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Chapter
[4]

Protected areas in biodiversity conservation of India: An overview

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Abstract

Habitat loss due to human activities and weather extrade is synergistically posing critical threats to the worldwide biodiversity main to irreversible extinction of diverse species. In wake of recent extinction, numerous forests are declared as protected areas wherein no greater human activities are allowed. However, the scope of these protected regions got broadened from mere conservation to poverty comfort and sustainable improvement within the course of the beyond decades. Though those protected regions appear to be supportive of the biodiversity conservation, numerous disputes and gaps have emerged that want to be addressed for powerful conservation and sustainable control in those protected areas. Although governmental regulations have addressed variety of these contests, handiest constrained achievement has been finished up to now. Therefore, similarly research wants to judge the performance of protected areas for biodiversity conservation and devise the mechanisms for powerful sustainable control of these protected areas.

Keywords Biodiversity, Conservation, National parks, Protected areas, Wildlife

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Introduction

Protected regions are legally mounted sites controlled for conservation of biodiversity. Worldwide approximately 8,163 protected areas cowl over 750 million hectares of marine and terrestrial ecosystems, amounting to 1.5 % of Earth's surface. Protected regions are described geographical areas which might be controlled so as to make sure their long time conservation, presenting us with beneficial environment offerings and cultural values. They are critical to maintaining biodiversity and human livelihoods and additionally offer us with answers to trendy demanding situations inclusive of food and water security, human fitness and well-being, minimising disaster risk and weather change. Today, there are about 200,000 protected regions within side the world, which is 14.6% of the world's land and 2.8% of its oceans. India is the second maximum populous country, and consequently any plans trying at conservation have to don't forget socio-financial improvement because the mounting human stress threatens the biotic assets of the country. Furthermore, ours is predominantly an agriculture country, and hence, policy makers have to recognise that conservation and sustainable usage of biodiversity is the important thing to all developmental making plans projects.

Biodiversity conservation has to be directed to inventorization of organic sources in special components of the country which includes the island atmosphere. Conservation of biodiversity via a community of protected regions which includes National Parks, Wildlife Sanctuaries, Biosphere Reserves, Tiger Reserves, Marine Reserves, Gene Banks, Wetlands, Mangroves and Coral Reefs. Rehabilitation of rural poor/tribes displaced because of advent of protected regions. Conservation of micro-organisms which assist in reclamation of wastelands and revival of organic ability of land. Protection and sustainable use of genetic sources/germplasm via suitable legal guidelines and practices. Regular entry to organic sources of the country with the motive of securing equitable percentage in advantages out of using organic sources and related expertise regarding it. Control of over-exploitation by TRAFFIC, CITES and different agencies, and additionally through treaties/protocols//environmental safety legal guidelines at National/International level.

Protection of domesticated plant and animal species with the intention to preserve indigenous genetic diversity. Maintenance of corridors among special nature reserves for the feasible migration of species in reaction to climate, or another demanding thing. Support for protective conventional abilities and expertise for conservation. Multiplication and breeding of threatened species with present day strategies of tissue culture and biotechnology. Discouragement of monoculture creation. Restriction on creation of distinctive species without feasible investigations (Figure 1).

Types of biodiversity conservation

During the last twenty years, plans for biodiversity conservation have been developed by the WRI and the IUCN with support from World Bank and other institution. There are two approaches of biodiversity conservation namely,

