018. National Tiger Conservation Authority, Government of India, New Delhi, and Wildlife Institute of India, Dehradun

33.   The fourth status assessment of tigers conducted in the year 2018 was the most comprehensive to date, in terms of both resource and data amassed. Camera traps were placed in 26,838 locations across 141 different sites in 20 States known to host Tigers and surveyed an effective area of 1,21,337 square kilometres. These camera traps captured 3,48,58,623 photographs of wildlife - 76,651 of which were tigers, 51,777 were leopards, and the remaining were those of other native fauna. From these photographs, individual tigers were identified using stripe-pattern-recognition software. The latest "tiger census" has been recognized by Guinness World Records as the largest camera-trap wildlife survey in the world.

34.   The magnitude of anthropogenic disturbances within Tiger Reserves and tiger occupied areas are assessed using a Relative Abundance Index (RAI) obtained through camera trap images of livestock, free ranging domestic dogs, wild animals with traps, poachers with arms or poached carcasses.

Highlights of the latest Tiger Assessment - 2018
- The overall tiger population in India was estimated at 2,967 (SE range 2,603 to 3,346). Out of this, 83% were actually camera trapped individual tigers and 87% were accounted for by camera trap-based capture-mark-recapture and remaining 13% were estimated through appropriate models (Statement 5.3).
- Tigers were observed to be increasing at a rate of 6% per annum in India when consistently sampled areas were compared from 2006 to 2018.
- Overall tiger occupancy, based on the forest cover survey report by Forest Survey of India (2017), was found to be stable at 88,985 km² (in year 2017) at the country scale since 2014, when the tiger occupancy was 88,558 km².
- The largest contiguous tiger population in the world of about 724 tigers was found in the Western Ghats while the second largest population of about 604 tigers was found across Uttarakhand and western Uttar Pradesh.
- The density of tiger was found to be significantly and strongly related with prey abundance indices. It increases as chital, sambar and gaur encounter rates as well as their dung density increased.
- Security, in the form of protected areas, has harbored higher tiger densities.

Figure 2: Tiger Population Map in Tiger Reserves - 2018
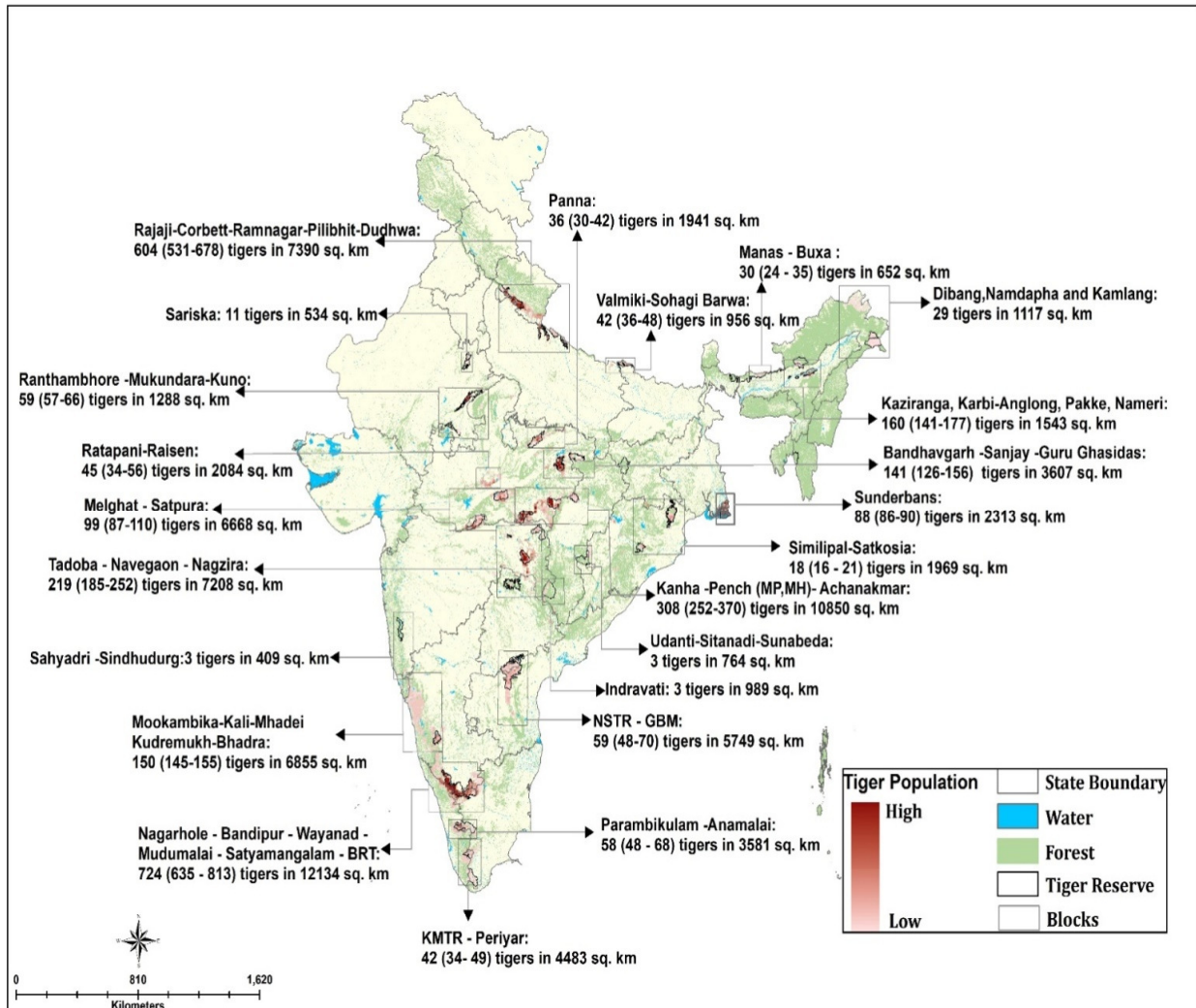
Project Elephant

