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CURRENT STATUS AND CONSERVATION OF MANGROVES IN INDIA: AN OVERVIEW

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Mangroves are the coastal trees or bushes that have evolved to thrive in a salty or estuary environment. The mangroves seem to be the only tree that can withstand salt concentrations in water. Mangal comes from the Portuguese word manguê, which means "tree stand." Mangroves are one of the most dynamic ecosystems that occur in shallow, sandy, or muddy regions (Alongi, 2008). According to the Global Forest Resource Assessment (FRA) report, mangrove forests cover approximately 14.79 million hectares across 113 nations. Only 6.9% of the world's mangroves are safeguarded under the existing conservation areas network, with 75 % of the world's mangroves occurring in just 15 countries (Giri et al., 2011). Asia has the largest mangrove area (5.55 million hectares), while Oceania has the smallest (1.30 million hectares). Only four countries were found to contain more than 40% of the total area of mangroves: Indonesia (19%), Brazil (9%), Nigeria (7%) and Mexico (6%) (ISFR Report, 2021).

Types of Mangrove

i. Red mangrove

The branching structure of airborne prop roots growing from the stem and basal branch of the soil distinguishes red mangrove. It can extend up to 25 – 38 meters (82 to 125 feet) in riverine woodland deltas, but most bordering shorelines are just 8 to 10 meters (26 to 33 feet). Wind pollinates the little white flowers with four petals and four bracts. Example - *Rhizophora mangle*.

ii. Black mangrove

The cable roots of the black mangrove radiate from the tree, with vertically upright shoots (pneumatophores) ranging 2 to 20 centimetres above the substrate. They have narrow, compact, or rectangular leaflets that are dark green on top and pale, almost cream green on the bottom, with short thick hairs. Example - *Avicennia germinans*.

iii. White mangrove

White mangroves can reach a height of 15 meters as a tree or a shrub. When developing in hypoxic or chemical disturbed soils, particular white mangroves become upright. Both the top and bottom surfaces are the same soft green tint. Mostly on terminal ends of branches, little yellowish blooms grow in alternate rows. Example - *Laguncularia racemosa*.

iv. Button wood

Buttonwood can reach a height of 12 to 14 meters (39 to 46 feet) as a shrub or tree. Their leaves are slender and pointed. The silver buttonwood is supposed to adapt to rocky, dry environments. The button is a seed cluster produced by them. Buttonwoods evolved to arid locations like buffer oceans and coastal strands thanks to mangroves' adjustments to the osmosis desert of saline water. Example - *Conocarpus erectus*.

Present Status of Mangroves in India

India has 4,992 square kilometres(sq.km) of mangrove forest, accounting for only 3.3 % of worldwide mangrove forests (ISFR Report, 2021). Around 70% of the population lives along the eastern coast (Bay of Bengal), 12% live along the west coast (Arabian Sea), and 18% live in the Andaman and Nicobar Islands. Sundarbans have the most extensive mangrove cover, accounting for 43 % of the total area in India, whereas Gujarat has the second-largest cover, accounting for 23 % (Ghosh *et al.*, 2015). Surprisingly, the Andaman and Nicobar Islands boast India's third-largest mangrove forest, accounting for 13% of the country's total cover area. The Sundarbans, which span India and Bangladesh, are the world's biggest mangrove forest and the only mangroves colonized by Royal Bengal Tigers, Gangetic dolphins, crocodiles, horseshoe crabs, lizards, and river terrapins are all found in the Sundarbans. After Indonesia and Australia, India is the world's third-richest country in mangrove biodiversity. The mangrove forest is divided into three categories - Very Dense

Mangrove, Moderately Dense Mangrove and Open Mangrove are shown in Table 1. The total cover area of mangrove forests is given in Table 2.

Table 1: Mangrove covers Assessment 2021

(Area in sq.km)

S. No.	State/UT	Very Dense Mangrove	ModeratelyDense Mangrove	Open Mangrove	Total	Change concerning ISFR 2019
1.	Andhra Pradesh	0.00	213.00	192.00	405.00	1.00
2.	Goa	0.00	21.00	6.00	27.00	1.00
3.	Gujarat	0.00	169.00	1,006.00	1,175.00	-2.00
4.	Karnataka	0.00	2.00	11.00	13.00	3.00
5.	Kerala	0.00	5.00	4.00	9.00	0.00
6.	Maharashtra	0.00	90.00	234.00	324.00	4.00
7.	Odisha	81.00	94.00	84.00	259.00	8.00
8.	Tamil Nadu	1.00	27.00	17.00	45.00	0.00
9.	West Bengal	994.00	692.00	428.00	2,114.00	2.00
10.	A&N Islands	399.00	168.00	49.00	616.00	0.00
11.	Daman & Diu and Dadra & Nagar Haveli	0.00	0.00	3.00	3.00	0.00
12.	Puducherry	0.00	0.00	2.00	2.00	0.00
	Total	1,475.00	1,481.00	2,036.00	4,992.00	17.00