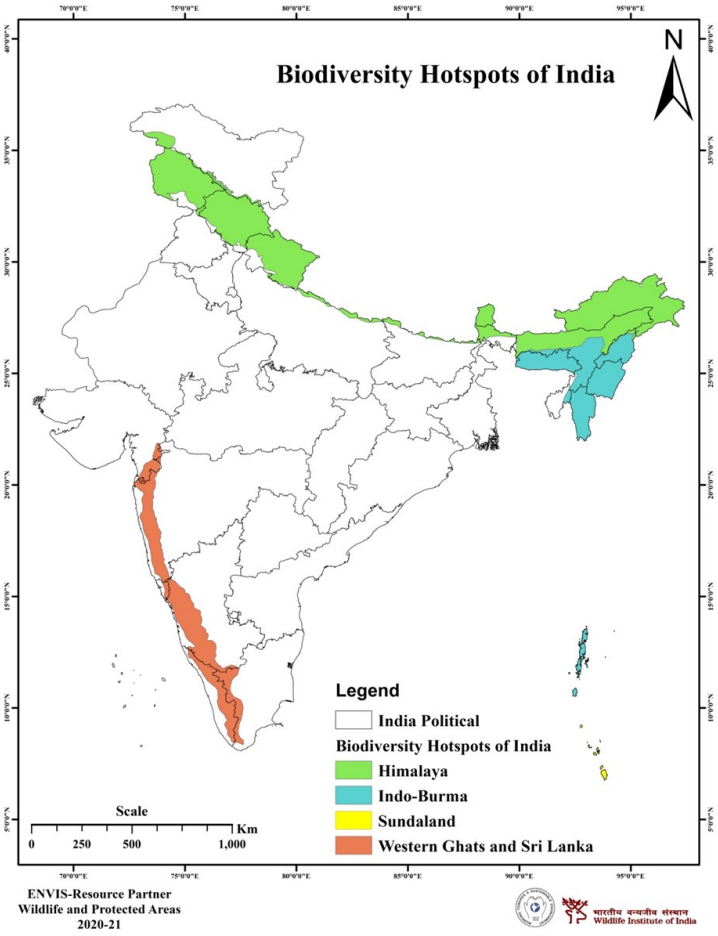

Figure 1. Map showing Biodiversity Hotspots of India (As on August, 2020; Source: WII, India).

1. *In situ* (on site) conservation - protect the specie in their natural habitat
2. *Ex situ* (off site) conservation - protect and preserve a species in place away from its natural habitat (Kumar *et al.*, 2020).

Protected area contributions to conservation

No bird or mammal is understood to have been misplaced from India because the cheetah (*Acinonyx jubatus*) changed into extirpated with inside the mid-twentieth century (Divyabhanusinh, 1999). Protected areas have performed an essential position on this success (Karanth *et al.*, 2010; Walston *et al.*,

2016). For example, >85% of the world's one-horned rhinos (*Rhinoceros unicornis*) and >70% of the world's tigers stay in India, in large part a effect of the efficient functioning of India's Tiger Reserves (Jhala *et al*., 2015; Talukdar *et al.,* 2008). For birds, protected regions offer primary refuges for plenty species in low numbers. The 3 Gyps vulture species, after experiencing a 97% populace decline in overall because of veterinary use of the drug diclofenac, at the moment are in large part determined inner or close to National Parks (Prakash *et al*., 2019).

Types of protected areas

- National Parks
- Wildlife Sanctuaries
- Conservation Reserves
- Community Reserves
- Marine Protected Areas
- Tiger Reserves
- Biosphere Reserve

The National Wildlife Database Cell of Wildlife Institute of India (WII) has been growing a National Wildlife Information System (NWIS) at the Protected Areas of the country. India has 981 Protected Areas along with 104 National Parks, 566 Wildlife Sanctuaries, ninety seven Conservation Reserves and 214 Community Reserves protecting a complete of 1,71,921 km^2 of geographical region of the country that is about 5.03% (E-supplementary resource 1).

National Park: An area, whether within a sanctuary or not, can be notified by the state government to be constituted as a National Park, by reason of its ecological, faunal, floral, geomorphological, or zoological association or importance, needed for the purpose of protecting & propagating or developing wildlife therein or its environment. No human activity is permitted inside the national park except for the ones permitted by the Chief Wildlife Warden of the state. There are 104 existing national parks in India covering an area of 43,716 km^2, which is 1.33% of the geographical area of the country (National Wildlife Database, December, 2021) (E-supplementary resource 1).

Wildlife Sanctuary: Any area other than area comprised with any reserve forest or the territorial waters can be notified by the State Government to constitute as a sanctuary if such area is of adequate ecological, faunal, floral, geomorphological, natural or zoological significance, for the purpose of protecting, propagating or developing wildlife or its environment. Some restricted human activities are allowed inside the Sanctuary area. There are 566 existing wildlife sanctuaries in India covering an area of 1,22,420 km^2, which is 3.72 % of the geographical area of the country (National Wildlife Database, December, 2021) (E-supplementary resource 1).

Conservation Reserves: Conservation reserves and community reserves in India are terms denoting 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 parts of the lands are privately owned. These protected area categories were first introduced in the Wildlife (Protection) Amendment Act of 2002 − the amendment to the Wildlife Protection Act of 1972. 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 (Table 1).

Community Reserves: Conservation reserves and community reserves in India are terms denoting 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 is privately owned. 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.

Marine Protected Areas: A marine protected area (MPA) is essentially a space in the ocean where human activities are more strictly regulated than the surrounding waters - similar to parks we have on land. These places are given special protections for natural or historic marine resources by local, state, territorial, native, regional, or national authorities.

Tiger Reserves: Project Tiger was launched by the Government of India in the year 1973 to save the endangered species of tiger in the country. Starting from nine reserves in 1973-2016 the number is grown up to fifty. A total area of 71027.10 km^2 is covered by these project tiger areas.

