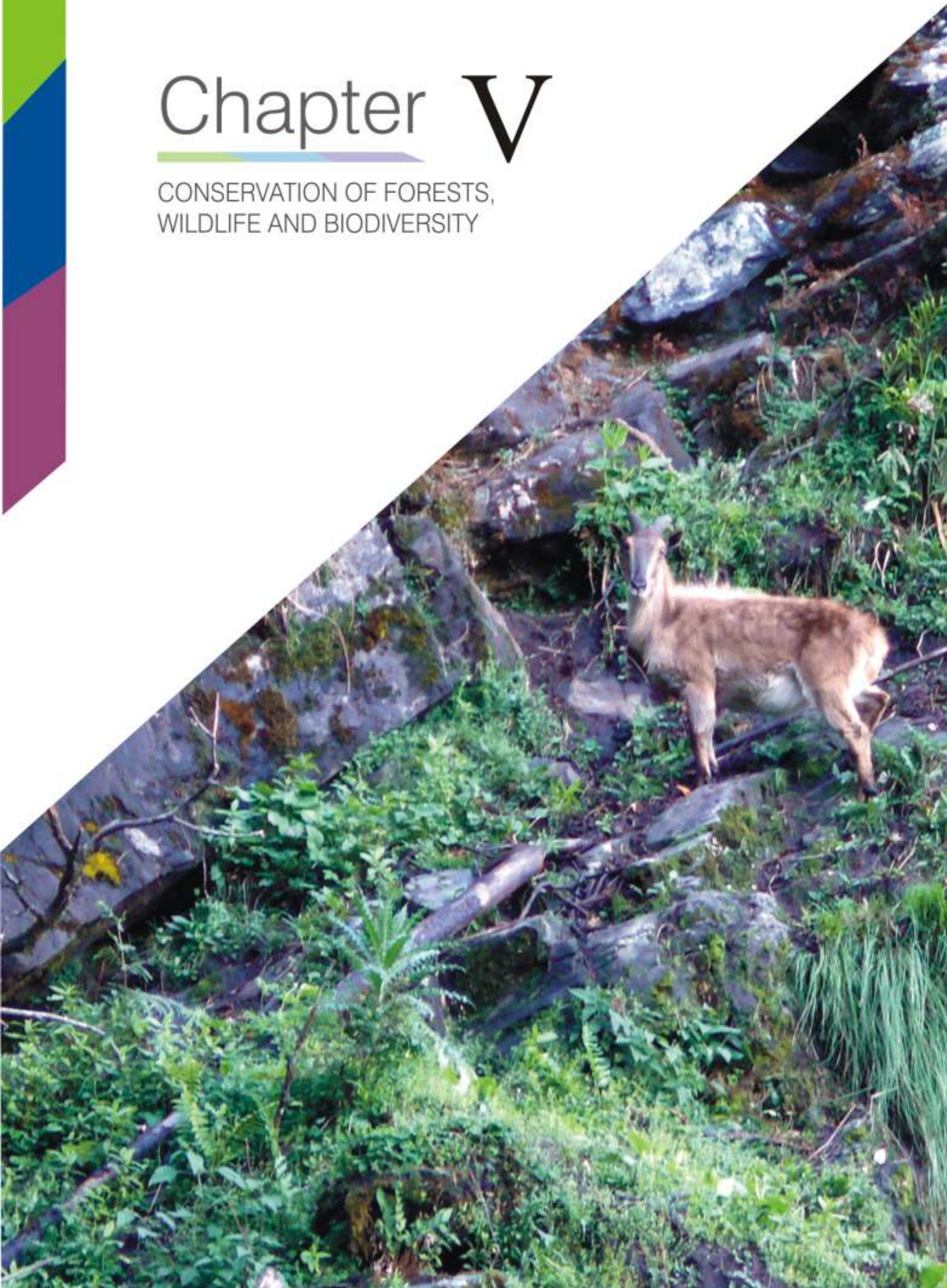


Chapter V

CONSERVATION OF FORESTS,
WILDLIFE AND BIODIVERSITY





CONSERVATION OF FORESTS, WILDLIFE AND BIODIVERSITY

5.1 STRATEGY FOR BIODIVERSITY CONSERVATION

India is one of the 17 countries which are bestowed with a wide variety of flora and fauna and hold almost 70% of the world's terrestrial biodiversity. In India, there are 26 recognized endemic centres of flowering plants. It encompasses around 30% of recorded flora and 7% of recorded fauna of the world. In all, so far, 45,968 plant species and 91,364 animal species have been documented. India is located at a confluence of three major realms-Eurasian, Afro-Tropical and Indo-Malayan. The unique bio-geographical location provides India the advantage of a wide range of coordinates (latitudes, longitudes and altitudes) that, in turn, give rise to different types of vegetations and eco-systems. Coupled with social and cultural interactions of the populace with the eco-systems and natural resources, the spectrum has been further enriched. Wildlife Institute of India has classified the country's flora and fauna into ten bio-geographical zones (Table 5.1.1.). Deccan Peninsula zone covers the highest of India's geographical area (41.9%) of country's flora and fauna; whereas, Islands have the minimum share of geographical area (0.3%).

Table 5.1.1. Bio-geographical zones of India

| S. no. | Zone | % of geographical area covered |
|--------|------------------|--------------------------------|
| 1. | Trans-Himalayan | 5.6 |
| 2. | Himalayan | 6.4 |
| 3. | Indian desert | 6.5 |
| 4. | Semi-Arid | 16.6 |
| 5. | Western ghats | 4.0 |
| 6. | Deccan Peninsula | 41.9 |
| 7. | Gangetic plains | 10.8 |
| 8. | Coasts | 2.6 |
| 9. | North-East | 5.4 |
| 10. | Island | 0.3 |

Source: Wild Life Institute of India; <http://wiienvis.nic.in/database/htmlpages/biozonemap.htm>.

Effective biodiversity conservation requires strong policies and legislations which have been put by India for achieving the aim. Following promulgation of the Indian Forest Act 1927 with an aim to protect forests, the first national park was established in 1936 which is now known as the Corbett National Park. After independence, the Indian Board for Wildlife was constituted in 1952 to focus on conservation. The



efforts were continuously taken up and, in a matter of time, 67 national parks and wildlife sanctuaries were created by 1972. Project Tiger, one of the most ambitious conservation projects, was initiated in 1973 and continues. Subsequently, the Forest Conservation Act 1980 was enacted followed by the Environmental Protection Act 1986. In the same year, the 'Man and Biosphere Reserve Programme' was initiated and India became a party to the Convention on Biodiversity in 1992 and Biodiversity Act was enacted in 2002. Along with these measures, the Wildlife (Protection) Act 1972 has been amended several times to make it more stringent and two new categories of protected areas, namely, conservation reserves and community reserves were added in 2002. The Act was again amended in 2006 and National Tiger Conservation Authority (NTCA) was established.

As a commitment towards strengthening global efforts in wildlife conservation, India is a party to the major international conventions like Convention on International Trade in Endangered Species (CITES) of Wildlife Fauna and Flora, International Union for Conservation of Nature and Natural Resources (IUCN), International Convention for Regulation of Whaling, UNESCO's World Heritage Committee and Convention on Migratory Species.

In addition to these efforts, the Eco-Task Force has also been raised under the Territorial Army which is actively involved in tree-planting. At present, there are 6 infantry battalions of the Territorial Army under the Eco-Task Force. These battalions have covered an area of 1,945.40 ha under plantations and have planted more than 18 lakh seedlings during 2018-19. The progress of the Eco-Task Force for plantation is given in Table 5.1.2.

Table 5.1.2. Progress of the Eco-Task Force of Territorial Army

| Battalion | Location | Year 2017-18 | | Year 2018-19 | |
|-----------------------|--|---------------------------------|--------------------|---------------------------------|--------------------|
| | | No. of seedlings planted (lakh) | Area covered (ha.) | No. of seedlings planted (lakh) | Area covered (ha.) |
| 127 Inf. Bn. (TA)Eco. | Tehri Garhwal (Uttarakhand) | 4.80 | 400.00 | 4.00 | 400.00 |
| 128 Inf. Bn. (TA)Eco. | Shri Mohangarh, Jaisalmer (Rajasthan) | 1.45 | 280.00 | 2.40 | 280.00 |
| 129 Inf. Bn.(TA)Eco | Bahu Purmandal Project Samba (Jammu and Kashmir) | 1.10 | 160.00 | 1.13 | 210.00 |
| 130 Inf. Bn. (TA)Eco. | Pithoragarh (Uttarakhand) | 5.18 | 500.00 | 5.00 | 500.00 |

| Battalion | Location | Year 2017-18 | | Year 2018-19 | |
|-----------------------|--|---------------------------------|--------------------|---------------------------------|--------------------|
| | | No. of seedlings planted (lakh) | Area covered (ha.) | No. of seedlings planted (lakh) | Area covered (ha.) |
| 134 Inf. Bn. (TA)Eco. | Sonitpur (Assam) | 0.23 | 23.50 | 2.83 | 245.50 |
| 135 Inf. Bn. (TA)Eco. | Chirang Res. Forest, Kokrajhar (Assam) | 3.00 | 300.00 | 3.05 | 309.90 |
| Total | | 15.76 | 1,663.50 | 18.41 | 1,945.40 |

Source: NAEB and MoEF&CC, Gol.



5.1.1 Biodiversity Act 2002

An important step towards biodiversity conservation was taken when the Biological Diversity Act 2002 was enacted as a result of the International Convention on Biological Diversity (1992). Also, Biological Diversity Rule 2004 followed. These steps were taken up after intensive and extensive consultations with stakeholders. The salient features of the Act are:

- (i) to regulate access to biological resources of the country with the purpose of securing equitable share in benefits arising out of use of biological resources and associated knowledge relating to biological resources,
- (ii) to conserve and sustainably use biological diversity,
- (iii) to respect and protect knowledge of local communities relating to biodiversity,
- (iv) to secure sharing of benefits with local people as conservers of biological resources and holders of knowledge and information relating to the use of biological resources,
- (v) conservation and development of areas of importance from the stand-point of biological diversity by declaring them as biological diversity heritage sites,

- (vi) protection and rehabilitation of threatened species and
- (vii) involvement of institutions of state governments in the broad scheme of implementation of the Biological Diversity Act through constitution of committees.

The Act was followed by constitution of the National Biodiversity Authority in 2003, with headquarters in Chennai, and was entrusted with the task of regulating the activities as provided in the Act, for issuing guidelines and advising the central and state governments on issues of biological diversity. Many state governments also constituted the State Biodiversity Boards (SBBs) as provided in Section 22 of the Act. The SBBs advise the state governments subject to any guidelines issued by the central government on matters related to the conservation and sustainable use of biodiversity. As of now, 29 states have constituted SBBs.

In addition to this, Biodiversity Management Committees (BMCs) have been constituted by local bodies in 26 states. This is almost double than 14 states reported in the previous report (FSRI 2010). The number of BMCs have increased from 31,542 (2009-10) to 1,39,831 (Table 5.1.1.1.).

During the FSRI 2010 reporting period up to 2009-10, there were 370 People's Biodiversity Registers (PBR) in 5 states which have now increased to 6,449 in 21 states. As of February 2019, maximum number of BMCs is in Uttar Pradesh (58,782) while minimum in Sikkim (35). Maximum numbers of PBRs are found in Karnataka (1,777) and minimum in Sikkim (4).