35.   **Project Elephant** was launched by the Government of India in the year 1991-92 with the following objectives:

- Protection of Elephants: control of poaching, patrolling, weapons, equipment, intelligence gathering, etc.
- Improvement of habitats and corridors: eco restoration, land acquisition, resettlement & rehabilitation, soil and water conservation;
- Human-Elephant Conflicts: crop protection measures, elephant proof trenches, solar power fencing, translocation of elephants, early warning systems, awareness and training programme for securing elephant corridors in the country for the safe passage of elephants; and

- Captive Elephant Welfare: Elephant Rescue & Rehabilitation Centers, Elephant welfare committees, veterinary services, public education.

36.   Under the Project, critical elephant habitats have been notified as "Elephant Reserves" for better management of wild elephants. There are 30 notified and 1 proposed Elephant Reserve in the country (Khasi Hills Elephant Reserve in Meghalaya). Further, several guidelines have been issued under the Project including those for 'management of Human Elephant Conflict', 'care and management of captive elephants', Protocol on Transboundary Elephant Conservation between India and Bangladesh, Standard Operating Procedure (SOP) for Dealing with Captive and Wild Elephant Deaths Due to Anthrax/Suspected Cases of Anthrax.

37.   These concerted efforts towards achieving the objectives of Project Elephant have resulted in an increase of wild elephant population from an estimated 15,000 in 1980 to almost 30,000 in 2017. For the first time in India, an all India synchronized elephant census was conducted in 2017.

Highlights of the latest Elephant Assessment
- There are 30 notified Elephant Reserves, extending over about 65,507 sq km, and 1 proposed Elephant Reserve in the country (Statement 5.2).
- The all India enumeration of wild population of elephants in the country is carried out at every five-year interval. The estimated population of wild elephants in the country has increased to 29,964 as compared to 27,669-27,719 in 2007.
- Asiatic Elephants (Elephas maximus) were once widespread in India and old literatures indicate that even during the Moghul period, elephants were found all over India. However, the current distribution of wild elephant in India is now restricted to four general areas: north-eastern India, central India, north-western India and southern India.
- In north-eastern India, the elephant range extends from the eastern border of Nepal in northern West Bengal and passes through parts of upper and western Assam, eastern Arunachal Pradesh, the foothills of Nagaland, as also some areas of Garo and Khasi Hills of Meghalaya. Isolated herds have also been observed in in Tripura, Mizoram, Manipur, and the Barak valley districts of Assam.
- In central India, highly fragmented elephant populations are found in the States of Odisha, Jharkhand, and the southern part of West Bengal, with some animals wandering into Chhattisgarh.
- In north-western India, the species occurs in six fragmented populations at the foot of the Himalayas in Uttarakhand and Uttar Pradesh.

