

# A Study on Habitat Loss of Mangrove Swamps over a Period in Mumbai Metropolitan Region

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*A mangrove covers 66 square km pads the coastline of Mumbai and goes about as a characteristic natural barrier against ocean level ascent and waterfront flooding, aside from giving various other biological system administrations. The mangroves are under ceaseless danger from the results of quick urbanization and populace flood.*

## **ABSTRACT:-**

In this review research paper, we focused on the history, economic and ecological Importance, the challenges faced by the mangroves in Mumbai and the government's efforts to protect mangroves and biodiversity. Oxford the dictionary defines mangroves as trees or shrubs that grow in tides, mainly tropical coastal swamps, and are entangled, the root system grows on the ground and forms dense bushes. Mangroves develop in unforgiving natural conditions. They can develop in outrageous conditions because of their morphological and physiological transformations, including complex root and salt filtration capacities to adapt to the immersion of saltwater and wave activity. They guard and stabilize the shoreline by way of appearing as a barrier towards disasters, expand soil/ sediment accretion, heavy metals, grant breeding ground for distinctive kinds of prawns, shell fishes etc. In the cutting-edge scenario, conservation of mangroves is now not solely necessary for sustainability of the complex ecological area, however additionally indispensable for interconnectivity of the marine and land ecosystems. In India, Mumbai is one of the common examples of mangroves destruction due to urbanization. All the seven islands of Mumbai have been reclaimed and linked to a non-stop land mass after destroying mangroves in the process. The mangroves are the face of Mumbai. We have to retailer mangroves, so that they can store us. Mangroves can be used to keep Mumbai and different coastal areas in India from an ecological catastrophe so that we don't come to be environmental refugees.

**KEYWORDS:** Mangroves, Conservation, Ecosystem services, Climate change, Ecological catastrophe.

## **INTRODUCTION**

The Mangrove ecosystem is unusual habitat observed at the interface between land and sea. The phrase Mangroves is considered to be aggregate of the Portuguese phrase 'Mangue' and the English phrase 'grove'. The time period "mangrove" is being utilized to the particular ecosystem of the intertidal world in the tropics and subtropics and the plant neighbourhood of this ecosystem is termed as "mangrove vegetation". Many human beings suppose that mangroves are a few dwarf weedy plant life alongside the shoreline however mangroves are a great deal greater than that. It is a total ecosystem performing as a buffer between land and sea. Mangroves are extensions of tropical and sub-tropical forests into the sea.

Mangroves are one of the biologically numerous ecosystems in the world, rich in natural count and vitamins and support very giant biomass of plant life and fauna. With continuing degradation and destruction of mangroves, there is indispensable want to understand the biodiversity of the mangrove ecosystems. Mangrove forests should play a crucial position in defending coastal areas from sea level upward thrust brought on by way of local weather exchange, Due to over exploitation of mangrove species and habitat loss now these mangroves are in threatened

status. The present study gives a baseline information on ecological status of mangrove swamps and salt marshes for their conservation and administration in Mumbai coastal environments.

Globally, mangrove areas are declining rapidly as they are cleared for coastal development and aquaculture and logged for timber and gasoline manufacturing (Beth et. al., 2010). The ecological and monetary significance of mangrove ecosystems is nicely mounted and highlighted by studies setting up a correlation between the protective feature of mangroves and the loss of lives and property precipitated via coastal hazards. Nevertheless, degradation of this ecosystem remains be counted of concern, emphasizing the fact that nice conservation of herbal sources is possible solely with an appreciation of the attitudes and perceptions of nearby communities. Mangrove forests are among the world’s most productive ecosystems and are the solely forests located at the confluence of land and sea in tropical and subtropical latitudes.



**Area distribution of mangroves in India (thousand ha)**

State/Union territory	Government of India, 1987	Government of India, 1997
West Bengal (Sundarbans)	420	212.3
Andaman and Nicobar Islands	119	96.6
Maharashtra	33	12.4
Gujarat	26	99.1
Andhra Pradesh	20	38.3
Tamil Nadu	15	2.1
Orissa	15	21.1
Karnataka	6	0.3
Goa	20	0.5
Kerala	Sparse	Nil
<b>Total</b>	<b>674</b>	<b>482.7</b>

**AIM**

Keeping perspective on the above viewpoints on mangroves, this paper is done predominantly with two objectives.