Table 5.1.1.1. Number of BMCs and PBRs (as on February 2019)

| S.no. | State | No. of BMCs | No. of PBR |
|-------|-------------------|-------------|------------|
| 1. | Andhra Pradesh | 6,031 | 100 |
| 2. | Arunachal Pradesh | 139 | 43 |
| 3. | Assam | 229 | 92 |
| 4. | Chhattisgarh | 223 | 0 |
| 5. | Goa | 191 | 0 |
| 6. | Gujarat | 7,661 | 1,126 |
| 7. | Himachal Pradesh | 609 | 6 |
| 8. | Jharkhand | 3,384 | 14 |
| 9. | Karnataka | 6,228 | 1,777 |
| 10. | Kerala | 1,043 | 892 |
| 11. | Madhya Pradesh | 23,431 | 890 |
| 12. | Maharashtra | 23,772 | 100 |
| 13. | Manipur | 95 | 22 |
| 14. | Meghalaya | 263 | 30 |
| 15. | Mizoram | 250 | 5 |
| 16. | Nagaland | 110 | 0 |

| S. no. | State | No. of BMCs | No. of PBR |
|--------------|---------------|-----------------|--------------|
| 17. | Odisha | 1,700 | 87 |
| 18. | Punjab | 74 | 11 |
| 19. | Rajasthan | 113 | 0 |
| 20. | Sikkim | 35 | 4 |
| 21. | Tamil Nadu | 385 | 0 |
| 22. | Telangana | 3,200 | 220 |
| 23. | Tripura | 502 | 431 |
| 24. | Uttarakhand | 948 | 124 |
| 25. | Uttar Pradesh | 58,782 | 325 |
| 26. | West Bengal | 433 | 150 |
| Total | | 1,39,831 | 6,449 |

Source: National Biodiversity Authority, MoEF&CC, GoI

5.1.2 Biodiversity Heritage Site (BHS)

Excerpts from the Guidelines for the selection and management of BHS

BHS are well defined areas that are unique, ecologically fragile ecosystems - terrestrial, coastal and inland waters and, marine having rich biodiversity comprising of any one or more of the following components: richness of wild as well as domesticated species or intra-specific categories, high endemism, presence of rare and threatened species, keystone species, species of evolutionary significance, wild ancestors of domestic/cultivated species or their varieties, past pre-eminence of biological components represented by fossil beds and having significant cultural, ethical or aesthetic values and are important for the maintenance of cultural diversity, with or without a long history of human association with them. The rules for management and conservation of all the heritage sites are framed by the state governments. As on April 2019, there are 14 BHSs in India (Table 5.1.2.1.). The significance and objectives of BHS are as follows:

- To strengthen the biodiversity conservation in traditionally managed areas and to stem the rapid loss of biodiversity in intensively managed areas, such areas need special attention.
- BHS also often represent a positive interface between nature, culture, society, and technologies, such that both conservation and livelihood security are or can be achieved, and positive links between wild and domesticated biodiversity are enhanced.
- To have a BHS in or around a community should be a matter of pride and honour to such community and this virtuous act of community may work as an example to the entire nation apart from ensuring availability of the resources to their own future generation. The areas like existing sacred grooves in general and those existing in Western Ghats in particular can be straight away be declared and notified as BHSs.
- It is necessary to instill and nurture conservation ethics in all sections of the society. The creation of BHS will ensure bringing home these values in the society and, thereby, put an end to over-exploitation of natural resources and avoid environmental degradation.

- e. The creation of BHS may not put any restriction on the prevailing practices and usages of the local communities, other than those Agenda for 19th Authority Meeting of National Biodiversity Authority dated 04.05.11 at CSIR, Ghaziabad voluntarily decided by them. The purpose is to enhance the quality of life of the local communities through this conservation measure.

Karnataka has notified first four BHS of the country. The Nallur Tamarind Grove was the first BHS of the country. It is popularly believed to be a relic of the Chola Dynasty that ruled the area almost 800 years ago. It has a population of around 300 trees and is a picture of dynamic pattern of plant diversity. A significant component of this BHS is a group of old tamarind trees standing with their gigantic trunks and large crowns. The second BHS of the country was Hogrekan in Chikmagalur and has unique Shola vegetation and grasslands with unique floral species many of whom are medicinal in value. Maharashtra becomes the second state to notify BHS in the country. It has one BHS preserved as a natural forest having biological, ethnical and historical values. The latest notified BHS is Madasaru in Odisha having an area of 528 ha.

Table 5.1.2.1. Details of BHS in India (as on April 2019)

| S. no. | Name of the BHS | Date of notification | Area (ha) | Location | State |
|--------|--|----------------------|-----------|--------------------------------|---------------|
| 1. | Nallur Tamarind Grove | 24.01.2007 | 21.85 | Devanahalli, Bengaluru | Karnataka |
| 2. | Hogrekan | 04.09.2010 | 1,015.01 | Kadur, Chikmagalur | Karnataka |
| 3. | University of Agricultural Sciences, GKVK Campus | 02.09.2010 | 167.00 | Bengaluru | Karnataka |
| 4. | Ambaraguda | 2011 | 3,857.12 | Shimoga | Karnataka |
| 5. | Glory of Allapalli | 15.07.2014 | 6.00 | Gadchiroli, Maharashtra | Maharashtra |
| 6. | Tonglu BHS under Darjeeling Forest Division | 20.03.2015 | 230.00 | Darjeeling | West Bengal |
| 7. | Dhotrey BHS under Darjeeling Forest Division | 20.03.2015 | 180.00 | Darjeeling | West Bengal |
| 8. | Ghariyal Rehabilitation Centre | 11.08.2016 | 10.00 | Kukrail Reserve Forest Lucknow | Uttar Pradesh |
| 9. | Ameenpur Lake | 21.11.2016 | 37.64 | Sangareddy | Telangana |
| 10. | Majuli | 29.03.2017 | 87,500.00 | Majuli | Assam |
| 11. | Dialong Village | 23.05.2017 | 1,135.00 | Tamenglong | Manipur |
| 12. | Chikigarh Kanak Durga | 16.04.2018 | 22.62 | Chilkigarh, Jhargram | West Bengal |

| S. no. | Name of the BHS | Date of notification | Area (ha) | Location | State |
|--------|-------------------------|----------------------|-----------|---------------------------|-----------|
| 13. | Khlaw Kur Syiem Kmielng | 13.12.2018 | 16.05 | Umling, Ri-Bhoi | Meghalaya |
| 14. | Madasaru | 02.04.2019 | 528.00 | Raikia, Kandhamal, Odisha | Odisha |

Source: National Biodiversity Authority, MoEF&CC, Gol.

5.2 WILDLIFE PROTECTION ACT 1972

The Act was legislated in 1972 by the Government of India to 'provide protection to wild animals, birds and plants and for matters connected therewith or ancillary or incidental thereto with a view to ensure ecological and environmental security of the country. Apart from implementing wide ranging reforms, the Act established schedules of protected plants and animal species and outlawed their hunting and harvesting. Under the Act, provisions for appointment of regulatory authorities like Director of Wildlife Preservation under the central government and chief wildlife warden and other officers under the state governments were also made to implement the Act. National Board for Wildlife was constituted for framing the policies and to provide advice to the central and state governments on the modalities for promoting wildlife conservation and methods for effectively controlling poaching and illegal trade of wildlife and products made out of wildlife. The state governments constituted state wildlife boards on similar lines. Procedures were laid down for declaring wildlife sanctuaries and national parks.

5.3 FOREST CONSERVATION ACT 1980

Developmental projects like dams, railways, roads, transmission lines, etc. require large tracts of land. Forest land has also to be diverted for these uses. In order to check the diversion of forests by state governments for non-forest use, the Government of India enacted the Forest Conservation Act which came into force on 25th October 1980. The Act makes it essential for state governments to seek prior approval of the central government for diverting forest land for non-forestry purposes like construction of roads and dams, mining, laying transmission and railway lines, defence purposes, etc. The objective of the Act was to regulate the indiscriminate diversion of forest lands for non-forestry purposes in order to maintain a balance between development and conservation of nature. The Act requires the state government to submit proposals for diversion of forest land which are examined for feasibility by a committee of experts. If the proposal is found suitable, it is approved by the central government under certain conditions to be fulfilled by the user agencies like compensatory afforestation, catchment area treatment (CAT), safety zone creation, etc. The area for compensatory afforestation is equal to the non-forest land or double degraded forest land as the case may be.

Since its formation, the implementation of the Act has been made more stringent and effective by the intervention of the Supreme Court of India. In 1996, the provisions of the Act were extended to all forests recorded as forest land in the government records regardless of the ownership of forests or the area conforms to the character of forests as the term is defined in the dictionary. This order brought even the private forests under the Act. Again in 2002, the court ordered realization of Net Present Value from the user agency and directed the MoEF&CC, Gol to constitute a body to manage the funds received under compensatory afforestation, thus, leading to the establishment of Compensatory Afforestation Fund Management Authority (CAMPA). Over time, the Act has been made user-friendly by simplifying the procedures and reducing the delays in approvals. Under the Act, regional APCCFs are appointed to look after a particular region. As on July 2019, there are ten regional offices of MoEF&CC (Table 5.3.1.). The proposals are submitted to them and they process them for approvals.

Table 5.3.1. List of regional offices of MoEF&CC in India (as on July 2019)

| S. no. | Zone | Location | State |
|--------|---------------|-------------|---|
| 1. | Southern | Bengaluru | Karnataka, Kerala, Goa and Lakshadweep |
| 2. | Western | Bhopal | Dadra and Nagar Haveli, Daman, Gujarat and Madhya Pradesh |
| 3. | Eastern | Bhubaneswar | Odisha and West Bengal |
| 4. | South-Eastern | Chennai | Andhra Pradesh, Telangana, Tamil Nadu, Puducherry and Andaman and Nicobar Island |
| 5. | Northern | Chandigarh | Chandigarh, Haryana, J&K and Punjab |
| 6. | North-Central | Dehradun | Himachal Pradesh and Uttarakhand |
| 7. | Central | Lucknow | Delhi, Rajasthan and Uttar Pradesh |
| 8. | Wes-Central | Nagpur | Chhattisgarh and Maharashtra |
| 9. | East-Central | Ranchi | Bihar and Jharkhand |
| 10. | North-Eastern | Shillong | Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and Tripura |

Source: MoEF&CC, Gol.

5.4 PROTECTED AREAS

Protected Areas have been created for management and protection of wildlife and their habitat. These areas are those in which the human occupation and exploitation of resources is limited, sometimes, zero. National parks and wildlife sanctuaries have been created in forest areas with relatively large populations of target species and associated ecological components. There are four main components of protected areas, namely, national parks, wildlife sanctuaries, conservation reserves and community reserves and in addition the marine protected areas. These components have been made on the basis of the level of protection (depending upon then laws and regulations of the country) and use of resources. The details of these components are given in Table 5.4.1. The Protected Area Network consists of 870 areas with a total area of 1.65 lakh km² which is around 21% of the total forest area of the country and 5.02% of the total geographical area of the country. Although the number of protected areas is very large, the average size is less than 200 km² per protected area. There are only 2 protected areas having an area of more than 5,000 km² and only 22 with area more than 1,000 and less than 5,000 km².

Table 5.4.1. Protected Area Network in India (as on July 2019)

| S. no. | Component of protected areas | Number | Area (km ²) | % of the country area |
|--------|------------------------------|------------|-------------------------|-----------------------|
| 1. | National parks | 104 | 40,501.13 | 1.23 |
| 2. | Wildlife sanctuaries | 551 | 1,19,775.80 | 3.64 |
| 3. | Conservation reserves | 88 | 4,356.49 | 0.13 |
| 4. | Community reserves | 127 | 525.22 | 0.02 |
| | Total | 870 | 1,65,158.60 | 5.02 |
| 5. | Marine protected areas | 131 | 9,801.13 | |

Source: National Wildlife Database Cell, Wildlife Institute of India; http://www.wiienvis.nic.in/Database/Protected_Area_854.aspx.

Most of the protected areas are under biotic pressures and are inhabited or surrounded by human settlements in the form of forest villages or forest fringe villages. In addition to this, certain marine protected areas have also been notified. There are 131 Marine Protected Areas spread over an area of nearly 9,800 km² including those in Andaman and Nicobar Islands and Lakshadweep. The details according to the categories are given in Table 5.4.2. Figure 5.4.1 shows the trend of total number and area of protected areas from the year 2010 to 2019.

Table 5.4.2. Establishment of protected areas in India from 2010 to 2019

| Year | National parks | | Wildlife sanctuaries | | Community reserves | | Conservation reserves | | Total Protected areas | |
|------|----------------|-------------------------|----------------------|-------------------------|--------------------|-------------------------|-----------------------|-------------------------|-----------------------|-------------------------|
| | Number | Area (km ²) | Number | Area (km ²) | Number | Area (km ²) | Number | Area (km ²) | Number | Area (km ²) |
| 2010 | 102 | 40,283.62 | 516 | 1,13,842.87 | 5 | 21 | 47 | 1,382.28 | 670 | 1,55,529.77 |
| 2011 | 102 | 40,283.62 | 518 | 1,13,998.75 | 5 | 21 | 52 | 1,801.29 | 677 | 1,56,104.66 |
| 2012 | 103 | 40,500.13 | 526 | 1,14,933.44 | 5 | 21 | 59 | 2,012.93 | 693 | 1,57,467.50 |
| 2013 | 102 | 40,500.13 | 532 | 1,17,123.63 | 19 | 30.94 | 64 | 2,232.61 | 717 | 1,59,887.31 |
| 2014 | 103 | 40,500.13 | 535 | 1,18,290.66 | 43 | 58.22 | 64 | 2,232.61 | 745 | 1,61,081.62 |
| 2015 | 103 | 40,500.13 | 541 | 1,18,866.44 | 44 | 59.51 | 71 | 2,548.82 | 759 | 1,61,974.90 |
| 2016 | 103 | 40,500.13 | 543 | 1,18,917.71 | 45 | 59.66 | 72 | 2,566.20 | 763 | 1,62,043.70 |
| 2017 | 103 | 40,500.13 | 544 | 1,18,931.80 | 46 | 72.61 | 76 | 2,587.95 | 769 | 1,62,092.49 |
| 2018 | 104 | 40,501.13 | 544 | 1,18,931.80 | 46 | 72.61 | 77 | 2,594.03 | 771 | 1,62,099.47 |
| 2019 | 104 | 40,501.13 | 551 | 1,19,775.8 | 127 | 525.22 | 88 | 4,356.49 | 870 | 1,65,158.64 |

Source: National Wildlife Database Cell, Wildlife Institute of India (July 2019); http://www.wiienvs.nic.in/Database/Protected_Area_854.aspx.