- There are eight main fragmented populations in southern India: in northern Karnataka; the crestline of Karnataka—Western Ghats; Bhadra— Malnad; Brahmagiri—Nilgiris—Eastern Ghats; Nilambur—Silent Valley—Coimbatore; Anamalais—Parambikulam; Periyar—Srivilliputhur; and Agasthya malai.

Monitoring of Illegal Killing of Elephants (MIKE) Programme

38. In addition to the Project Elephant, elephants in India are also being monitored under the MIKE Programme, with the following objectives:

    i. To measure levels and trends in the illegal hunting of elephants;

    ii. To determine changes in these trends over time; and

    iii. To determine the factors causing or associated with such changes, and to try and assess in particular to what extent observed trends are a result of any decisions taken by the Conference of the Parties to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).

39. Under the MIKE programme, data are being collected on a monthly basis in specified MIKE patrol forms from eight MIKE sites, viz., Chirang Ripu (Assam), Dhang Patki (Assam), Eastern Dooars (WB), Deomali (Arunachal Pradesh), Garo Hills (Meghalaya), Mayurbhanj (Odisha), Mysore (Karnataka), Nilgiri (Tamil Nadu), Shivalik (Uttarakhand) and Wayanad (Kerala).

Conservation Measures in India

40. There are two broad approaches in conservation that are adopted to protect and maintain biodiversity – in-situ and ex-situ. In-situ conservation refers to the conservation of species in their natural habitats, while ex-situ conservation is the preservation of components of biological diversity outside their natural habitats, e.g., zoos. In-situ conservation is considered the most appropriate way of conserving biodiversity. Conserving the areas where populations of species exist naturally is an underlying condition for the conservation of biodiversity and hence, protected areas form a central element of any national strategy to conserve biodiversity.

41. The International Union for Conservation of Nature (IUCN) is a membership Union composed of both government and civil society organisations. The IUCN, through its World Commission on Protected Areas develops knowledge based policy, advice and guidance on the full suite of issues surrounding protected areas. The enlisting of protected areas is part of a strategy being used toward the conservation of the world's

natural environment and biodiversity. The IUCN has developed the *protected area management categories* system to define, record, and classify the wide variety of specific aims and concerns when categorising protected areas and their objectives.

42.   In India, the Protected Areas are declared under Wildlife (Protection) Act, 1972. India has 18 biosphere reserves and 86 conservation reserves. Amongst the protected areas, India has 101 national parks and 553 sanctuaries covering an area of 1.6 lakh sq. km.

Wildlife Sanctuary

43.   A Wildlife Sanctuary is a natural habitat, owned by the government or private agency, which safeguards particular species of birds and animals. It restricts any activity that puts animals/species at any unduly stressful condition. It corresponds to IUCN Category IV Protected areas. In India, there are 553 wildlife sanctuaries as of December 2019.[9]

National Parks

44.   IUCN has defined 'National Parks' as Category II type of protected areas. It is established by central or state government. These areas are protected from human exploitation, pollution and stand for conservation of wild nature. There are 101 national parks in India as of December 2019.

Conservation Reserves and Community Reserves

45.   Conservation Reserves and Community Reserves denote those protected areas of India which typically act as buffer zones to or connectors and migration corridors between established national parks, wildlife sanctuaries and reserved and protected forests of India. Such areas are designated as conservation areas if they are uninhabited and completely owned by the Government of India but used for subsistence by communities and community areas if part of the lands are privately owned. These protected area categories were first introduced in the Wildlife (Protection) Amendment Act of 2002. These categories were added because of reduced protection in and around existing or proposed protected areas due to private ownership of land and land use.

Biosphere Reserves (BR)

46.   These are large areas of bio diversity where flora and fauna are protected. These regions of environmental protection approximately correspond to IUCN Category V of Protected areas. They may cover multiple national parks and wildlife sanctuaries. These are established to protect biodiversity of a larger area. There are 18 Biosphere Reserves in

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[9]ENVIS Centre on Wildlife & Protected Areas, Wildlife Institute of India

India established by the government. The concept of biosphere reserves is the key to achieving a balance between conserving biodiversity, encouraging economic and social development and preserving cultural values.