- 1) An evaluation of mangrove territory in Mumbai.
- 2) Threats to mangroves, its misfortune, and ramifications of its decrease including rebuilding and customary preservation.
- 3) Need for Mangrove management and conservation.

**METHODOLOGY**

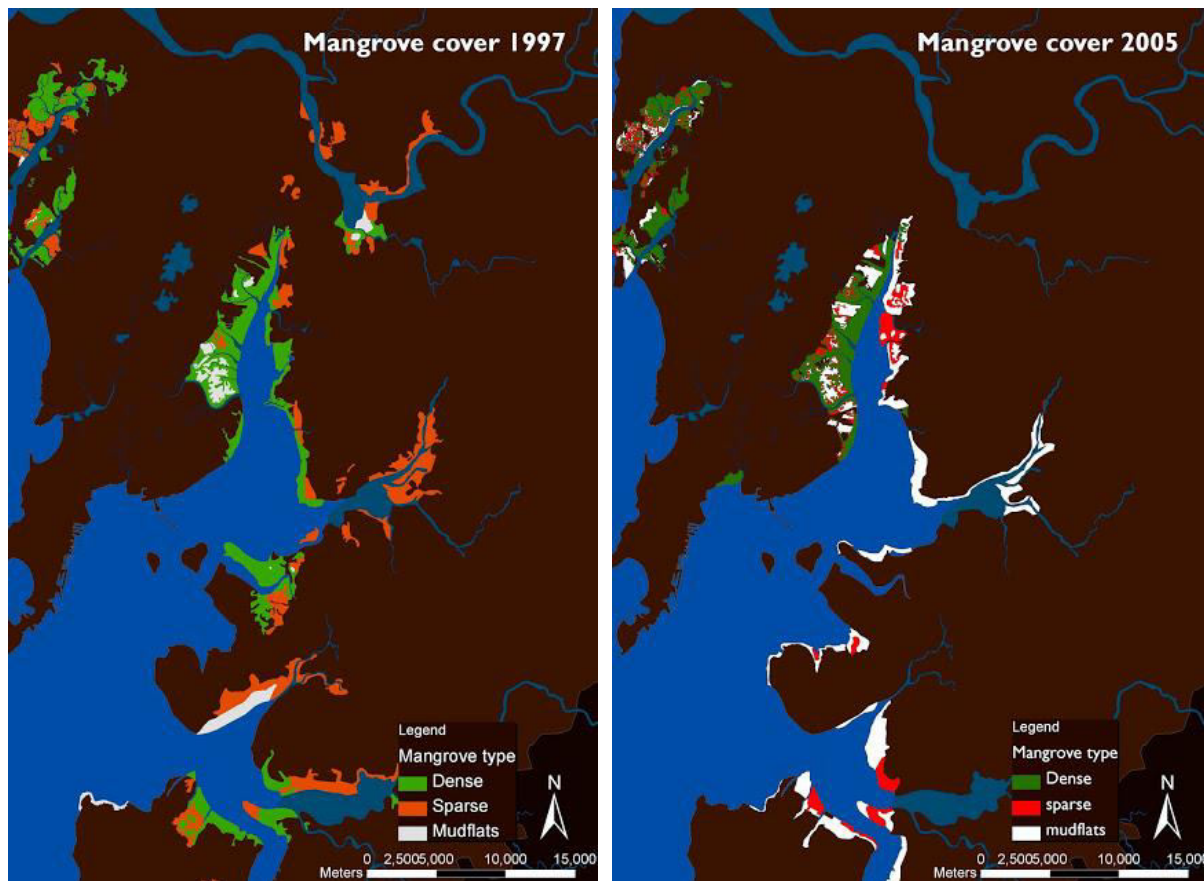
The goal of the find out about is to consider the quantity of degradation took region over a period. The objectives encompass the suited restoration of the mangrove place and the lessening of the pollution from close by industries of the learn about area. An ecological survey of outer harbour mangrove swamps and salt marshes used to be performed to generate baseline statistics on mangrove site.