Note: These data are based on availability of data from forest departments and gazette notification notified by the ministries.

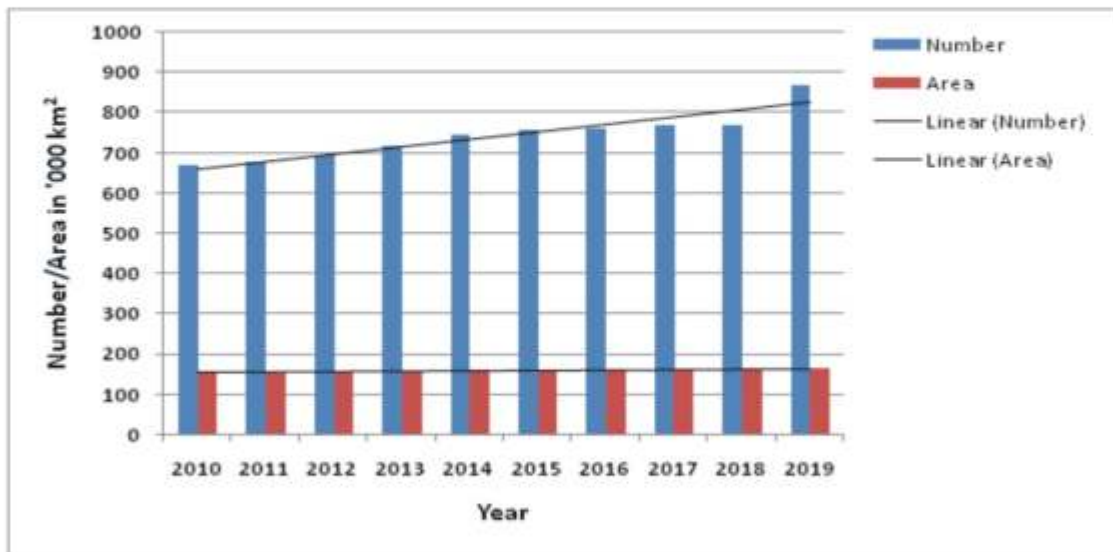


Fig. 5.4.1. Trends (numbers and total area) under Protected Area Network from 2010 to 2019.

5.4.1 National Parks

National parks are notified areas, whether within a sanctuary or not, by the state governments with reference to its ecological, faunal, floral, geo-morphological, or zoological association or importance, needed for the purpose of protecting and propagating or developing wildlife therein or its environment. No human activity is permitted inside a national park except those permitted by the Chief Wildlife Warden of the state, the terms and conditions of which are given in the Wildlife Protection Act 1972. State wise details about the National Parks are presented in Table 5.4.1.1. Madhya Pradesh has the maximum number of national parks (10) while Uttarakhand occupies the maximum area under National Parks, i.e., 4,915.02 km² for its six National Parks. Punjab, Chandigarh, Dadra and Nagar Haveli, Daman and Diu, Delhi, Lakshadweep and Puducherry do not have any national parks and therefore, not included in the Table 5.4.1.1. Though, area wise, Sikkim is a small state still it has a National Park that occupies an area of 25.14% of its geographical area and qualified to be the first in the list. Two other state/UT, namely, Uttarakhand and Andaman and Nicobar Island had more than 5% of state's geographical area under national park.



Table 5.4.1.1 National parks in India (as on May 2019)

| S. no. | State/UT | Geographical area (km ²) | No. of national parks | Total area under national parks (km ²) | % of state area |
|--------------|-----------------------------|--------------------------------------|-----------------------|--|-----------------|
| 1. | Andhra Pradesh | 1,60,205 | 3 | 1,368.88 | 0.86 |
| 2. | Arunachal Pradesh | 83,743 | 2 | 2,290.82 | 2.74 |
| 3. | Assam | 78,438 | 5 | 1,977.79 | 2.52 |
| 4. | Bihar | 94,163 | 1 | 335.65 | 0.36 |
| 5. | Chhattisgarh | 1,35,191 | 3 | 2,899.08 | 2.14 |
| 6. | Goa | 3,702 | 1 | 107 | 2.89 |
| 7. | Gujarat | 1,96,022 | 4 | 480.12 | 0.24 |
| 8. | Haryana | 44,212 | 2 | 48.25 | 0.11 |
| 9. | Himachal Pradesh | 55,673 | 5 | 2,271.38 | 4.08 |
| 10. | Jammu and Kashmir | 222,236 | 4 | 3,925.00 | 1.77 |
| 11. | Jharkhand | 79,714 | 1 | 226.33 | 0.28 |
| 12. | Karnataka | 1,91,791 | 5 | 2,795.76 | 1.46 |
| 13. | Kerala | 38,863 | 6 | 558.16 | 1.44 |
| 14. | Madhya Pradesh | 3,08,245 | 10 | 3,657.26 | 1.19 |
| 15. | Maharashtra | 3,07,713 | 6 | 1,273.60 | 0.41 |
| 16. | Manipur | 22,327 | 1 | 40 | 0.18 |
| 17. | Meghalaya | 22,429 | 2 | 267.48 | 1.19 |
| 18. | Mizoram | 21,081 | 2 | 150 | 0.71 |
| 19. | Nagaland | 16,579 | 1 | 202.02 | 1.22 |
| 20. | Orissa | 1,55,707 | 2 | 990.7 | 0.64 |
| 21. | Rajasthan | 3,42,239 | 5 | 3,947.07 | 1.15 |
| 22. | Sikkim | 7,096 | 1 | 1,784.00 | 25.14 |
| 23. | Tamil Nadu | 1,30,058 | 5 | 307.85 | 0.24 |
| 24. | Telangana | 1,14,840 | 3 | 19.62 | 0.02 |
| 25. | Tripura | 10,486 | 2 | 36.71 | 0.35 |
| 26. | Uttar Pradesh | 2,40,928 | 1 | 490 | 0.2 |
| 27. | Uttarakhand | 53,483 | 6 | 4,915.02 | 9.19 |
| 28. | West Bengal | 88,752 | 6 | 1,981.65 | 2.23 |
| 29. | Andaman and Nicobar Islands | 8,249 | 9 | 1,153.94 | 13.99 |
| Total | | 32,87,263 | 104 | 40,501.14 | 1.23 |

Source: National Wildlife Database, Wildlife Institute of India; http://wiienvs.nic.in/Database/npa_8231.aspx.

5.4.2 Wildlife Sanctuaries

Wildlife Sanctuaries have been notified under the Wildlife Protection Act 1972 for protecting, propagating or developing wildlife or its environment. Such areas are other than areas under any reserve forest (including territorial waters) that has adequate ecological, faunal, floral, geomorphological, natural or zoological significance. Some restricted human activities are allowed inside the sanctuary in accordance with Chapter VI of Wildlife Protection Act 1972. As on May 2019, there are 551 Wildlife sanctuaries in India covering a total area of 1,16,746.37 km² (Table 5.4.2.1). Andaman and Nicobar Island have the maximum number of wildlife sanctuaries (96) covering 4.72% area of the State. Gujarat occupies the maximum area of 16,618.42 km² for its 23 wildlife sanctuaries.

Table 5.4.2.1. Wildlife sanctuaries in India (as on May 2019)

| S. no. | State/UT | Geographical area (km ²) | Total number of wildlife sanctuaries | Area of wildlife sanctuaries (km ²) | % of state area |
|--------|-------------------|--------------------------------------|--------------------------------------|---|-----------------|
| 1. | Andhra Pradesh | 1,60,205 | 13 | 5,942.23 | 3.71 |
| 2. | Arunachal Pradesh | 83,743 | 11 | 7,487.75 | 8.94 |
| 3. | Assam | 78,438 | 18 | 1,840.14 | 2.35 |
| 4. | Bihar | 94,163 | 12 | 2,901.67 | 3.08 |
| 5. | Chhattisgarh | 1,35,191 | 11 | 3,760.29 | 2.78 |
| 6. | Goa | 3,702 | 6 | 6,47.91 | 17.5 |
| 7. | Gujarat | 1,96,022 | 23 | 16,618.42 | 8.48 |
| 8. | Haryana | 44,212 | 8 | 233.21 | 0.53 |
| 9. | Himachal Pradesh | 55,673 | 28 | 6,116.10 | 10.99 |
| 10. | Jammu and Kashmir | 2,22,236 | 15 | 10,243.11 | 4.61 |
| 11. | Jharkhand | 79,714 | 11 | 1,955.82 | 2.45 |
| 12. | Karnataka | 1,91,791 | 30 | 6,774.81 | 3.53 |
| 13. | Kerala | 388,63 | 17 | 1,928.24 | 4.96 |
| 14. | Madhya Pradesh | 3,08,245 | 25 | 7,158.42 | 2.32 |
| 15. | Maharashtra | 3,07,713 | 48 | 7,592.301 | 2.47 |
| 16. | Manipur | 22,327 | 2 | 184.81 | 0.83 |
| 17. | Meghalaya | 22,429 | 4 | 94.1 | 0.42 |
| 18. | Mizoram | 21,081 | 8 | 1,090.75 | 5.17 |
| 19. | Nagaland | 16,579 | 3 | 20.34 | 0.12 |
| 20. | Odisha | 1,55,707 | 19 | 7,094.65 | 4.56 |
| 21. | Punjab | 50,362 | 13 | 326.60 | 0.65 |
| 22. | Rajasthan | 3,42,239 | 25 | 5,592.38 | 1.63 |
| 23. | Sikkim | 7,096 | 7 | 399.10 | 5.62 |

| S. no. | State/UT | Geographical area (km ²) | Total number of wildlife sanctuaries | Area of wildlife sanctuaries (km ²) | % of state area |
|--------------|-----------------------------|--------------------------------------|--------------------------------------|---|-----------------|
| 24. | Tamil Nadu | 1,30,058 | 29 | 6,157.12 | 4.73 |
| 25. | Telangana | 1,14,840 | 9 | 5,675.91 | 4.94 |
| 26. | Tripura | 10,486 | 4 | 566.93 | 5.41 |
| 27. | Uttar Pradesh | 2,40,928 | 26 | 5,829.20 | 2.42 |
| 28. | Uttarakhand | 53,483 | 7 | 2,690.12 | 5.03 |
| 29. | West Bengal | 88,752 | 16 | 1,456.21 | 1.64 |
| 30. | Andaman and Nicobar Islands | 8,249 | 96 | 389.39 | 4.72 |
| 31. | Chandigarh | 114 | 2 | 26.01 | 22.82 |
| 32. | Dadra and Nagar Haveli | 491 | 1 | 92.16 | 18.77 |
| 33. | Daman and Diu | 112 | 1 | 2.19 | 1.96 |
| 34. | Delhi | 1,483 | 1 | 27.82 | 1.88 |
| 35. | Lakshadweep | 32 | 1 | 0.01 | 0.03 |
| 36. | Puducherry | 480 | 1 | 3.9 | 0.81 |
| Total | | 32,87,263 | 551 | 1,16,746.37 | 3.56 |

Source: National Wildlife Database, Wildlife Institute of India; http://wiienvs.nic.in/Database/wls_8230.aspx.

States/UTs having more than 5% of the state geographical area under wildlife sanctuaries are depicted in Figure 5.4.2.1. Chandigarh has the maximum share (22.82%) of geographical area under its two Wildlife Sanctuaries whose area is 26.01 km². Four states, namely, Sikkim, Tripura, Mizoram and Uttarakhand had a share of about 5% under wildlife sanctuaries.