Biosphere Reserve: Biosphere Reserves are areas of terrestrial and coastal ecosystems which are internationally recognized within the framework of UNESCO's Man and Biosphere (MAB) Programme launched in 1971. These reserves are required to meet a minimal set of criteria and adhere to a minimal set of conditions before being admitted to the World Network of Biosphere Reserves designated by UNESCO for inclusion in the World Network of Biosphere Reserves. Biosphere reserves are helps to promote sustainable development based on local community efforts and sound science. The first biosphere reserve of the world was established in 1979, since then the network of biosphere reserves has increased to 631 in 119 countries across the world and 15 numbers in India (Figure 2).

Structure of Biosphere Reserve: The Biosphere Reserves are constituted on a core-buffer strategy (Figure 3).

- Core zone forming the sanctum sanctorum
- Buffer zone that concentrically surrounds the core zone

Core area: It is kept free of biotic disturbances and forestry operations, where collection of minor forest produce, grazing, human disturbances are not allowed.

Buffer zone: It is managed as a 'multiple use area' with twin objectives of providing habitat supplement to the spillover population of wild animals from the core conservation unit and to provide site specific eco-developmental inputs to surrounding villages for relieving the impact on the core. No relocation is visualized in the buffer area, and forestry operations, Non-Timber Forest Produce (NTFP) collection

Table 1. Protected areas of India from 2000 to 2020 (As on December, 2020).

Year	No. of National Parks	Area Under National Parks (km²)	No. of Wild Life Sanctuaries	Area Under Wild Life Sanctuaries (km²)	No. of Community Reserves	Area Under Community Reserves (km²)	No. of Conservation Reserves	Area Under Conservation Reserves (km²)	No. of Protected Areas	Total Area under Protected Areas (km²)
2000	89	37803.10	485	108862.50	-	-	-	-	574	146665.60
2006	96	38392.12	503	111229.48	1	0.31	4	42.87	604	149664.78
2007	98	38428.88	507	111529.04	5	21	7	94.82	617	150073.74
2008	99	39441.74	510	113123.35	5	21	45	1259.84	659	153845.93
2009	99	39441.74	512	113395.36	5	21	45	1259.84	661	154117.94
2010	102	40283.62	516	113842.87	5	21	47	1382.28	670	155529.77
2011	102	40283.62	518	113998.75	5	21	52	1801.29	677	156104.66
2012	103	40500.13	526	114933.44	5	21	59	2012.93	693	157467.50
2013	102	40500.13	532	117123.63	19	30.94	64	2232.61	717	159887.31
2014	103	40500.13	535	118290.66	43	58.22	64	2232.61	745	161081.62
2015	103	40500.13	541	118866.44	44	59.51	71	2548.82	759	161974.90
2016	103	40500.13	543	118917.71	45	59.66	72	2566.20	763	162043.70
2017	103	40500.13	544	118931.80	46	72.61	76	2587.95	769	162092.49
2018	104	40501.13	544	118931.80	46	72.61	77	2594.03	771	162099.47
2019	101	40,564.03	553	119,756.97	163	833.34	86	3,858.25	903	1,65,012.59
2020	104	43,716	566	1,22,420	214	1,302	97	4,483	981	1,71,921

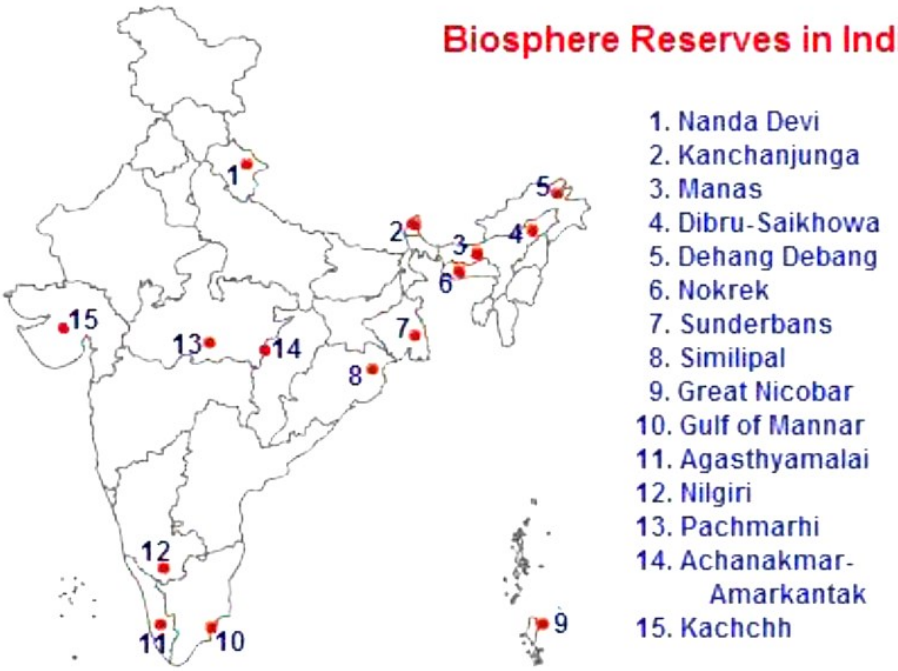

Figure 2. Biosphere Reserves setup in India.