Table 13: Status of different categories of Protected Areas in India

Categories of Protected Area		Number	Area (in Km²)
Terrestrial Protected Area	National Parks	101	40564
	Wild Life Sanctuaries	553	119757
	Community Reserves	163	833
	Conservation Reserves	89	4128
	Total	**906**	**165282**
Marine Protected Areas	National Parks	13	2798
	Sanctuaries	116	6909
	Community/ Conservation Reserves	4	272
	Total	**133**	**9979**

Source: 1. Wildlife Institute of India and K Sivakumar, Coastal and Marine Biodiversity Protected Areas in India: Challenges and Way Forward, K. Venkataraman et al. (eds.),Ecology and Conservation of Tropical Marine Faunal Communities, Springer-Verlag Berlin Heidelberg 2013.

State-wise number of Terrestrial and Marine Protected Areas is given at Annexure 5.2.

Insights into the Red List Species in India

47.   The International Union for Conservation of Nature (IUCN) Red List of Threatened Species is one of the most well-known objective assessment systems for classifying the status of plants, animals and other organisms threatened with extinction. It contains explicit criteria and categories to classify the conservation status of individual species on the basis of their probability of extinction.

48.   The IUCN Red List categories and criteria are intended to be an easily and widely understood system for classifying species at high risk of global extinction. It divides species into nine categories: Not Evaluated, Data Deficient, Least Concern, Near Threatened, Vulnerable, Endangered, Critically Endangered, Extinct in the Wild and Extinct. Any species that has been assessed as Critically Endangered, Endangered or Vulnerable are called 'threatened species'. The IUCN list also includes 'Least Concern' Species, which have a lower risk of extinction, but are still important in terms of global biodiversity. Some 'Least Concern' species are undergoing slow declines and hence, it is important to monitor these species and to develop appropriate conservation actions to prevent them from becoming threatened in the future. The inclusion of the different categories of species helps track the changing status of biodiversity.

49.   The IUCN Red List is a powerful tool to inform and catalyse action for biodiversity conservation and policy change, critical to protecting the natural resources required for survival. By providing information about range, population size, habitat and ecology, use and/or trade, threats and conservation actions, the IUCN Red List helps inform necessary conservation decisions and guide funding priorities.

50.   The IUCN Red List relies on Assessors (trained individuals and species experts) to assess species based on the currently available data and information. The information is gathered from a range of sources, including published scientific papers, books, reports, expert knowledge, indigenous knowledge and citizen science. The Red List Authorities review the assessments, and then the IUCN Red List Unit checks the assessments before publishing them on IUCN Red List website.

IUCN Red List Spatial Data

51.   The IUCN Red List of Threatened Species contains global assessments for over 1,20,000 species. The IUCN provides, in public domain, intercontinental species shape files with the Geographic Coordinate System as *GCS_WGS_1984* and the Unit as *Degree (~100km)*. The IUCN data repository has spatial datasets on mammals, amphibians, birds, reptiles, fishes, plants and other groups. More than 80% of the total red list species (>96,600 species) have spatial data[10]. The data is freely accessible and includes taxonomic information, distribution status, IUCN Red List Category, sources and other relevant details. More information and resources can be found at the IUCN Red List Resources & Publications page[11].

52.   The IUCN spatial datasets can be used to evaluate the species richness of the red list species for any defined region/area. Species Richness represents a measure of variety of species based simply on a count of the number of species in a particular sample and is generally expressed as the number of species per unit area.

53.   In order to facilitate its use, the IUCN Red List Toolbox for ArcMap[12] is also available alongside the dataset, which intersects the red list species polygon with a grid or shapefile of polygons, giving the number of species per cell or region polygon. The toolbox also enables preparation of Species Richness Map, which shows the number of IUCN red list species found per pixel having area 0.07 degree², or roughly 865 sq.km.

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[10]https://www.iucnredlist.org/resources/spatial-data-download
[11]https://www.iucnredlist.org/resources
[12]https://www.iucnredlist.org/resources/spatialtoolsanddata

54.   To understand the distribution of the red listed species in India, an exercise was undertaken using IUCN spatial datasets on mammals, amphibians and reptiles, using the IUCN Red List of Threatened Species, Red List Version 2020-2 downloaded on August 31, 2020. The number of red listed terrestrial species in India under these categories, as available in the IUCN spatial datasets is given in the following **Table 14**.