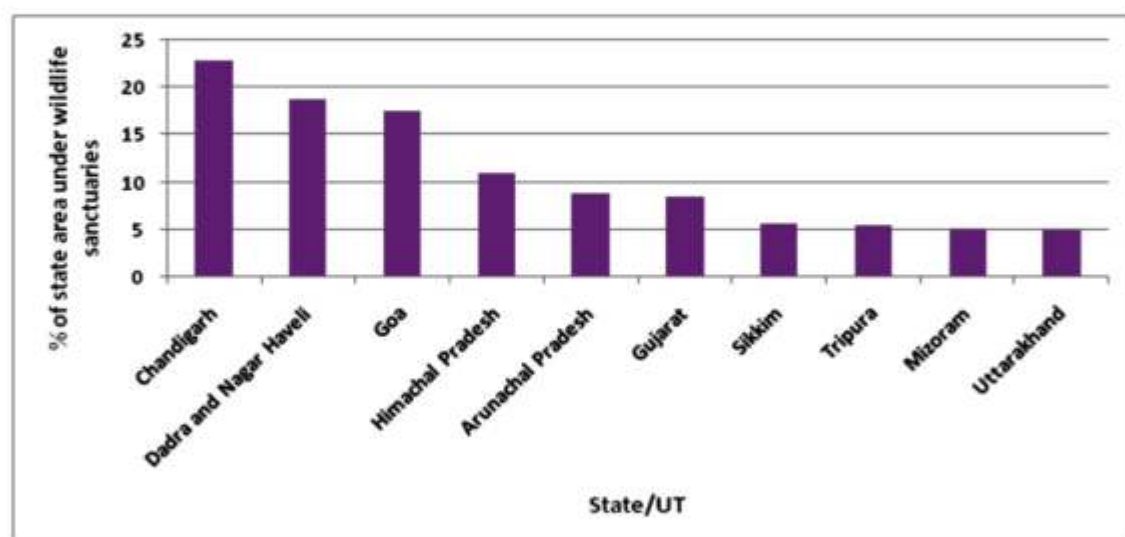


Fig. 5.4.2.1. States with more than 5% of state area under wildlife sanctuaries.

5.4.3 Conservation Reserves

It is a protected area which acts as a buffer zone or a migration corridor or connects established National Parks, Wildlife Sanctuaries and Reserved and Protected Forests of India. They are completely uninhabited and completely owned by the Government of India but used for subsistence by communities. These were notified in the Wildlife Protection Act 2002 – the amendment to Wildlife Protection Act 1972. These areas have been added because of reduced protection in and around existing or proposed areas due to private ownership of land and land use.

As on July 2019, there are 88 conservation reserves in India covering a total area of 4,356.46 km² (Table 5.4.3.1.). West Bengal covers maximum area of 1,415.91 km² while minimum being in Sikkim (0.06 km²). Jammu and Kashmir has the maximum number of conservation reserves (34) covering 0.38% area of the state.

Table 5.4.3.1. Conservation reserves in India (as on July 2019)

| S.no. | State | Number of conservation reserves | Area (km ²) | % of state area |
|--------------|-------------------|---------------------------------|-------------------------|-----------------|
| 1. | Gujarat | 1 | 227.00 | 0.116 |
| 2. | Haryana | 2 | 48.72 | 0.110 |
| 3. | Himachal Pradesh | 3 | 19.17 | 0.034 |
| 4. | Jammu and Kashmir | 34 | 829.75 | 0.373 |
| 5. | Karnataka | 15 | 649.25 | 0.339 |
| 6. | Maharashtra | 6 | 460.52 | 0.150 |
| 7. | Punjab | 4 | 25.71 | 0.051 |
| 8. | Rajasthan | 11 | 463.06 | 0.135 |
| 9. | Sikkim | 01 | 0.06 | 0.001 |
| 10. | Tamil Nadu | 2 | 4.88 | 0.004 |
| 11. | Uttarakhand | 4 | 212.43 | 0.088 |
| 12. | West Bengal | 5 | 1,415.91 | 1.595 |
| Total | | 88 | 4,356.46 | 0.133 |

Source: National Wildlife Database, Wildlife Institute of India; http://wiienvs.nic.in/Database/cr1_8229.aspx.

5.4.4 Community Reserves

Similar to conservation reserves, community reserves are areas with same function as conservation reserves but are privately owned. As on May 2019, there were 127 community reserves across five states with Meghalaya having the maximum number (65) and rest distributed amongst Nagaland (57), Punjab (3), Karnataka (1) and Kerala (1). The total areas span 525.22 km² (Table 5.4.4.1.). Nagaland has the maximum share (2.14%) of geographical area for its 57 conservation reserves. There are only two states, namely, Punjab and Karnataka having both the conservation and community reserves.

Table 5.4.4.1. Community reserves in India (as on May 2019)

| S. no. | State | Number | Area (km ²) | % of state area |
|--------------|-----------|------------|-------------------------|-----------------|
| 1. | Karnataka | 1 | 3.12 | 0.002 |
| 2. | Kerala | 1 | 1.50 | 0.004 |
| 3. | Meghalaya | 65 | 136.97 | 0.611 |
| 4. | Nagaland | 57 | 354.61 | 2.139 |
| 5. | Punjab | 3 | 29.02 | 0.058 |
| Total | | 127 | 525.22 | 0.016 |

Source: National Wildlife Database, Wildlife Institute of India; http://wiienvs.nic.in/Database/crj_8228.aspx.

5.4.5 Marine Protected Areas

This is a space in the ocean where human activities are limited due to more strict regulations than the surrounding waters, in analogy to the parks on lands. Special protection is accorded to these areas by the local, state, territorial, native, regional or national authorities. Marine Protected Areas are in two broad categories of locations – inland and island. They were notified as early as 1975, the first one being notified in Bhitarkanika Sanctuary in Odisha. Total 9,801.13 km² of area is under marine protected areas with 8,231.62 km² inland and 1,569.63 km² islands of Andaman and Nicobar and Lakshadweep (Table 5.4.5.1). In a small area of 1,569.63 km², there are as many as 106 marine protected areas, with 1 being in Lakshadweep and 105 in Andaman and Nicobar Islands. For the states under inlands, West Bengal occupies the maximum area (4,021.62 km²) followed by the Odisha (2,339.25 km²).

Table 5.4.5.1. Marine protected areas in India (as on May 2019)

| Type | State/UT | Number | Area (km ²) |
|----------------------|------------------------|-----------|-------------------------|
| Peninsular India | Andhra Pradesh | 3 | 930.51 |
| | Dadra and Nagar Haveli | 1 | 92.16 |
| | Daman and Diu | 1 | 2.18 |
| | Goa | 1 | 1.78 |
| | Gujarat | 3 | 463.97 |
| | Kerala | 1 | 1.50 |
| | Maharashtra | 2 | 46.03 |
| | Odisha | 5 | 2,339.25 |
| | Tamil Nadu | 3 | 332.50 |
| | West Bengal | 5 | 4,021.62 |
| Sub-total (A) | | 25 | 8,231.50 |

| Type | State/UT | Number | Area (km ²) |
|-------------------|-----------------------------|--------|-------------------------|
| Islands | Andaman and Nicobar Islands | 105 | 1,569.62 |
| | Lakshadweep | 1 | 0.01 |
| Sub-total (B) | | 106 | 1,569.63 |
| Grand Total (A+B) | | 131 | 9,801.13 |

Source: National Wildlife Database, Wildlife Institute of India; http://wiienviis.nic.in/Database/MPA_8098.aspx.

5.5 STATUS OF ZOOS IN INDIA

The zoos in India require recognition of the Central Zoo Authority for operation under the provision of the Section 38 H(1) of the Wild Life Protection Act 1972. For the purpose of scientific management and operation of zoos in the country and regulation of the physical and human infrastructure in the zoos, the Government of India has laid down standard and norms under the Recognition of Zoo Rules, 2009. Accordingly, under Rule 9, the zoos in India have been classified in the categories- large, medium, small and mini zoos. This classification of the zoos has been made for the purpose of management of the zoos and to apply the standards and norms pertaining to the housing, upkeep, veterinary care, etc. As on 31st March 2018, there are 160 zoos in the country recognized under the Section 38 H(1) of the Wild Life (Protection) Act, 1972. There are 17 large, 25 medium, 35 small and 83 mini (which includes 16 rescue centres) category zoos (Table 5.5.1). Karnataka has the maximum number of zoos (16) followed by Maharashtra and West Bengal (13 each). However, Maharashtra and West Bengal does not have any large zoo.

Table 5.5.1. Number of zoos in India (as on March 2018)

| S. no. | State/UT | Large | Medium | Small | Mini | Rescue center | Total |
|--------|-------------------|-------|--------|-------|------|---------------|-------|
| 1. | Andhra Pradesh | 2 | 0 | 0 | 4 | 1 | 7 |
| 2. | Arunachal Pradesh | 0 | 0 | 1 | 2 | 1 | 4 |
| 3. | Assam | 1 | 0 | 0 | 0 | 1 | 2 |
| 4. | Bihar | 1 | 0 | 0 | 0 | 0 | 1 |
| 5. | Chhattisgarh | 0 | 3 | 0 | 0 | 0 | 3 |
| 6. | Goa | 0 | 0 | 1 | 0 | 0 | 1 |
| 7. | Gujarat | 2 | 4 | 0 | 2 | 0 | 8 |
| 8. | Haryana | 0 | 0 | 1 | 3 | 3 | 7 |
| 9. | Himachal Pradesh | 0 | 0 | 2 | 3 | 2 | 7 |
| 10. | Jammu and Kashmir | 0 | 0 | 0 | 1 | 0 | 1 |
| 11. | Jharkhand | 0 | 3 | 0 | 1 | 0 | 4 |
| 12. | Karnataka | 3 | 0 | 3 | 9 | 1 | 16 |
| 13. | Kerala | 1 | 1 | 1 | 3 | 0 | 6 |
| 14. | Madhya Pradesh | 0 | 2 | 1 | 2 | 0 | 5 |
| 15. | Maharashtra | 0 | 2 | 5 | 2 | 4 | 13 |
| 16. | Manipur | 0 | 1 | 0 | 0 | 0 | 1 |

| S. no. | State/UT | Large | Medium | Small | Mini | Rescue center | Total |
|--------------|-----------------------------|-----------|-----------|-----------|-----------|---------------|------------|
| 17. | Meghalaya | 0 | 0 | 1 | 1 | 0 | 2 |
| 18. | Mizoram | 0 | 0 | 1 | 1 | 0 | 2 |
| 19. | Nagaland | 0 | 1 | 0 | 0 | 0 | 1 |
| 20. | Odisha | 1 | 0 | 2 | 7 | 0 | 10 |
| 21. | Punjab | 1 | 0 | 3 | 2 | 0 | 6 |
| 22. | Rajasthan | 0 | 1 | 4 | 1 | 0 | 6 |
| 23. | Sikkim | 0 | 0 | 1 | 0 | 0 | 1 |
| 24. | Tamil Nadu | 1 | 3 | 3 | 2 | 0 | 9 |
| 25. | Telangana | 1 | 0 | 1 | 6 | 0 | 8 |
| 26. | Tripura | 0 | 1 | 0 | 0 | 0 | 1 |
| 27. | Uttar Pradesh | 2 | 0 | 0 | 5 | 1 | 8 |
| 28. | Uttarakhand | 0 | 0 | 1 | 2 | 0 | 3 |
| 29. | West Bengal | 0 | 3 | 2 | 6 | 2 | 13 |
| 30. | Andaman and Nicobar Islands | 0 | 0 | 1 | 0 | 0 | 1 |
| 31. | Dadra and Nagar Haveli | 0 | 0 | 0 | 1 | 0 | 1 |
| 32. | Delhi | 1 | 0 | 0 | 1 | 0 | 2 |
| Total | | 17 | 25 | 35 | 67 | 16 | 160 |

Source: Central Zoo Authority, GoI; <http://cza.nic.in/uploads/documents/reports/english/ar2017-18.pdf>.

The share (%) of large zoos of the states/UTs in the total number of large zoos of the country is shown in Figure 5.5.1. The states having no large zoos were excluded from this Figure. Karnataka has the maximum large zoos (17%) in the country.