Source – ISFR Report, 2021

Table2: Mangrove distribution in India

Rank	States/UTs with the highest mangrove cover	Total mangrove cover in sq. km
1	West Bengal	2114
2	Gujarat	1140
3	Andaman and Nicobar Islands	617
4	Andhra Pradesh	404
5	Maharashtra	304
6	Odisha	243
7	Tamil Nadu	49
8	Goa	26
9	Kerala	9
10	Karnataka	10

Source - ISFR Report - 2021

Reason for Increase in Mangrove Cover

Odisha – Natural regeneration and plantation initiatives in Kendrapara, Jagatsinghpur, and Balasore have improved eight sq km. **Maharashtra** – Natural regeneration is responsible for the gain of four square kilometres. **Karnataka** - Conservation measures such as planting and revitalization have resulted in an improvement of three sq km. **West Bengal**- The increase of

threesq km is primarily due to rehabilitation in the South 24 Parganas district (41.74%) (ISFR Report, 2021).

Importance of Mangroves

Mangroves are vital and provide many benefits to the environment. Mangroves have a complex root structure that effectively dissipates sea wave energy, safeguarding coastal regions from tsunamis, storm surges, and soil erosion (Kathiresan, 2010). Mangrove roots help sediment deposition by slowing water flows. They also prevent coastal erosion and contamination of the sea and play an essential role in the food chain (Nagelkerken *et al.*, 2008). The decaying leaves of mangrove trees are decomposed by fungi and bacteria, providing food for shrimp and crab. Large fish consume these marine crustaceans, and large fish are captured and consumed by animals. They offer a significant source of income for coastal populations that rely on honey, tannins, wax, and fishing (Hussain and Badola, 2010).

Threats to Mangroves

Natural hazards and damaging human activities are the most common threats to mangrove forests.

(a) Natural hazards: -Particularly in the geographically fragile Andaman and the Nicobar Islands, cyclones, typhoons, and significant wave action. Wildlife animals' browsing and trampling are frequently let to graze freely, particularly in places near human habitation. Barnacle infestation attaches to immature seedlings and obstructs respiration and photosynthesis, slowing seedling growth. Weeds like *Acrostichum aureum* and *Acanthus* species invade deforested mangrove habitats and prevent the regrowth of economically important mangrove tree species.

(b) Human hazards: -Anthropogenic activities have largely degraded the wetlands and mangrove forests. Timber borers, caterpillars (which consume the mangrove foliage and harm the wood), and beetles are insect pests that reduce mangrove diversity. Deforestation for urbanization and industry development and trash disposal without treatment of bodies of water and soil reduce mangrove productivity.

Conservation and Management of Mangrove Forests

The increasing human population in coastal areas and the demand rising for small timber, fodder, fuel wood, or other non-wood forest products are putting strain on mangrove

ecosystems. In India, three management practices are used to efficiently maintain mangrove forests: promotion, regulation, and involvement. The Government of India is implementing the Management Action Plan (MAP) in 38 mangrove areas along the coast of the cape. India has a solid regulatory approach, with enough legal help for mangrove protection in National Parks, Wildlife Refuges, Reserved Forests, Protected Forests, and Community Reserves. However, successful implementation of the legislation is frequently hampered by a lack of human and financial resources and poor infrastructure (Pattanaik *et al.*, 2009). Various states are implementing mangrove conservation and management initiatives to increase the biodiversity of mangroves. Direct seed planting, raised bed plantation, and fishbone channel plantation are some of the key strategies used in Gujarat to restore degraded mangrove habitats. Training for sustainable mangrove protection is also held regularly. Mangrove ecology and biodiversity have been conserved in Maharashtra through preservation, restoration, regeneration, and maintenance (Song *et al.*, 2021).

Conclusion

From a productive, defensive, and social standpoint, mangroves serve various purposes. However, because of rising population constraints in coastal regions and a lack of understanding, mangrove lands have been converted to multiple uses on a vast scale. We can promote tourism by increasing the growth of mangrove trees. Furthermore, the primary goal of a fisherman is to catch fish. They are constantly working to keep the mangrove resources afloat. Even slight changes in water levels, on the other hand, can result in lower flood extents and, as a result, reduced property damage and loss of life.

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