



Mangroves- Importance and Threats

Dr.Gangotri S. Nirbhavane

Assistant Professor, Dr. Ambedkar College of Commerce and Economics, Wadala, Mumbai, India – 400 031.

Email - gangotrienv@gmail.com

Abstract: *Ecologically mangroves are very important in maintaining the balance of ecosystems. Mangroves are part of highly productive, complex biological ecosystems, where many aquatic animals survive. Ecologically mangroves play vital role in maintaining and in soil conservation. Roots of mangroves are having significant role in water filtration process in waterbodies. Mangroves are helpful in natural calamities like flood, cyclones, tsunami etc.*

Mangroves have been exploited for timber for boats, building dwellings, fuel-wood cooking and heating. Mangrove forests provide numerous resources to coastal people as their survival and livelihood depend upon mangroves.

Mangroves have vanished with alarming rate. Many species of animals are found only in mangroves ecosystem, but they are disappearing with the cutting of mangroves forest. There is urgent need to conserve this important resource. Until local communities and local authorities will not take initiative to save this important resource, restoration will not be possible. Awareness in the local people is require about the importance of mangroves resources and problems faced by mangroves.

An attempt made to address the importance of Mangroves forests for human being as well as threats faced by this resource in today's time.

Key Words: *Aquatic, Conservation, Ecosystem, Mangroves, Tsunami, Restoration.*

1. INTRODUCTION:

A mangrove is a shrub or tree that grows in wet ground in coastal saline water or at the edge of rivers and has some roots that are above ground. Mangroves occur worldwide in the tropics, subtropics and even in some temperate coastal areas, mainly between latitudes 30°N and 30°S with the greatest mangrove area within 5° of the equator. Mangroves are most productive and biologically have a complex ecosystem on Earth.

Mangroves act as a bridge connecting land and sea. Mangroves protect nearby areas from floods, tsunamis and from extreme weather conditions. Mangrove forests are effective in carbon sequestration and to mitigate the effects of climate change. Mangroves support sustainable coastal ecosystems. There are roughly 54 true species of mangrove belonging to 16 different families. (1) In some areas of the world, mangroves are present in less number along the coastline, and in some areas, they are present with high density as a massive aquatic forest.

A mangrove is a woody tree or shrub that lives along sheltered coastlines within the tropic or subtropical latitudes. Mangroves manage to survive in challenging conditions as their roots are submerged in water. Mangrove trees thrive in hot, muddy, salty conditions. The mangrove ecosystem also supports an incredible diversity of creatures-including some species unique to mangrove forests. Scientists are discovering, mangrove swamps are extremely important to our own well-being and to the health of the planet. Many species of mangroves are not necessarily closely related to one another, but they do share the unique ability of growing within reach of the tides in salty soil. Some mangrove species live so close to the shoreline that they are flooded with salt water every day as the tide comes in and submerges their roots. All mangroves have evolved special adaptations that enable them to live in salty, oxygen-poor soil. (1)

Mangroves play an important role in sustainable ecosystem, but their restoration depend on local stakeholders.



Fig.1- Mangroves

Objectives -

1. To know about the mangroves and its importance.
2. To know about the threats faced by mangrove areas.

2. METHOD:

The study is based on the secondary data. Secondary data is collected from books, Research papers, Government agencies reports, Journals, NGO's and Newspapers.

3. LITERATURE REVIEW:

Mangrove Forests-

Mangrove forests also called mangrove swamps or mangals, are found in tropical and subtropical tidal areas. Areas where mangroves occur include estuaries and marine shorelines. (2)

Mangroves are coastal plants that can live in saltwater, and when conditions are favourable, they cover the coastline in dense patches known as mangrove forests or swamps. As the primary species, intricate in forming mangrove forests, prefer very warm, wet conditions, they are limited up to tropical and warm temperate latitudes around the world.