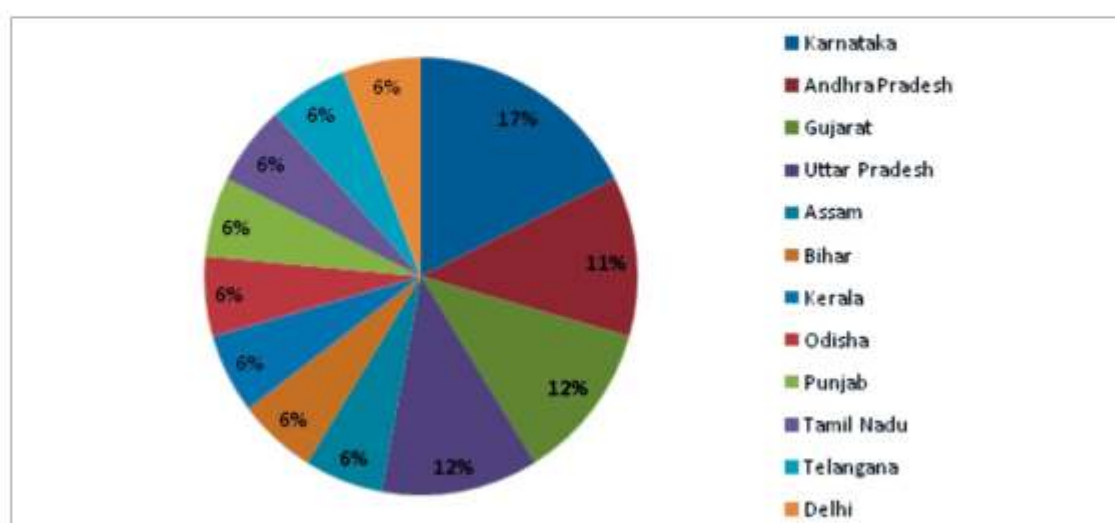


Fig 5.5.1. State-wise share (%) of large zoos of the country.

5.6 TIGER CONSERVATION

Tiger is the national animal of India. Project Tiger was initiated in 1973 by Government of India to protect not only tiger but also regenerating forest ecosystem and its biodiversity. In the initial stages, it started with nine forest reserves of Assam, Bihar, Karnataka, Madhya Pradesh, Maharashtra, Odisha, Rajasthan, Uttar Pradesh and West Bengal covering an area of 14,000 km². It is now a centrally sponsored scheme that covers 50 tiger reserves spread over 72,821.81 km² in 18 states across the country. Besides this, advice regarding 6 additional areas important for tiger conservation has been given to the states. Owing to the project, India has managed to save tiger from the brink of extinction and now boasts the maximum tiger population in the 13 tiger range countries of the world. The project is implemented using the ecosystem approach by a combination of core-buffer strategy. The initiatives taken under the project have given a new perspective to the management of wildlife in the country.

Conservation of tiger has received momentum by some new innovative initiatives taken up in the last few years. The National Board of Wildlife constituted a Tiger Task Force that was chaired by the Prime Minister. Its recommendations were implemented urgently to address the issue. In September 2006, the National Tiger Conservation Authority (NTCA) was constituted for the purpose of strengthening the efforts of conservation of tiger and ensuring normative standards in management of tiger reserves. In June 2007, the Wildlife Crime Control Bureau (The Tiger and other Endangered Species Crime Control Bureau) was constituted to check illegal trade in wildlife. Independent management effectiveness evaluation of tiger reserves is being carried out as per the criteria of IUCN. NTCA is providing state governments with funds, technical knowhow and guidance to raise special armed force – Special Tiger Protection Force – to provide protection to tigers in tiger reserves. Local people like *Van Gujjars* (a community residing in the forests) are also being involved in tiger protection.



5.6.1 Tiger Census in India

One of the most crucial exercises in tiger conservation is the census which aims at estimating the tiger population in the country. Monitoring the tiger population has been done since a long time but from 2006 onwards the exercise is undertaken every four years using more scientific and statistically robust estimation procedures. India has been estimating its tigers using a double sampling approach involving a mark-recapture framework to ascertain tiger numbers, which is being improved over time keeping in view advancements made in science.

There is a rise in tiger numbers which figure as 20.90% from 2006 to 2010, 30.48% from 2010 to 2014 and 33.29% from 2014 to 2018 (Table 5.6.1.1.). The rise in tiger numbers was in conformity with the average annual growth rate of tigers since, 2006. Madhya Pradesh (526) saw the highest number of tigers closely followed by Karnataka (524) in the year 2018. Maximum increase in tigers was found in Madhya Pradesh (about 71%) as compared to Indian average (33.29%) from 2014 to 2018. Chhattisgarh, Goa, Mizoram and North Bengal saw a decline in their tiger numbers. Odhisa did not show any change in tiger population during this period. All other states witnessed a positive trend. All 5 landscapes showed an increase with the Central India and Eastern Ghats (688-1,033) recording the highest increment from 2014 to 2018.

Table 5.6.1.1. Estimated state-wise population of tiger and their occupancy

| Landscape/state | Tiger population | | | | Tiger occupancy (km ²) | |
|---|------------------|------------|------------|--------------|------------------------------------|---------------|
| | 2006 | 2010 | 2014 | 2018 | 2014 | 2018 |
| Shivalik Hills and Gangetic Plain | | | | | | |
| Bihar | 10 | 8 | 28 | 31 | - | - |
| Uttarakhand | 178 | 227 | 340 | 442 | - | - |
| Uttar Pradesh | 109 | 118 | 117 | 173 | - | - |
| Shivalik-Gangetic | 297 | 353 | 485 | 646 | 8,815 | 8,346 |
| Central Indian Landscape and Eastern Ghats | | | | | | |
| Andhra Pradesh | 95 | 72 | 68 | 48# | - | - |
| Chhattisgarh | 26 | 26 | 46* | 19 | - | - |
| Jharkhand | - | 10 | 3* | 5 | - | - |
| Madhya Pradesh | 300 | 257 | 308* | 526 | - | - |
| Maharashtra | 103 | 168 | 190* | 312 | - | - |
| Odisha | 45 | 32 | 28* | 28 | - | - |
| Rajasthan | 32 | 36 | 45 | 69 | - | - |
| Telangana | - | - | - | 26# | - | - |
| Central India and Eastern Ghats | 601 | 601 | 688 | 1,033 | 40,185 | 47,717 |
| Western Ghats Landscape Complex | | | | | | |
| Goa | - | - | 5* | 3 | - | - |
| Karnataka | 290 | 300 | 406 | 524 | - | - |
| Kerala | 46 | 71 | 136 | 190 | - | - |
| Tamil Nadu | 76 | 163 | 229 | 264 | - | - |
| Western Ghats | 412 | 534 | 776 | 981 | 27,824 | 27,297 |
| North East hills and Brahmaputra Plains | | | | | | |
| Arunachal Pradesh | 14 | - | 28* | 29* | - | - |

| Landscape/state | Tiger population | | | | Tiger occupancy (km ²) | |
|---|------------------|--------------|--------------|--------------|------------------------------------|---------------|
| | 2006 | 2010 | 2014 | 2018 | 2014 | 2018 |
| Assam | 70 | 143 | 167 | 190 | - | - |
| Mizoram | 6 | 5 | 3* | 0 | - | - |
| Northern West Bengal | 10 | - | 3* | 0 | - | - |
| North East hills and Brahmaputra | 100 | 148 | 201 | 219 | 9,901 | 3,312 |
| Sunderbans | Not assessed | 70 | 76 | 88 | 1,834 | 2,313 |
| Total | 1,411 | 1,706 | 2,226 | 2,967 | 88,559 | 88,985 |

Source: National Tiger Conservation Authority, MoEF&CC, Gol.

*Estimated through scat DNA.

#For comparison with previous estimates of Andhra Pradesh, combined Andhra Pradesh and Telangana population estimates of current year.

The tiger mortality is one of the most concerning issue. Tiger deaths occur due to natural and other causes (poaching, accidental, etc.). Table 5.6.1.2 gives the temporal data on tiger mortality due to different causes from 2012 to 2018. Maximum tiger mortality was found in the year 2016 (121) followed by in 2017 (117). In general, the tiger mortality due to poaching is found to be decreasing from 2012 to 2018. For this reporting period, out of total 657 mortality cases, maximum cases were found due to natural deaths (48%) followed by the poaching (21%) and under scrutiny (13%).

Table 5.6.1.2. Cause and number of cases of tiger mortality from 2012 to 2018

| Year | Natural | Unnatural not attributed to poaching (tiger accidents, eliminated in conflicts events, etc.) | Under scrutiny | Poaching | Seizure | Total |
|--------------|------------|--|----------------|------------|-----------|------------|
| 2012 | 42 | 7 | 0 | 23 | 16 | 88 |
| 2013 | 32 | 3 | 0 | 29 | 4 | 68 |
| 2014 | 46 | 7 | 0 | 13 | 12 | 78 |
| 2015 | 54 | 5 | 0 | 12 | 11 | 82 |
| 2016 | 60 | 8 | 10 | 21 | 22 | 121 |
| 2017 | 49 | 4 | 26 | 27 | 11 | 117 |
| 2018 | 30 | 1 | 51 | 13 | 8 | 103 |
| Total | 313 | 35 | 87 | 138 | 84 | 657 |

Source: National Tiger Conservation Authority, MoEF&CC, Gol; https://projecttiger.nic.in/content/159_6_TigerMortality.aspx (accessed on July 15, 2019).

The data on tiger mortality presented in Table 5.6.1.2 has been split state wise in Table 5.6.1.3. Out of 657 tiger deaths, maximum were reported from Madhya Pradesh (141) followed by Maharashtra (108), while no tiger deaths were recorded in Gujarat. Only one tiger death was reported from Arunachal Pradesh and Haryana.

Table 5.6.1.3 State wise tiger mortality due of various causes from 2012 to 2018

| S. no. | State | Natural | Unnatural not attributed to poaching (accident, eliminated in conflicts events, etc.) | Under scrutiny | Poaching | Seizure | Total |
|--------------|-------------------|------------|---|----------------|------------|-----------|------------|
| 1. | Andhra Pradesh | 2 | 0 | 0 | 2 | 2 | 6 |
| 2. | Arunachal Pradesh | 0 | 0 | 0 | 1 | 0 | 1 |
| 3. | Assam | 20 | 1 | 0 | 18 | 10 | 49 |
| 4. | Bihar | 5 | 1 | 0 | 2 | 2 | 10 |
| 5. | Chhattisgarh | 0 | 0 | 0 | 0 | 9 | 9 |
| 6. | Delhi | 0 | 0 | 0 | 0 | 2 | 2 |
| 7. | Gujarat | 0 | 0 | 0 | 0 | 0 | 0 |
| 8. | Haryana | 0 | 0 | 0 | 0 | 1 | 1 |
| 9. | Karnataka | 57 | 2 | 7 | 24 | 9 | 99 |
| 10. | Kerala | 23 | 1 | 2 | 5 | 3 | 34 |
| 11. | Madhya Pradesh | 78 | 6 | 16 | 30 | 11 | 141 |
| 12. | Maharashtra | 54 | 9 | 21 | 18 | 6 | 108 |
| 13. | Nagaland | 0 | 0 | 0 | 1 | 1 | 2 |
| 14. | Odisha | 1 | 0 | 2 | 2 | 2 | 7 |
| 15. | Rajasthan | 6 | 0 | 7 | 0 | 1 | 14 |
| 16. | Tamil Nadu | 22 | 4 | 9 | 10 | 4 | 49 |
| 17. | Telangana | 0 | 0 | 0 | 1 | 2 | 3 |
| 18. | Uttar Pradesh | 8 | 2 | 5 | 10 | 6 | 31 |
| 19. | Uttarakhand | 31 | 9 | 18 | 13 | 11 | 82 |
| 20. | West Bengal | 6 | 0 | 0 | 1 | 2 | 9 |
| Total | | 313 | 35 | 87 | 138 | 84 | 657 |

Source: National Tiger Conservation Authority, MoEF&CC, GoI; https://projecttiger.nic.in/content/159_6_TigerMortality.aspx (accessed on July 15, 2019).

5.6.2 Details of Tiger Reserves in India

There are 50 tiger reserves in India with total area of 72,821.80 km² (32,362.70 km² for buffer and 40,459.10 km² for core tiger habitat area) from as low as 80.6 km² for Amangarh (buffer of Corbett tiger reserve) to a high of 3,296.31 km² for Nagarjunsagar Srisaillam tiger reserve. The distribution of tiger

reserves in various states are given in the Table 5.6.2.1. A direct relationship was found between core and buffer habitat which shows the increase of core habitat with the increase of buffer habitat of the tiger reserves. Total estimated tigers in the country are more than 1,500.