Table 14: Data availability for India in IUCN Spatial Database as on August 31, 2020

Category	Acronym	Number of Species		
		Mammals	Amphibians	Reptiles
Critically Endangered	CR	9	20	10
Endangered	EN	60	36	13
Near Threatened	NT	58	13	11
Vulnerable	VU	87	23	23
Least Concerned	LC	338	119	199
Data Deficient	DD	40	87	66
Grand Total		592	298	322

55.   The state level red list species counts, as compiled using the IUCN Red List Toolbox, are given in the **Table 15** and **Figure 3** shows the species richness across the country, with the protected areas of India marked on the map.

Table 15: State wise Count of IUCN Red List Species

State/UT	Species Richness Count		
	Mammals	**Amphibians**	**Reptiles**
Andhra Pradesh	126	23	79
Arunachal Pradesh	195	77	60
Assam	179	61	60
Bihar	126	25	43
Chhattisgarh	81	23	40
Delhi	49	10	12
Goa	108	31	61
Gujarat	120	18	62
Haryana	92	11	19
Himachal Pradesh	123	17	19
Jammu & Kashmir	152	16	22
Jharkhand	82	20	46
Karnataka	147	82	102
Kerala	144	103	140
Madhya Pradesh	93	16	44
Maharashtra	132	44	95
Manipur	146	42	54
Meghalaya	142	53	50

State/UT	Species Richness Count		
	Mammals	**Amphibians**	**Reptiles**
Mizoram	130	27	49
Nagaland	138	53	52
Odisha	112	24	72
Punjab	87	11	16
Rajasthan	90	10	25
Sikkim	157	27	32
Tamil Nadu	152	80	158
Telangana	83	21	44
Tripura	99	24	39
Uttar Pradesh	121	20	39
Uttarakhand	139	23	26
West Bengal	211	53	93
Andaman & Nicobar	55	14	40
Chandigarh	56	10	9
Dadra & Nagar Haveli	69	19	31
Daman & Diu	94	11	45
Lakshadweep	27		5
Puducherry	104	19	64

Figure 3: Species Richness Map of Red List Species
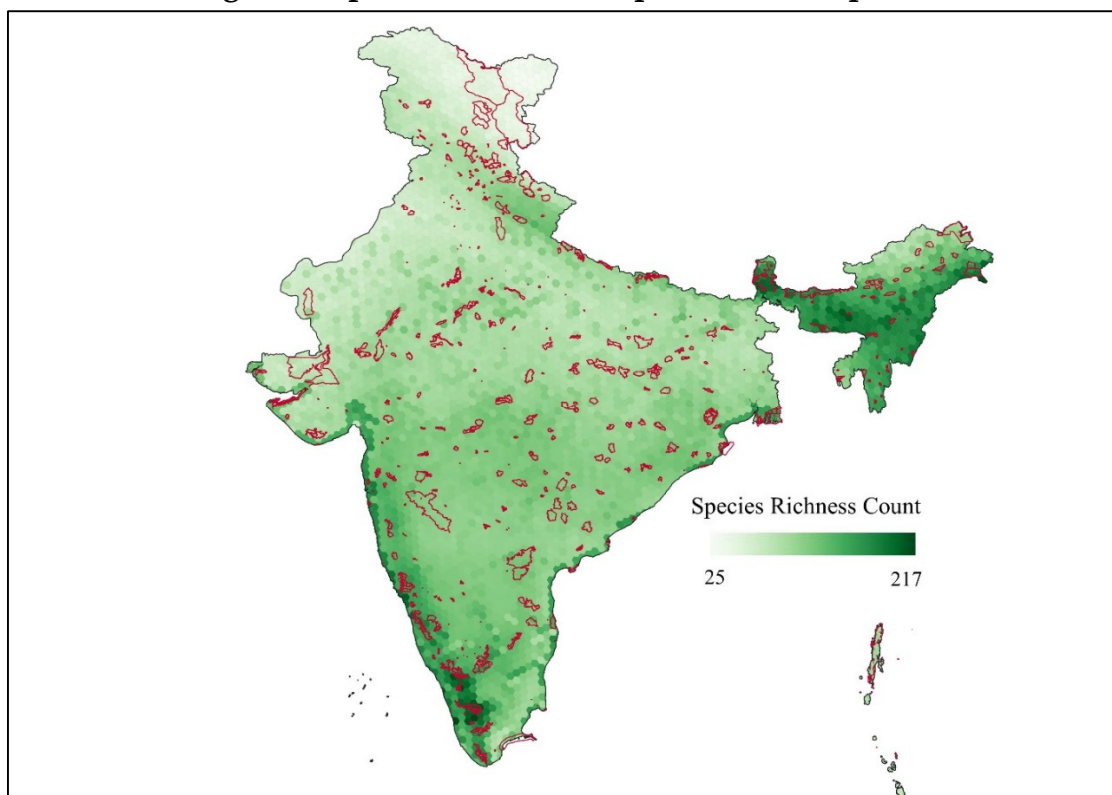
^ Species includes Mammals, Amphibians, Reptiles; the red polygons indicate the protected areas.