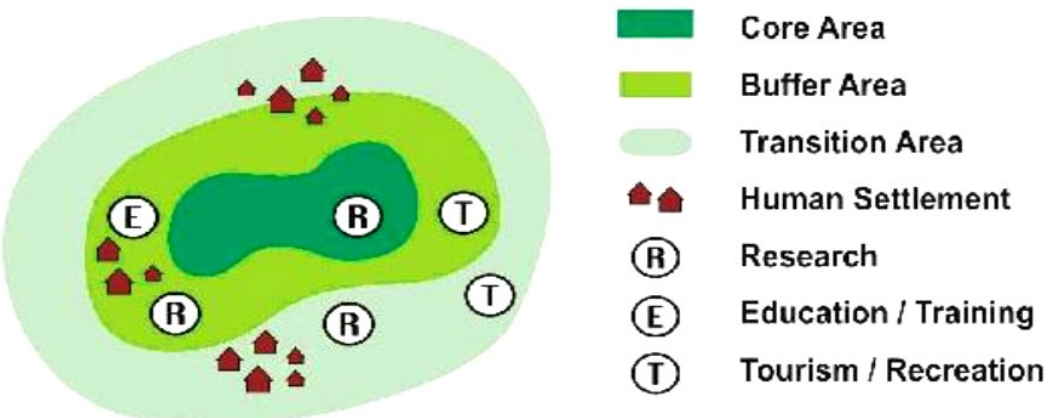

Figure 3. Structure of a model biosphere reserve.

and other rights and concessions to the indigenous communities are permitted in a regulated manner to complement the initiatives in the core unit (Kumar *et al*., 2020).

Threats to protected areas

Hunting: Hunting is another understudied threat. Hunting pressure clearly varies across regions and taxa, but is particularly intense in north east India. India's wildlife laws entirely prohibit hunting of wildlife in these forests, but enforcement is weak. Tribal communities have a strong tradition of hunting for meat, medicine, ritual customs, recreation, and increasingly for income (Aiyadurai *et al*., 2010). Beyond tigers, the primary targets are hornbills, ungulates, pheasants, bears, and primates (Datta *et al*., 2008a), although other groups such as squirrels and small carnivores are also hunted (Datta *et al*., 2008b; Dollo *et al*., 2010).

Fragmentation: India is losing forest area at the rate of 0.2% per year, and >90% of remaining forest fragments are less than 1 km² in size. Global assessments indicate that habitat fragmentation in India is extensive (Crooks *et al*., 2017). Beyond forest loss, fragmentation prevents movement in arboreal animals, such as the western hoolock gibbon Hoolock hoolock (Vasudev and Fletcher Jr, 2015). Isolation of fragments has resulted in increased human-elephant conflicts (Baskaran *et al*., 2013), reduced gene flow among populations of tigers (Natesh *et al*., 2017) and forest understory birds (Robin *et al*., 2015) and altered species composition in mixed foraging bird flocks (Sridhar and Sankar, 2008).

Climate change and invasive species: The richest locations for biodiversity in the east Himalaya should be relatively resistant to warming, given low anticipated climate change velocities (km/degree/year), facilitating tracking by flora and fauna. However, invasive plants are expected to be particularly adept at climate tracking, with presumed impacts on native flora (Mungi *et al*., 2018; Thapa *et al*., 2018). In the plains of India, high climate velocities in addition to the fragmented forested landscape may combine to accentuate threats from habitat loss and invasive species, and further intensify connectivity issues.

Protection measures: Establish and put in force measures for the rehabilitation and recovery of the ecological integrity of protected areas. Take measures to manipulate dangers related to invasive alien species in protected areas. Develop policies, enhance governance, and make sure enforcement of urgent measures that could halt the illegal exploitation of sources from protected areas, and improve global and nearby cooperation to do away with illegal change in such sources thinking of sustainable standard resource use of indigenous and neighbourhood communities

Conclusion

Protected areas were initially established to conserve biodiversity in the face of inevitable human-centred development. However, they have emerged as a critical tool for not only safeguarding species but also for poverty alleviation, improving human livelihoods, and overall development of a nation. The diverse ecosystems and ethnic groups of India do not allow a single conservation approach

to be implemented successfully across the country. Therefore, a feasible approach based on primary field data should be promoted for the successful conservation of the species and ecosystems. Further, the success and failure of any protected areas should be judged on the basis of conservation of species and ecosystems rather than planning whether to restrict or allow local communities and other such factors.

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E-supplementary resource

Online version of this book chapter contains additional supplementary resource/data which can be accessed at: https://www.aesacademy.org/book/biological-diversity-current-status-and-conservation-policies.

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