**EVOLUTION OF MANGROVES**

Mumbai may be a reclaimed island along its entire shoreline. The wave action has increased within the North Western area and has eroded the 16 km long coastline by about 500 meter within the past 35 years. Only mangroves can provide a natural control for the eroding shoreline. Also Coastal biodiversity including the million migratory birds that visit Mumbai are housed by the mangroves. A new report by climate change researchers predicts much of Mumbai, which is India's financial capital, will be underwater by 2050 if global carbon emissions aren't reduced. The city, originally a cluster of seven islands, is especially vulnerable. The mangroves have been afforded protection under Category I of the CRZ (Coastal Zone Regulation 1991). They are also entitled protection

under the prevailing forest conservation regime, the Maharashtra Private Forest Act 1975, the Wildlife Protection Act 1972 and the Maharashtra Felling of Trees (Regulation) Act 1964.

The area under mangroves in Maharashtra was 200 km<sup>2</sup> in 1972-75, which reduced to 108 km<sup>2</sup> in 1997 but increased to 118 km<sup>2</sup> in 2001. According to MMRDA, the mangrove areas in Mumbai have shown significant increase since 1991. However, this claim is under contention, as the maximum numbers of reclamation have taken place between 1991 and 1997. It is believed that about 70 per cent of Mumbai's mangroves have been destroyed due to various development activities.



The mangrove cover map 2005 shows that dense mangrove areas near the Thane Creek have been converted to mudflats. The analysis of mangrove cover change in MMR shows that there has been an overall decrease in the mangrove area in MMR. The decrease in the dense and sparse mangrove has been maximum in the Thane Creek area west side followed by Manori, Malad respectively.

The pressures of rapid haphazard development, high and growing population density, relaxation of the building restrictions of no-development zones, along with the growth of pollution, encroachments, deforestation for fuel and economic gains, and destruction of natural land-forms for real estate development lead to the catastrophic depletion of the largest and most precious of the vanishing green zones of the city.

Over the years, excessive built up area intentionally strangled the city's open spaces, wetlands, mangroves and salt-pan lands for commercial purposes. This loss and subsequent commercialization and concretization of open spaces has meant that water, which previously could seep into the soil has practically nowhere to go, leading to flooding. Conservation of the mangroves which is still existent in the city and an initiative to safeguard them with the help of controlled development in the areas around the mangrove is one of the possible measures to help preserve them.

## **IMPORTANCE OF MANGROVES FOR MUMBAI**

Increasing human populace in coastal areas is ensuing in extended pressure on mangrove ecosystems in many countries, with the developing demand for timber, fuelwood, fodder and different nonwood woodland merchandise (NWFPs), To make sure the conservation of mangroves for environmental benefits, collectively with a sustainable grant of a range of woodland and other products to meet the everyday necessities of neighbourhood people, fabulous administration of mangrove ecosystems is needed. Management can additionally open new avenues for self-employment such as ecotourism, fishing, beekeeping and cottage industries primarily based on mangrove forest products, assisting to enhance the socio-economic prerequisites of the local communities.

Mangroves characterize the spirit of Mumbai – they are plucky survivors. But every day, tens of millions of residents in Mumbai pass these hardy plant life imagining they are little greater than dirty, muddy weeds developing pointlessly along the shoreline. But people do now not recognize that how vital mangroves are for the nice of existence of the residents of Mumbai. By trapping silt, mangroves preserve the integrity of Mumbai's shoreline. This is a crucial carrier to the metropolis of Mumbai as it is very inclined to erosion, having been constructed on reclaimed land that is battered through the sea on all three sides. The ecosystem has a very massive unexplored possible for herbal merchandise beneficial for medicinal reason and additionally for Salt production, Apiculture, Fuel and Fodder etc.