Legal Backing for Conservation of Threatened Species in India

56.   Law is a reflection of the needs and demands of society. The very existence of legislation is proof that some consensus has developed concerning the importance of conserving species and ecosystems. Supporting the identification of threatened species by the Botanical Survey of India and the Zoological Survey of India, plants and animals, which are on the verge of extinction or likely to become extinct in the near future, are notified legally as threatened species under Section 38 of the Biological Diversity Act, 2002.

57.   Section 38 of the Biological Diversity Act, 2002 provides for the Central Government, in consultation with the concerned State Government, to notify 'any species which is on the verge of extinction or likely to become extinct in the near future as a threatened species and prohibit or regulate collection thereof for any purpose and take appropriate steps to rehabilitate and preserve those species'.

58.   The notification process under Section 38 is facilitated by the National Biodiversity Authority (NBA) in consultations with the Botanical Survey of India for plants and the Zoological Survey of India for animals through the concerned State Biodiversity Boards.
59.   These notifications are available in public domain on the website of National Biodiversity Authority at http://nbaindia.org/content/18/21/1/notifications.html.

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Statement 5.1: Population estimates of tigers in tiger reserves for the year 2018-19

States	Tiger Reserves	Tigers utilizing the Tiger Reserve		Tigers within the Tiger Reserve	
		Number	Standard Error	Number	Standard Error
Shivalik Hills and Gangetic Plains					
Bihar	Valmiki	33	1	32	0.06
Uttar Pradesh	Dudhwa	107	16	82	3.4
Uttar Pradesh	Pilibhit	65	3	57	0.3
Uttarakhand	Corbett	266	6	231	0.3
Uttarakhand	Rajaji	52	5	38	1
Central India and Eastern Ghats					
Andhra Pradesh	Nagarjunasagar Srisailam	43	2	38	0.03
Chhattisgarh	Achankamar	_	_	5	_
Chhattisgarh	Indravati*	3	_	3	_
Chhattisgarh	Udanti Sitanadi	_	_	1	_
Jharkhand	Palamau	_	_	0	_
Madhya Pradesh	Bandhavgarh	124	5	104	0.43
Madhya Pradesh	Kanha	108	5	88	0.45
Madhya Pradesh	Panna	31	3	25	0.5
Madhya Pradesh	Pench	87	10	61	4
Madhya Pradesh	Satpuda	47	2	40	0.02
Madhya Pradesh	Sanjay Dubri	6	_	5	_
Maharashtra	Bor	_	_	6	_
Maharashtra	Meighat	49	2	46	0.04
Maharashtra	Navegaon Nagzira	6	1	6	0.003
Maharashtra	Pench	82	8	53	2.5
Maharashtra	Sahyadri*	_	_	3	_
Maharashtra	Tadoba	106	6	83	1.15
Odisha	Satkosia	_	_	1	_
Odisha	Simlipal	12	1	8	0.04
Rajasthan	Mukundra	_	_	1	_
Rajasthan	Ranthambore	55	1	53	0.17
Rajasthan	Sariska	_	_	11	_
Telangana	Amrabad	9	2	7	0.25
Telangana	Kawal	_	_	1	_
Western Ghats					
Karnataka	Bandipur	173	12	126	2
Karnataka	Bhadra	38	4	30	0.32
Karnataka	Biligiri Rangaswamy Temple	86	8	52	0.25