Table 5.6.2.1. Details of tiger reserves in India (as on June 2018)

| S. no. | Year of creation | Name of tiger reserve | State | Area (km ²) | | | Tiger population |
|--------|------------------|---------------------------------------|----------------------|---------------------------------------|-----------------------|----------|------------------|
| | | | | Core/ critical tiger habitat | Buffer/ peripheral | Total | |
| 1. | 1973-74 | Bandipur | Karnataka | 872.24 | 584.06 | 1,456.30 | 120 |
| 2. | 1973-74 | Corbett | Uttarakhand | 821.99 | 466.32 | 1,288.31 | 215 |
| | | Amangarh (buffer of Corbett TR) | Uttar Pradesh | - | 80.60 | 80.60 | - |
| 3. | 1973-74 | Kanha | Madhya Pradesh | 917.43 | 1,134.36 | 2,051.79 | 80 |
| 4. | 1973-74 | Manas | Assam | 840.04 | 2,310.88 | 3,150.92 | 11 |
| 5. | 1973-74 | Melghat | Maharashtra | 1,500.49 | 1,268.03 | 2,768.52 | 25 |
| 6. | 1973-74 | Palamau | Jharkhand | 414.08 | 715.85 | 1,129.93 | 3 |
| 7. | 1973-74 | Ranthambore | Rajasthan | 1,113.36 | 297.93 | 1,411.29 | 37 |
| 8. | 1973-74 | Similipal | Odisha | 1,194.75 | 1,555.25 | 2,750.00 | 17 |
| 9. | 1973-74 | Sunderbans | West Bengal | 1,699.62 | 885.27 | 2,584.89 | 68 |
| 10. | 1978-79 | Periyar | Kerala | 881.00 | 44.00 | 925.00 | 20 |
| 11. | 1978-79 | Sariska | Rajasthan | 881.11 | 332.23 | 1,213.34 | 9 |
| 12. | 1982-83 | Buxa | West Bengal | 390.58 | 367.32 | 757.90 | 2 |
| 13. | 1982-83 | Indravati | Chhattisgarh | 1,258.37 | 1,540.70 | 2,799.07 | 12 |
| 14. | 1982-83 | Namdapha | Arunachal Pradesh | 1,807.82 | 4.00 | 1,811.82 | 11 |
| 15. | 1982-83 | Nagarjunsagar Srisaïlam (part)* | Andhra Pradesh | 2,595.72 | 700.59 | 3,296.31 | - |
| 16. | 1987-88 | Dudhwa | Uttar Pradesh | 1,093.79 | 1,107.98 | 2,201.77 | 58 |
| 17. | 1988-89 | Kalakad- Mundanthurai | Tamil Nadu | 895.00 | 706.54 | 1,601.54 | 10 |
| 18. | 1988-89 | Valmiki | Bihar | 598.45 | 300.93 | 899.38 | 22 |
| 19. | 1989-90 | Pench | Madhya Pradesh | 411.33 | 768.30 | 1,179.63 | 43 |
| 20. | 1992-93 | Tadoba-Andhari | Maharashtra | 625.82 | 1,101.77 | 1,727.59 | 51 |
| 21. | 1993-94 | Bandhavgarh | Madhya Pradesh | 716.90 | 820.04 | 1,536.94 | 63 |

| S. no. | Year of creation | Name of tiger reserve | State | Area (km ²) | | | Tiger population |
|--------------|------------------|----------------------------|-------------------|---------------------------------------|-----------------------|------------------|------------------|
| | | | | Core/ critical tiger habitat | Buffer/ peripheral | Total | |
| 22. | 1993-94 | Panna | Madhya Pradesh | 576.13 | 1,021.97** | 1,598.10 | 17 |
| 23. | 1994-95 | Dampa | Mizoram | 500.00 | 488.00 | 988.00 | 3 |
| 24. | 1998-99 | Bhadra | Karnataka | 492.46 | 571.83 | 1,064.29 | 22 |
| 25. | 1998-99 | Pench | Maharashtra | 257.26 | 483.96 | 741.22 | 35 |
| 26. | 1999-00 | Pakke | Arunachal Pradesh | 683.45 | 515.00 | 1,198.45 | 7 |
| 27. | 1999-00 | Nameri | Assam | 320.00 | 144.00 | 464.00 | 5 |
| 28. | 1999-00 | Satpura | Madhya Pradesh | 1339.26 | 794.04 | 2,133.31 | 26 |
| 29. | 2008-09 | Anamalai | Tamil Nadu | 958.59 | 521.28 | 1,479.87 | 13 |
| 30. | 2008-09 | Udanti-Sitanadi | Chhattisgarh | 851.09 | 991.45 | 1,842.54 | 4 |
| 31. | 2008-09 | Satkosia | Odisha | 523.61 | 440.26 | 963.87 | 3 |
| 32. | 2008-09 | Kaziranga | Assam | 625.58 | 548.00 | 1,173.58 | 103 |
| 33. | 2008-09 | Achanakmar | Chhattisgarh | 626.195 | 287.82 | 914.017 | 11 |
| 34. | 2008-09 | Dandeli-Anshi | Karnataka | 814.88 | 282.63 | 1,097.51 | 5 |
| 35. | 2008-09 | Sanjay-Dubri | Madhya Pradesh | 812.57 | 861.93 | 1,674.50 | 8 |
| 36. | 2008-09 | Mudumalai | Tamil Nadu | 321.00 | 367.59 | 688.59 | 89 |
| 37. | 2008-09 | Nagarahole | Karnataka | 643.35 | 562.41 | 1,205.76 | 101 |
| 38. | 2008-09 | Parambikulam | Kerala | 390.89 | 252.77 | 643.66 | 19 |
| 39. | 2009-10 | Sahyadri | Maharashtra | 600.12 | 565.45 | 1,165.57 | 7 |
| 40. | 2010-11 | Biligiri Ranganatha Temple | Karnataka | 359.10 | 215.72 | 574.82 | 68 |
| 41. | 2012-13 | Kawal | Telangana | 892.23 | 1,123.21 | 2,015.44 | |
| 42. | 2013-14 | Sathyamangalam | Tamil Nadu | 793.49 | 614.91 | 1,408.40 | 72 |
| 43. | 2013-14 | Mukandra Hills | Rajasthan | 417.17 | 342.82 | 759.99 | - |
| 44. | 2013-14 | Nawegaon-Nagzira | Maharashtra | 653.67 | 1,241.27 | 1,894.94 | 7 |
| 45. | 2014 | Amrabad | Telangana | 2,166.37 | 445.02 | 2,611.39 | 54 |
| 46. | 2014 | Pilibhit | Uttar Pradesh | 602.80 | 127.45 | 730.25 | - |
| 47. | 2014 | Bor | Maharashtra | 138.12 | 678.15 | 816.27 | 25 |
| 48. | 2015 | Rajaji Tiger Reserve | Uttarakhand | 819.54 | 255.63 | 1,075.17 | 5 |
| 49. | 2016 (24.2.16) | Orang | Assam | 79.28 | 413.18 | 492.46 | - |
| 50. | 2016 (8.9.16) | Kamlang | Arunachal Pradesh | 671.00 | 112.00 | 783.00 | - |
| Total | | | | 40,459.1 | 32,362.7 | 72,821.80 | 1,586 |

Source: National Tiger Conservation Authority, MoEF&CC, GoI; https://projecttiger.nic.in/content/109_1_ListofTigerReservesCoreBufferAreas.aspx (accessed on July 15, 2019).

*Revised area details are awaited from the state governments concerned after reorganization.

**Notified vide notification No. F. 15-21/2010/10-2 dated 24.7.2014 by the State Government of Madhya Pradesh (old area of the buffer was 1,002.42 km²).

5.7 ELEPHANT CONSERVATION

Elephants are also under constant threats for their tusks which fetch a very high value of ivory in the national and international markets. Although, a number of measures have been taken up by the international community for discouraging items made out of ivory, smuggling of ivory is rampant and this puts tuskers at a risk. Elephant deaths have also been reported due to accidents, sometimes, with trains running in elephant corridors and forests. Table 5.7.1 gives the population of elephants in the wild. There are about 30,000 wild elephants estimated in the country with a maximum in Karnataka (6,049) followed by Assam (5,710) and Kerala (5,706). The constant increase is found from 2007 to 2017 in some of the states, namely, Andhra Pradesh, Assam, Chhattisgarh, Karnataka, Nagaland, Odisha, Tripura, Uttarakhand and West Bengal. Meghalaya and Uttarakhand has not conducted elephant census in 2012, therefore, the figure of 2007 has been maintained for 2012 as well.

Table 5.7.1. Population of wild elephant (on five yearly basis)

| S. no. | State/UT | Year | | |
|--------------|-----------------------------|----------------------|----------------------|---------------|
| | | 2007 | 2012 | 2017 |
| 1. | Andaman and Nicobar Islands | - | - | 25 |
| 2. | Andhra Pradesh | 28 | 41 | 65 |
| 3. | Arunachal Pradesh | 1,690 | 890 | 1,614 |
| 4. | Assam | 5,281 | 5,620 | 5,719 |
| 5. | Bihar | - | - | 25 |
| 6. | Chhattisgarh | 122 | 247 | 247 |
| 7. | Haryana | - | - | 7 |
| 8. | Himachal Pradesh | - | - | 7 |
| 9. | Jharkhand | 624 | 688 | 679 |
| 10. | Karnataka | 4,035 | 5,648-6,488 | 6,049 |
| 11. | Kerala | 6,068 | 5,942-6,422 | 5,706* |
| 12. | Madhya Pradesh | - | - | 7 |
| 13. | Maharashtra | 7 | 4 | 6 |
| 14. | Manipur | - | - | 9 |
| 15. | Meghalaya | 1,811 | 1,811 | 1,754 |
| 16. | Mizoram | 12 | - | 7 |
| 17. | Nagaland | 152 | 212 | 446* |
| 18. | Odisha | 1,862 | 1,930 | 1,976 |
| 19. | Tamil Nadu | 3,867 | 4,015 | 2,761 |
| 20. | Tripura | 59 | 59 | 102* |
| 21. | Uttar Pradesh | 380 | 291 | 232 |
| 22. | Uttarakhand | 1,346 | 1,346 | 1,839 |
| 23. | West Bengal | 325-350 | 647 | 682 |
| Total | | 27,669-27,719 | 29,391-30,711 | 29,939 |

Source: Project elephant division, MoEF&CC, GoI.

*Results are based on indirect (dung) count method as direct counts could not be carried out.

The number of estimated wild elephant increased over time till 2012, thereafter, achieving a plateau with slight decline at the end in 2017 (Fig. 5.7.1).

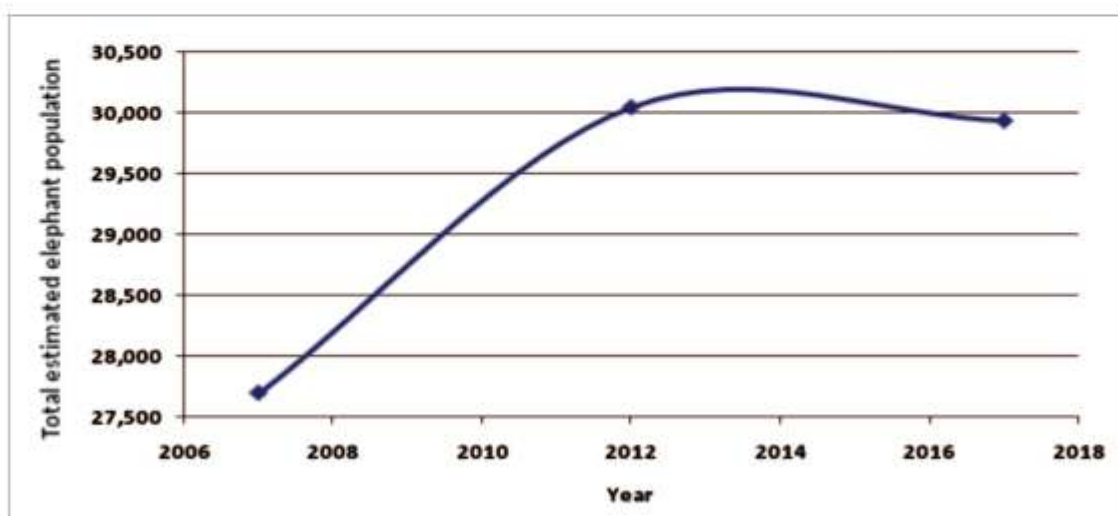


Fig. 5.7.1. Trends in estimated wild elephant population in a 5-year interval.

Table 5.7.2 gives the outlay and release of budget for Project Elephant from 2012-13 to 2017-18. The release has constantly increased except a dip in 2015-16 and, later, an amount of INR 2,562.16 lakh was released in 2017-18.