Mangroves supply livelihood for the fish people by means of breeding and nursing the Fish, Prawns, Molluscs and Crabs etc. The Kolineighbourhood in Mumbai worships mangroves due to the fact they recognize that these are breeding and nursery grounds for the marine organisms on which their sustenance depends. Costal biodiversity which includes the million migratory birds that go to Mumbai are housed via mangroves. Mumbai mangroves can grant a giant base for lookup possibilities for researchers in Botany, Flora and Fauna of Mumbai coastline studies.

## **MANGROVE DESTRUCTION IN MUMBAI**

Rapid traits like housing, industrialization, air pollution and growing populace of Mumbai has resulted into degradation of mangroves. There are two essential creeks, Vasai Creek toward north and Thane Creek towards south where luxuriant mangrove patches are nevertheless left. Otherwise the State Govt. organizations have failed to guard this important, productivemangrove ecosystem from constructing mafias. In India, a felony safety is afforded to this ecosystem by means of way of rules in the structure of Coastal Regulation Zone Notification. Recently Mumbai High Court has ordered freeze on destruction of mangrove forests in Maharashtra and has banned development inside 50 metres of them. The courtroom has additionally directed to notify mangrove areas as blanketed forests. Thus, there is already a mechanism furnished for administration of this ecosystem. In such a situation, safety of the mangrove ecosystem is feasible solely thru the participation of the neighbourhood and via constructing up stress agencies for ensuring management of this ecosystem and strict implementation of the felony provisions via the Government. Thereby, integrity of habitats quintessential for spawning, juveniles and feeding and for biodiversity, aside from ecological sustainability and communitysustainability may want to be maintained. In the previous few years there has been an expand in the cognizance of the humans in Mumbai. Residents associations are coming together to unfold this awareness. They understand that the speedy destruction of mangroves alongside the coast of Mumbai will havefar-reaching outcomes on the city. The NGOs in Mumbai are making efforts to spotlight the troubles like land reclamation, coastalregulation quarter notification and unlawful destruction of the mangrove areas via the interventions of the neighbourhood stategovernment and neighbourhood bodies.

### **Problems caused by humans**

- Indiscriminate tree felling and lopping, mainly for fuelwood, fodder and timber, especially in areas close to human habitation
- Encroachment on publicly owned mangrove forest lands.
- Discharge of industrial pollutants into creeks, rivers and estuaries, which is a major problem in some regions of the world.

- The traditional use of dragnets in fishing, which often hampers regeneration of mangroves because young seedlings get entangled in the nets and are uprooted.
- Obstruction and diversion of water for culvert construction.

A short car ride from the dried mangroves along the highway, a municipal garbage truck dumps trash on the edge of a mangrove patch. Sludge and plastic waste cover the roots of the mangroves, slowly choking them. In another area nearby, hundreds of acres of mangroves are being cut for the construction of the Navi Mumbai international airport.



One of India's most glamorous infrastructure projects, the country's first bullet train — which will run between Mumbai and Ahmedabad, in the western Indian state of Gujarat — is estimated to destroy at least 32,000 mangroves.

With these mangroves gone, Mumbai will be left without a vital line of defence when natural disasters strike. And that has happened before. In 2005, when the city experienced unprecedented monsoon rainfall leading to catastrophic flooding, one of the worst affected areas was a commercial hub in central Mumbai, full of shopping malls and skyscrapers. It's been constructed by reclaiming low-lying areas on the banks of the Mithi River, previously home to a sprawling mangrove forest that acted as a natural storm water drain.

### Natural hazards

- Cyclones, typhoons and strong wave action.
- Browsing and trampling by wildlife and livestock (goats, buffaloes and cows), which are often left to graze freely, especially in areas close to human habitation.
- Infestation by barnacles which attach to young seedlings, interfering with respiration and photosynthesis and delaying seedling growth.
- Crabs, which attack young seedlings, girdle the root collars and eat the fleshy tissues of the propagules.
- Gastropods that eat young leaves and flowers of mangroves, a big problem.