States	Tiger Reserves	Tigers utilizing the Tiger Reserve		Tigers within the Tiger Reserve	
		Number	Standard Error	Number	Standard Error
Karnataka	Anshi Dandeli (Kali)	11	_	4	_
Karnataka	Nagarhole	164	7	127	0.43
Kerala	Parambikulam	33	3	26	0.2
Kerala	Periyar	33	6	26	0.46
Tamil Nadu	Anamalai	25	3	20	0.23
Tamil Nadu	KMTR	8	1	7	0.01
Tamil Nadu	Mudumalai	162	10	103	0.38
Tamil Nadu	Sathyamangalam	126	6	83	2
NE Hills and Brahmaputra Plains					
Arunachal Pradesh	Kamlang*	_	_	4	1
Arunachal Pradesh	Namdapha*	_	_	11	1
Arunachal Pradesh	Pakke	_	_	3	_
Assam	Kaziranga	135	7	104	10
Assam	Manas	31	2	31	2
Assam	Nameri	_	_	3	_
Assam	Orang	21	3	21	2.8
Mizoram	Dampa	_	_	0	_
West Bengal	Buxa	_	_	0	_
Sundarban					
West Bengal	Sundarvan	106	4	88	2

Source: Status of Tigers Copredators & Prey in India 2018, National Tiger Conservation Authority & Wildlife Institution of India

*#: MaxEnt model result; *: scat DNA result*

*** Same three tigers in Nameri and Paake. In some tiger reserves that abut each other (Bandipur, Madumalai, and Satyamangalam; Pench – Madhya Pradesh and Pench - Maharashtra) individual tigers could be double counted. These double counts are accounted for in estimating the tiger population at the landscape and State scale. In order to minimize double count of tigers the estimate of "Tigers within Tiger Reserves" is to be used.*

Statement 5.2: Elephant reserves in India (as on 16.08.2018)

Sl. No	State	Elephant Range	Elephant Reserve with date of notification	TotalArea (Sq. Km)
I	West Bengal	Eastern India (South West Bengal-Jharkhand-Orissa)	1. Mayurjharna ER(24.10.02)	414
	Jharkhand		2. Singhbhum ER (26.9.01)	4,530
	Orissa		3. Mayurbhanj ER (29.9.01)	3,214
	Orissa		4. Mahanadi ER (20.7.02)	1,038
	Orissa		5. Sambalpur ER (27.3.02)	427
	Chhattisgarh		6. Badalkhol-Tamorpingla (15.9.2011)	1,048
	Sub total			**10,671**
II	Arunachal Pradesh	North Brahmaputra	7. Kameng ER (19.6.02)	1,892
	Assam		8. Sonitpur ER (6.3.03)	1,420
	Sub total			**3,312**
III	Assam	South Brahmaputra	9. Dihing-Patkai ER (17.4.03)	937
	Arunachal Pradesh		10. South Arunachal ER (29.2.08)	1,958
	Sub total			**2,895**
IV	Assam	Kaziranga	11. Kaziranga – Karbi Anglong (17.4.03)	3,270
	Assam		12. Dhansiri-Lungding ER (19.4.03)	2,740
	Nagaland		13. Intanki ER (28.2.05)	202
	Nagaland		14. Singphan ER* (16.8.2018)	24
	Sub total			**6,236**
V	Assam	Eastern Dooars	15. Chirang-Ripu ER (7.3.03)	2,600
	West Bengal		16. Eastern Dooars ER (28.8.02)	978
	Sub total			**3,578**
VI	Meghalaya	E. Himalayas	17. Garo Hills ER (31.10.01)	3,500
	Sub total			**3,500**
VII	Karnataka	Nilgiri – Eastern Ghat	18. Mysore ER (25.11.02)	8,056
	Karnataka		19. Dandeli ER (26.03.2015)	2,321
	Kerala		20. Wayanad ER (2.4.02)	1,200
	Tamil Nadu		21. Nilgiri ER (19.9.03)	4,663
	Andhra Pradesh		22. Rayala ER (9.12.03)	766
	Sub total			**17,006**
VIII	Kerala	South Nilgiri	23. Nilambur ER (2.4.02)	1,419
	Tamil Nadu		24. Coimbatore ER (19.9.03)	566
	Sub total			**1,985**
IX	Tamil Nadu	Western Ghat	25. Anamalai ER (19.9.03)	1,457
	Kerala		26. Anaimudi ER (2.4.02)	3,728
	Sub total			**5,185**
X	Kerala	Periyar	27. Periyar (2.4.02)	3,742
	Tamil Nadu		28. Srivilliputtur ER(19.9.03)	1,249
	Sub total			**4,991**
XI	Uttarakhand	North India	29. Shivalik ER (28.10.02)	5,405
	Uttar Pradesh		30. Uttar Pradesh ER (9.9.09)	744
	Sub total			**6,149**
	TOTAL			**65,507**