Table 5.7.2 Budget outlay and release for Project Elephant (INR lakh)

| S. no. | Outlay/released | 2012-13 | 2013-14 | 2014-15 | 2015-16 | 2016-17 | 2017-18 |
|-----------------------------------|--|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| 1 | Outlay | 2,258 | 3,258 | 1,900 | 1,696 | 2,000 | 2,750 |
| 2 (a) | Released to central sector | 38.00 | 39.00 | 83.00 | 79.00 | 60.25 | 70.83 |
| 2 (b) | Released to centrally sponsored scheme | 1,796.50 | 1,843.53 | 1,767.43 | 1,135.45 | 2,060.05 | 2,491.33 |
| Total released (2(a)+2(b)) | | 1,834.50 | 1,882.53 | 1,850.43 | 1,214.45 | 2,120.30 | 2,562.16 |

Source: Project elephant division, MoEF&CC, Gol.



5.8 CONSERVATION OF CRITICALLY ENDANGERED SPECIES

Efforts are on to protect and conserve critically endangered species. There are fourteen such wildlife species, namely, Asiatic lion, Dolphin, Dugong, Great Indian Bustard, Hangul, Jerdon's Courser, Manipur Brow Antler Deer, Marine Turtle, Nilgiri Thar, Rhinoceros, Snow Leopard, Vulture, Swiftlets and Wild Buffalo. These species are specific to certain states. The brief about the three species, snow leopard, ghariyal and vulture, are given as under:

One of the most endangered species included in Schedule I of the Wildlife Protection Act 1972, the snow leopard is found in five states, namely, Arunachal Pradesh, Himachal Pradesh, Jammu and Kashmir, Sikkim and Uttarakhand. As per the report of World Wildlife Fund for Nature India, there are 200-600 estimated population of snow leopards in these states (Table 5.8.1). The species is vulnerable due to conflict with the adjoining human population, degradation of its habitat, depletion of prey base and poaching for its fur and bones, which are used in traditional Chinese medicines. A major portion of the species is present in Jammu and Kashmir. Early efforts to conserve snow leopards were done in 2006 by the Nature Conservation Foundation and International Snow Leopard Conservancy.

There are about 650 ghariyals reported in the three states namely, Madhya Pradesh, Uttar Pradesh and Rajasthan (Table 5.8.1). A National Tri-State Chambal Sanctuary Management and Coordination Committee for conservation of gharial has been constituted by the MoEF&CC to ensure better coordination amongst the states and improving monitoring and guidance from the centre.

Vulture is one of the species identified for provision of funds under the species recovery programme. Vultures are natural scavengers and the Gyps vultures feed on the soft tissues of large ungulate carcasses, thereby, playing a vital role in cleaning up the rotting carcasses left in open. Unfortunately, the population of these vultures started to decline considerably from 1990 onwards. A total of 30,000 populations are estimated as per the report of IUCN. Most of the population has declined due to the use of the non-steroidal anti-inflammatory drug 'Diclofenac' by veterinarians.

Table 5.8.1. Estimated populations of some critically endangered wildlife species

| S.no. | Species | Estimated population (no.) | Assessed on |
|-------|----------------------------|----------------------------|------------------|
| 1. | Hangul | 100-150 | 01 December 2016 |
| 2. | Snow Leopard* | 200-600 | NA |
| 3. | Vulture | 30,000 | 01 October 2017 |
| 4. | Asiatic Lion** | 523 | NA |
| 5. | Nilgiri Thar | 1,800-2,000 | 30 June 2008 |
| 6. | Manipur Brow Antler Deer** | 200 | NA |
| 7. | Dugong** | 250 | NA |
| 8. | Wild Buffalo | 2,500 | 25 May 2016 |
| 9. | Jerdon's Courser | 50-249 | 01 October 2016 |
| 10. | Great Indian Bustard | 50-249 | 17 August 2018 |
| 11. | Rhinoceros | 2,200 | 30 June 2008 |
| 12. | Dolphin** | 1,200-1,800 | NA |
| 13. | Gharial | 650 | NA |

Source: IUCN; accessed at <https://www.iucnredlist.org/>.

*Source: Snow Leopard Conservancy India Trust; <http://snowleopardindia.org>.

**Source: WWF India; <https://www.wwfindia.org>.

NA: Data not available.

5.9 BIOSPHERE RESERVES

Biosphere Reserves in India have been created under the Man and Biosphere (MAB) programme of UNESCO. They are unique in the sense that they represent unique communities of biodiversity. They are areas with unusual features of exceptional interest with natural and cultural landscapes with people as integral component of the system. The National Biosphere Reserve Programme was initiated in 1986 to serve as a wider base for conservation of entire range of living resources and their ecological foundations. This is in addition to the already established system of protected area network. They are similar to protected areas extended over large areas. The potential sites for creation of biosphere reserves were identified by a core advisory group of experts of the MAB programme. Since the land and forest is under the states, the concerned state government has to agree to designate the identified area as a biosphere reserve. After a detailed study, project report is prepared by the states following the criteria adopted for designation of an area as a biosphere reserve. The financial assistance for management and research activities in these areas is provided by the central government while the actual management is the responsibility of the state government with facilities, technical knowhow, training, etc. being provided by the central government.

Biosphere reserves widen the scope of conventional approach of protection and provide further strength to the existing protected area network and do not intend to replace the existing protected area networks. Existing protected areas may become a part of the biosphere reserves without any change in their status. Inclusion of existing protected areas in a biosphere reserve enhances its national value. However, biosphere reserves need not necessarily be established around the existing protected areas. The first biosphere reserve Nilgiri established in 1986 spread over an area of 5,520 km² and covers areas of three states, namely, Karnataka, Tamil Nadu and Kerala. As on March 2019, there are 18 notified biosphere reserves in India (Table 5.9.1.). Eleven biosphere reserves, viz., Achanakmar-Amarkantak, Agasthyamala, Gulf of Mannar, Great Nicobar, Khangchendzonga, Nanda Devi, Norkek, Nilgiri, Pachmarhi, Similipal and Sunderbans have been included by UNESCO in the World Network of Biosphere Reserves (WNBR). Kachchh biosphere reserve has the maximum area of 10,500 km² followed by the Gulf of Mannar with an area of 12,454 km². The latest biosphere reserve which is included in WNBR is Khangchendzonga in Sikkim having an elevation of 1,220m above sea-level.

Table 5.9.1. Biosphere reserves in India (as on March 2019)

| S. no. | Name | Area (km ²) | Date of notification | Location/ state/bio-geographic zones | Key fauna | Key flora |
|--------|-------------|-------------------------|---------------------------|--|---|---|
| 1. | *Nilgiri | 5,520.00 | 01.08.1986/ 10.11.2000 | Part of Wynad, Nagarhole, Bandipur and Mudumalai, Nilambur, Silent Valley and Siruvani hills (Tamil Nadu, Kerala and Karnaktaka)-Western Ghats | Nilgiri Thar, Lion-tailed Macaque, Nilgiri Langur | Vanda, Liparis, Medusa's head orchid, Spiranthes, Chi-tou wind orchid |
| 2. | *Nanda Devi | 5,860.69 | 18.01.1988/ 29.10.2004 | Part of Chamoli, Pithoragarh and Almora districts Uttarakhand- west Himalayas | Himalayan Tahr, Koklas pheasant, Brown Bear | Silver weed, Fairy Primrose, Salep orchid |

| S. no. | Name | Area (km ²) | Date of notification | Location/ state/bio- geographic zones | Key fauna | Key flora |
|--------|-----------------|-------------------------|---------------------------|--|---|---|
| 3. | *Nokrek | 820.00 | 01.09.1988/ 26.05.2009 | Part of Garo Hills district-east Himalayas, Meghalaya | Pig tailed macaque, saltwater Crocodile | Screw pine, Nipa palm, Ceylon Iron wood |
| 4. | Manas | 2,837.00 | 14.03.1989 | Part of Kokrajhar, Bongaigaon, Barpeta, Nalbari, Kamrup and Darang districts of Assam-east Himalayas | Pygmy hog, Hispid hare, Golden langur | Catechu tree, Sissoo, white siris |
| 5. | *Sunderbans | 9,630.00 | 29.03.1989/ 10.11.2001 | Part of Delta of Ganges and Barahamaputra river system of West Bengal-Gangentic Delta | Bengal tiger, Salvator lizard, Bengal monitor lizard | Sundari, Nypa, Passur, Tagal mangrove, Crabapple mangrove |
| 6. | *Gulf of Mannar | 10,500.00 | 18.02.1989/ 10.11.2001 | Indian part of Gulf of Mannar between India and Sri Lanka (Tamil Nadu) - Coasts | Dugong (Sea Cow), Sea fan | Morning glory, Halophila grass |
| 7. | *Great Nicobar | 885.00 | 06.01.1989/ 30.05.2013 | Southern most islands of Andaman and Nicobar | Serpent eagle, Crab eating Macaque, Saltwater crocodile | Screw pine, Nipa palm, Ceylon iron wood |
| 8. | *Similipal | 4,374.00 | 21.06.1994/ 26.05.2009 | Part of Mayurbhanj district (Odisha)-Deccan peninsula | Red breasted Falconet, Ruddy-mongoose | Colix grass, Saltree, Myrobalan, Sisso, Champak |
| 9. | Dibru-Saikhowa | 765.00 | 28.07.1997 | Part of Dibrugarh and Tinsukhia districts-east Himalayas of Assam | Golden langur, Hollock gibbon | Rauvolfia, Benteak, Livistona, orchid |
| 10. | Dehang Debang | 5,111.50 | 02.09.1998 | Part of Siang and Debang valley in Arunachal Pradesh-east Himalayas | Red Panda, Green pit viper, Takin | Tree fern, Begonia |
| 11. | *Pachmarhi | 4,926.00 | 03.03.1999/ 26.05.2009 | Part of Betul, Hoshangabad and Chhindwara districts of Madhya Pradesh-Semi-Arid-Gujarat-Rajputana | Barasinga, Wild buffalo, Red jungle fowl | Sal, Selaginella fern, Polymorpha bamboo |

| S. no. | Name | Area (km ²) | Date of notification | Location/ state/bio-geographic zones | Key fauna | Key flora |
|--------|-----------------------|--|---------------------------|--|--|---|
| 12. | *Khangchen-dzonga | 2,619.92 | 07.02.2000/ 25.07.2018 | Part of north and west Sikkim | Snow leopard, Red panda | Schima <i>Tsuga</i> , <i>Juniperous</i> , <i>dronrosa</i> and <i>Rheum australe</i> |
| 13. | *Agasthyamala | 3,500.36 1,828.00 (Kerala) 1,672.36 (Tamil Nadu) | 12.11.2001/ 19.03.2016 | Part of Thirunelveli and Kanya Kumari districts of Tamil Nadu and Thiruvananthapuram, Kollam and Pathanamthita of Kerala | Lion tailed macaque, Slender loris, Great pied hornbill | Rudraksha, Gaub tree, Wild dhaman, black plums |
| 14. | *Achankmar-Amarkantak | 3,835.51 | 30.03.2005/ 11.07.2012 | Part of Anuppur and Dindori district of Madhya Pradesh, part of Bilaspur districts (Chhattisgarh) | Four horn-antelope, Saras crane, Sacred grove bush frog, White backed vulture, Indian wild dog | Almost 1,500 plant species representing over 151 plant families can be found in the reserve |
| 15. | Kachchh | 12,454.00 | 29.01.2008 | Parts of Kachchh, Rajkot, Surendranagar and Patan civil district (Gujarat) | Indian wild ass | <i>Prosopis juliflora</i> , <i>Salvadorao-leoides</i> cactus |
| 16. | Cold Desert | 7,770.00 | 28.08.2009 | Pin Valley National Park and surroundings; Chandratal and Sarchu and Kibber Wildlife Sanctuary (Himachal Pradesh) | Snow leopard | Himalayan cedar (<i>Cedrus deodara</i>) |
| 17. | Seshachalam | 4,756.00 | 20.09.2010 | Seshachalam hill range in Eastern Ghats encompassing part of Chittoor and Kadapa districts (Andhra Pradesh) | Slender loris | Red sanders |
| 18. | Panna | 2,998.98 | 25.08.2011 | Part of Panna and Chhattarpur district (Madhya Pradesh) | Tiger, chital, chinkara, sambhar and sloth bear | Teak and Kardhai (<i>Anogeissus pendula</i>) |

Source: MAB committee, MoEF&CC, Gol.