### CURRENT MANAGEMENT APPROACH

The current management of mangroves in India focus on a combination of legislative conservation as well as sustainable exploitation through cooperative management. (DasGupta, 2013). It was after the Ramsar Convention, which is a treaty for the conservation and sustainable use of wetlands that mangroves were under surveillance for steady restriction on its deforestation. India formulated a comprehensive plan for the conservation of mangroves soon after the convention. There are also other committees such as the National Mangrove Committee which is an advisory body to promote scientific assessment and evaluation of mangrove habitats. In addition, realising the importance of marine ecosystems, especially of mangroves, the Government of India designated special Marine and Coastal Protected Areas. Marine ecosystems in Islands are considered as Category II

The role of these areas is to preserve biodiversity, genetic diversity, 10 conserving and maintaining the ecological process. The other legislative initiative is through coastal zoning for effective management in order to restrict coastal urbanization through setting up of Coastal Regulation Zone. All the Indian mangroves receive legal protection under Environment Protection Act and are responsible for regulating activities that may affect mangrove ecosystems through the setting up of Environment Impact Assessment Notification.

## MEASURES TO BE TAKEN

It is important to address some of the shortcomings of Legislative and Non-Legislative framework towards management, conservation, restoration and regeneration of mangroves.

1. Economic valuations of the mangrove ecosystem goods and services can attract investments which will lead to even more effective management. The importance of an ecosystem is most often understood only when we no longer derive benefits from it, therefore effective cost-benefit analysis needs to be conducted since the provision of one ecosystem services comes at the cost of another and there are also many indirect benefits derived from such ecosystems that do not have a market value. There is no universal value to the mangrove ecosystems, since they widely vary based on socio-economic conditions from one region to another hence careful analysis needs to be undertaken in specific to the Indian context. Such individual studies have been attempted in Matang Mangrove Forest Reserve in Malaysia where it is assessed that one hectare of mangroves contributes to ~US\$37,500 per year to fisheries (Aburto-Oropeza et. al., 2008).
2. Population growth has evidenced to continue to rise around coastal areas. Their continued dependence on mangroves will lead to its exploitation rather than conservation. Active alternative livelihoods need to be provided to the communities if their activities continue to be exploited and deteriorate the health of mangroves. They could be effectively involved in eco-tourism. "Ecotourism is considered to be the cutting edge of creativity in the tourism industry". This would ensure that a large section of the community would be engaged in preserving and conservation activities, and the local communities could also sell some products which are derived in a sustainable manner. The case study of Iriomote Island in Japan has devised a successful model that promotes tourism and at the same time tour companies and tourists are educated to minimize the potential negative impacts to these ecosystems. This concept will offer a marketing tool to promote many services which are provided on the basis of sustainable principles and actively involve local communities.
3. Improper benefit sharing between the governments and communities lead to conflicts and loss of community interest in participatory management. More consistent funds need to be provided to communities for continuous management without any breaks. Community Stewardship in countries like Fiji and Samoa have led to considerable levels of protection.
4. Marine and Coastal pollution are some of the biggest threats faced by the Mumbai mangroves. To prevent risks from disasters such as Tsunami, the government could mandate coastal barrier plantation such as countries like Indonesia and Malaysia.
5. Management of mangroves in Mumbai has been a combination of Community participation coupled with legal framework. The involvement of private sector to increase stakeholder participation in its conservation programmes could be explored. Such an example is the case of "Global Conservation Standard" in Costa Rica which is a financial mechanism by which the private sector companies could buy conservation credits and for every revenue it generates, it could in turn use a part or whole to invest in sustainable development activities of ecosystem goods and services.

## CONCLUSION

The paper reviews not only the current status of mangroves in Mumbai, but also some of the direct and indirect benefits that are provided by them. Citations of certain international case studies provide insights into what could further be enhanced in Mumbai for better management. In addition, the threats faced by mangrove ecosystems in Mumbai highlights the importance of coastal and marine ecosystems. Conservation needs to be linked with a broader perspective with active community involvement, environmental security and reducing any risks from natural calamities. Such measures need to be adopted more holistically in view of anticipatory adaptation measures which hold the clue for a successful and effective management.

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