Statement 5.3: Estimated number of tiger in States and Landscapes of India

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	402 (336-487)	534 (500-568)	776 (685-861)	981 (871 - 1,093)
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)
Sundarban		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)**

Source: Status of Tigers Copredators & Prey in India 2018, National Tiger Conservation Authority & Wildlife Institution of India

*: Scat DNA based estimates were also used ; #: For comparison with previous estimates of Andhra Pradesh, combine population estimate of current Andhra Pradesh and Telangana.

Note: Numbers in parenthesis are one standard error limits of the mean.

Statement 5.4: Region wise population estimation of Elephants in India, 2017

Region	State	Elephant density / km²	Elephant Population
North-East	Arunachal Pradesh	0.23	1614
	Assam	0.38	5719
	Meghalaya	0.16	1754
	Tripura	0.1	102*
	Nagaland	0.45	446*
	West Bengal (North Region)	0.25	488
	Manipur		9
	Mizoram		7
			10,139
East Central Region	Odisha		1976
	Jharkhand	0.16	679
	Chhattisgarh		247
	Bihar		25
	Madhya Pradesh		7
	West Bengal (South Region)		194
			3128
North West Region	Uttarakhand	0.45	1839
	Uttar Pradesh		232
	Haryana		7
	Himachal		7
			2085
South Region	Karnataka	0.67	6049
	Kerala	0.32	5706*
	Maharashtra		6
	Andhra Pradesh		65
	Andaman & Nicobar Islands	0.14	25*
	Tamil Nadu		2761
			14612
GRAND TOTAL			**29964**

Note: # The total census figures for West Bengal is 682 (North Bengal (488) + South Bengal (194).

* Results are based on indirect (dung) count method as direct counts could not be carried out as informed by State & UTs like Kerala, Nagaland, Tripura and Andaman & Nicobar Islands.

Statement 5.5: Number of Protected Areas in India from 2000 to 2019

(as on December, 2019)

Year	National Parks		Wild Life Sanctuaries		Community Reserves		Conservation Reserves		Total Protected Area	
	Number	Area (km²)	Number	Area (km²)	Number	Area (km²)	Number	Area (km²)	Number	Area (km²)
2000	89	37,803	485	1,08,863	-	-	-	-	574	1,46,666
2006	96	38,392	503	1,11,229	1	0.31	4	43	604	1,49,665
2007	98	38,429	507	1,11,529	5	21	7	95	617	1,50,074
2008	99	39,442	510	1,13,123	5	21	45	1,260	659	1,53,846
2009	99	39,442	512	1,13,395	5	21	45	1,260	661	1,54,118
2010	102	40,284	516	1,13,843	5	21	47	1,382	670	1,55,530
2011	102	40,284	518	1,13,999	5	21	52	1,801	677	1,56,105
2012	103	40,500	526	1,14,933	5	21	59	2,013	693	1,57,468
2013	102	40,500	532	1,17,124	19	31	64	2,233	717	1,59,887
2014	103	40,500	535	1,18,291	43	58	64	2,233	745	1,61,082
2015	103	40,500	541	1,18,866	44	59	71	2,549	759	1,61,975
2016	103	40,500	543	1,18,918	45	60	72	2,566	763	1,62,044
2017	103	40,500	544	1,18,932	46	73	76	2,588	769	1,62,092
2018	104	40,501	544	1,18,932	46	73	77	2,594	771	1,62,100
2019	101*	40,564	553	1,19,757	163	833	89	4128	906	1,65,282

Source: National Wildlife Database, Wildlife Institute of India
*Note: 1. * Three Button Islands National Parks (North Button Island, Middle Button Island & South Button Island) of Andaman & Nicobar Islands have been merged with Rani Jhansi Marine National Park.*
2. These data are based on availability of data from Forest Department and Gazette Notification notified by the Ministries.
3. ˙Community Reserves and Conservation Reserves have been established in India from 2006 onwards. Hence these values are zero for the year 2000.