*included in World Network of Biosphere Reserve (MAB-UNESCO)

5.10 RAMSAR CONVENTION

The convention on Wetlands of International Importance, popularly known as the Ramsar Convention, is an international treaty for conservation and sustainable utilization of wetlands. It recognizes their fundamental ecological functions apart from the economic, cultural, scientific and recreational values. It is an intergovernmental treaty that provides a framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. It was adopted in 1971 in the Iranian city of Ramsar after a series of negotiations throughout 1960s, when concerns were first raised at the increasing loss and degradation of wetland habitats for migratory water birds. The treaty finally came into force in 1975. It is the only global treaty that deals with a particular ecosystem covering all geographic regions of the earth.

The mission of the convention is 'conservation and wise use of all wetlands through local and national actions and international cooperation, as a contribution towards achieving sustainable development throughout the world', which has been defined as 'the maintenance of their ecological character, achieved through the implementation of ecosystem approaches, within the context of sustainable development'. Thus, the focus is on the benefit of humankind through conservation and sustainable use of wetlands and their resources. Three main focal points of the convention are:

- (i) Designation of suitable wetlands as Ramsar sites (wetlands of international importance) and ensure their effective management.
- (ii) To work towards wise use of the identified wetlands through national land-use planning, appropriate policies and legislation, management actions and public education.
- (iii) To cooperate internationally concerning trans-boundary wetlands, shared wetland systems, shared species and development projects.

The wetlands covered under the treaty include lakes, swamps and marshes, wet grasslands and peat lands, oases, estuaries, deltas and tidal flats, near-shore marine areas, mangroves and coral reefs, and man-made sites like fish ponds, rice paddies, reservoirs and salt pans. As on February 2019, there are 27 Ramsar sites in India covering an area of 11,121.31 km² (Table 5.10.1.). First two sites declared Ramsar wetland sites in India were Chilka lake and Keoladeo Ghana National Park. The maximum number of Ramsar sites were declared in the year 2002 (14) followed by 2005 (6). Sunderbans wetlands covers the maximum area of 4,230 km² followed by the VembanadKol wetlands with an area of 1,512.50 km².

Table 5.10.1. Ramsar wetlands sites in India (as on February 2019)

| S. no. | Site | State | Date of declaration | Area (km ²) |
|--------|------------------------|------------------|---------------------|-------------------------|
| 1. | Asthamudi wetland | Kerala | 19.8.2002 | 614 |
| 2. | Bhitarkanika Mangroves | Odisha | 19.8.2002 | 650 |
| 3. | Bhoj-wetlands | Madhya Pradesh | 19.8.2002 | 32.01 |
| 4. | Chandertal wetlands | Himachal Pradesh | 8.11.2005 | 0.49 |
| 5. | Chilka lake | Odisha | 1.10.1981 | 1165 |
| 6. | Deepor Beel | Assam | 19.8.2002 | 40 |
| 7. | East Calcutta wetlands | West Bengal | 19.8.2002 | 125 |

| S. no. | Site | State | Date of declaration | Area (km ²) |
|--------------|------------------------------|-------------------|---------------------|-------------------------|
| 8. | Harike lake | Punjab | 23.3.1990 | 41 |
| 9. | Hokera wetlands | Jammu and Kashmir | 8.11.2005 | 13.75 |
| 10. | Kanjli lake | Punjab | 22.1.2002 | 1.83 |
| 11. | Keoladeo Ghana national park | Rajasthan | 1.10.1981 | 28.73 |
| 12. | Kolleru lake | Andhra Pradesh | 19.8.2002 | 901 |
| 13. | Loktak lake | Manipur | 23.3.1990 | 266 |
| 14. | Nalsarovar Bird Sanctuary | Gujarat | 24.9.2012 | 120 |
| 15. | Point Calimere | Tamil Nadu | 19.8.2002 | 385 |
| 16. | Pong Dam lake | Himachal Pradesh | 19.8.2002 | 156.62 |
| 17. | Renuka wetlands | Himachal Pradesh | 8.11.2005 | 0.2 |
| 18. | Ropar lake | Punjab | 22.1.2002 | 13.65 |
| 19. | Rudrasagar lake | Tripura | 8.11.2005 | 2.4 |
| 20. | Sambhar lake | Rajasthan | 23.3.1990 | 240 |
| 21. | Sasthamkotta lake | Kerala | 19.8.2002 | 3.73 |
| 22. | Sunderbans wetlands | West Bengal | 30.1.2019 | 4,230 |
| 23. | Surinsar-Mansar lake | Jammu and Kashmir | 8.11.2005 | 3.5 |
| 24. | Tsomoriri lake | Jammu and Kashmir | 19.8.2002 | 120 |
| 25. | Upper Ganga river | Uttar Pradesh | 8.11.2005 | 265.9 |
| 26. | VembanadKol wetlands | Kerala | 19.8.2002 | 1,512.5 |
| 27. | Wular lake | Jammu and Kashmir | 23.3.1990 | 189 |
| Total | | | | 11,121.31 |

Source: MoEF&CC, GoI.

5.11 HUMAN-WILDLIFE CONFLICT

The history of conflict between human beings and wildlife dates back to the era when wild animals and human beings shared the resources. However, especially in India, there has been a substantial increase in this conflict for the past half a century, mainly owing to an increase in human population, shrinking of habitat of wildlife due to encroachments, opening of forests for road construction and other reason. Alternatively, there has been increase in population of some wild animals due to strong and strengthened conservation practices. Total number of instances of human-wildlife conflict are available for few states from 2010-11 to 2017-18 which are given in Table 5.11.1. The number of human deaths and human injuries for the same period is shown in Table 5.11.2. and Table 5.11.3., respectively. Table 5.11.4. shows the number of cattle deaths in wildlife conflicts. From the available data, maximum instances were found in the central Indian states (Chhattisgarh, Madhya Pradesh and Maharashtra) (Table 5.11.1.). Maximum number of human deaths were reported in Assam (around 87 year⁻¹) (Table 5.11.2), while, maximum human were injured in the state of Madhya Pradesh (about 2,230 year⁻¹) (Table 5.11.3). The maximum cattle deaths were reported in the state of Maharashtra (about 6,000 year⁻¹) (Table 5.11.4).

Table 5.11.1. Instances of human-wildlife conflict in selected states

| State | Year | | | | | | | |
|-----------------------------|---------|---------|---------|---------|---------|---------|---------|---------|
| | 2010-11 | 2011-12 | 2012-13 | 2013-14 | 2014-15 | 2015-16 | 2016-17 | 2017-18 |
| Andaman and Nicobar Islands | NA | NA | NA | NA | 6 | 6 | 15 | NA |
| Assam | 99 | 132 | 145 | 235 | 303 | 371 | 234 | 121 |
| Chhattisgarh | NA | NA | NA | NA | NA | 28,315 | 5,540 | NA |
| Gujarat | 3,650 | 3,861 | 3,437 | 3,719 | 3,411 | 3,376 | 4,341 | NA |
| Kerala | NA | NA | NA | NA | 7,694 | 6,022 | NA | NA |
| Madhya Pradesh | NA | 5,224 | 7,395 | 7,884 | 7,392 | 4,909 | NA | NA |
| Maharashtra | NA | 4,847 | 5,231 | 9,166 | 4,957 | 8,561 | 6,401 | NA |
| Meghalaya | NA | NA | 1,252 | 2,014 | 1,007 | 2,541 | 1,037 | NA |
| Odisha | 212 | 174 | 312 | 339 | 254 | 91 | NA | NA |
| Uttarakhand | NA | NA | NA | 3,411 | 2,808 | 3,457 | 8,719 | NA |
| West Bengal | NA | 191 | 174 | NA | 309 | 275 | NA | NA |

Source: SFDs; NA: data not available.

Table 5.11.2. Human deaths in human-wildlife conflict in selected states

| State | Year | | | | | | | |
|-----------------------------|---------|---------|---------|---------|---------|---------|---------|---------|
| | 2010-11 | 2011-12 | 2012-13 | 2013-14 | 2014-15 | 2015-16 | 2016-17 | 2017-18 |
| Andaman and Nicobar Islands | NA | NA | NA | NA | 2 | 2 | 4 | NA |
| Assam | 61 | 68 | 84 | 81 | 51 | 118 | 110 | 72 |
| Chhattisgarh | NA | NA | NA | NA | NA | 95 | 47 | NA |
| Gujarat | 16 | 28 | 15 | 24 | 20 | 19 | 19 | NA |
| Himachal Pradesh | 6 | 9 | 2 | NA | NA | NA | NA | NA |
| Karnataka | 44 | 30 | 59 | 68 | 53 | 47 | 48 | NA |
| Kerala | NA | NA | NA | NA | 149 | 104 | NA | NA |
| Madhya Pradesh | 55 | 51 | 48 | 48 | 61 | 52 | NA | NA |

| State | Year | | | | | | | |
|-------------|---------|---------|---------|---------|---------|---------|---------|---------|
| | 2010-11 | 2011-12 | 2012-13 | 2013-14 | 2014-15 | 2015-16 | 2016-17 | 2017-18 |
| Maharashtra | NA | 39 | 39 | 36 | 33 | 45 | 37 | NA |
| Meghalaya | NA | NA | 3 | 9 | 3 | 9 | 4 | NA |
| Odisha | 74 | 58 | 96 | 93 | 74 | 29 | NA | NA |
| Uttarakhand | NA | NA | NA | 34 | 32 | 43 | 69 | NA |
| West Bengal | NA | 71 | 83 | NA | 109 | 124 | NA | NA |

Source: SFDs; NA: Data not available.

Table 5.11.3. Human injuries in human-wildlife conflict in selected states

| State | Year | | | | | | | |
|----------------------------|---------|---------|---------|---------|---------|---------|---------|---------|
| | 2010-11 | 2011-12 | 2012-13 | 2013-14 | 2014-15 | 2015-16 | 2016-17 | 2017-18 |
| Andman and Nicobar Islands | NA | NA | NA | NA | 1 | 1 | 2 | NA |
| Assam | 38 | 64 | 61 | 129 | 77 | 67 | 55 | 46 |
| Chhattisgarh | NA | NA | NA | NA | NA | 737 | 245 | NA |
| Gujarat | 114 | 128 | 133 | 169 | 180 | 103 | 113 | NA |
| Himachal Pradesh | 494 | 497 | 455 | NA | NA | NA | NA | NA |
| Karnataka | 211 | 158 | 151 | 157 | 204 | 162 | 108 | 176 |
| Kerala | NA | NA | NA | NA | 516 | 409 | NA | NA |
| Madhya Pradesh | 2,440 | 3,181 | 2,906 | 2,092 | 1,334 | 1,442 | NA | NA |
| Maharashtra | NA | 635 | 463 | 429 | 428 | 704 | 403 | NA |
| Meghalaya | NA | NA | 3 | 3 | 3 | 8 | 1 | NA |
| Odisha | 124 | 109 | 182 | 208 | 140 | 56 | NA | NA |
| Uttarakhand | NA | NA | NA | 220 | 193 | 170 | 463 | NA |
| West Bengal | NA | 120 | 91 | NA | 200 | 151 | NA | NA |

Source: SFDs; NA: Data not available.

Table 5.11.4. Number of cattle deaths in conflict with wildlife in selected states

| State | Year | | | | | | | |
|------------------|---------|---------|---------|---------|---------|---------|---------|---------|
| | 2010-11 | 2011-12 | 2012-13 | 2013-14 | 2014-15 | 2015-16 | 2016-17 | 2017-18 |
| Assam | NA | NA | NA | 25 | 175 | 186 | 69 | 3 |
| Chhattisgarh | NA | NA | NA | NA | NA | 1,127 | 522 | NA |
| Gujarat | 3,520 | 3,705 | 3,289 | 3,526 | 3,211 | 3,254 | 4,209 | NA |
| Haryana | NA | NA | NA | NA | NA | NA | NA | 35 |
| Himachal Pradesh | 1,336 | 1,646 | 1,737 | NA | NA | NA | NA | NA |
| Karnataka | 751 | 653 | 1,269 | 832 | 1,390 | 1,700 | 1,869 | 2,428 |
| Kerala | NA | NA | NA | NA | 23 | 355 | NA | NA |
| Madhya Pradesh | 2,729 | 4,163 | 4,930 | 5,232 | 4,990 | 5,929 | NA | NA |
| Maharashtra | NA | 4,173 | 4,729 | 8,701 | 4,496 | 7,812 | 5,961 | NA |
| Meghalaya | NA | NA | 17 | 1 | NA | NA | NA | NA |
| Odisha | 14 | 7 | 34 | 38 | 40 | 6 | NA | NA |
| Uttarakhand | NA | NA | NA | 3,157 | 2,583 | 3,244 | 8,187 | NA |

Source: SFDs; NA: Data not available.