Mangrove forests provide many of the resources on which coastal people depend for their survival and livelihood. (3) Indonesia, Thailand, and Mexico are some places with particularly large areas of mangrove forest. Mangrove forests are valuable resources which exist on the earth's surface as they provide dual services of coastal protection and habitat for commercially important species. (4)

Types of mangrove forests -based upon its surrounding geography. (1)

1. Mangrove forests along open bays and lagoons that are getting full sun are considered mangrove fringes. These forests are dependent upon regular tides that flush leaves, twigs, and mangrove propagules out into the open ocean.
2. An over wash forest is similar to a fringe forest except the entire forest is an island that becomes flooded at high tide. Isolated from the main land and terrestrial predators, it is a popular place for birds to nest.
3. Riverine mangrove forests are within river floodplains by the coast and are heavily influenced by the changing seasons. Sometimes they are flooded with fresh river water, while during summer droughts the soil can become exceptionally salty when the fresh river water is almost non-existent.
4. Basin mangrove forests extend far inland and occur in inlets, deep bays, and coves.
5. Dwarf, or scrub, mangrove forests only attain canopy heights of less than 5 feet (1.5 meters) although they contain the same species as the other types of forest. The stunted growth is often attributed to a lack of nutrients, high salinity, and rocky soils. (1)

Importance of Mangroves

1. Source of Livelihood -Mangroves are a source of survival for many people, they are dependent on mangroves. Fishermen, honey, and wax collectors, wood cutters, they are directly dependant on this important resource for livelihood. People in nearby areas collect shellfish, shrimp, and clams. The mangrove trees provide fuel, medicines, tannins, and wood for building houses and boats.
2. The indigenous people of Australia and Sri Lanka use extracts from mangrove plants as valuable sources of dyes. The importance of bark tannins has declined in many Asian countries, but mangrove tannin is still used in India and Bangladesh for leather curing, and in Sri Lanka tannin is used traditionally in curing fishnets. (5)



3. Local industry in Sundarbans in India and Bangladesh are having production of honey. Fruits of *Avicennia marina* are universally used as vegetables. The fruits of *Kandelia candel* and *Bruguiera gymnorrhiza* contain starch and if sliced, soaked in water to rinse out tannins and then ground to a paste, can make excellent cakes or sweetened stuffing for pastry. It is reported that some mangrove plants and extracts are used as incense, perfumes, hair preservatives, condiments and aphrodisiacs. Edible jelly and a kind of salt are made from the ashed leaflets. (5)
4. Mangroves are habitat for thousands of animals. Several kinds of roost, birds' nests are present and feed in mangroves. termites, ants, moths, spiders, and scorpions feed and nest in hollowed twigs of mangroves. Frogs cling to bark and leaves of mangroves.
Mangrove forests are important feeding grounds for thousands of species and support a diverse food web. Snakes, monkeys, lizards crawl along tree limbs. Crocodiles laze in the salt water. Some creatures are found only in mangrove forests.
5. Every year tons of leaves fall from the mangrove forest; as the leaves decompose, they provide nutrients to algae and invertebrates, which in turn feed numerous small organisms such as sponges, worms, birds, fish, shellfish, crabs, shrimps etc. Tides circulate these nutrients among mudflats, coral reefs, and estuaries.
6. Mangroves make available ideal breeding grounds for many species of the world's fish, shellfish, crabs, shrimps etc. Mangrove roots are shelter for many fish species such as snook, tarpon, and as they grow, they head out to forage in the seagrass beds, and once they grow fully, they move into the open ocean. (3)
7. Mangroves have the capability to modify and support the surrounding environment. Mangrove roots absorb the effect of waves, which permits for the build -up of sand, dirt, and silt particles. The roots hold on to sediments which leads to better water quality and reduces soil erosion.
8. Mangroves are helpful in improving water quality by absorbing nutrients from runoff, which might cause a harmful algal bloom offshore. Both coral reefs and seagrass beds depend on the water purifying capacity of nearby mangrove forests to keep the water clear and healthy.
9. Mangrove forests absorb and store carbon from the atmosphere. This stored carbon is utilized for the building blocks of plant bodies such as branches, roots, and leaves. When mangroves trees become older and die as well as fallen leaves mix in the seafloor and stored carbon from trees buried in the soil, mix with water. This buried carbon is known as 'Blue Carbon' as it is stored underwater in coastal ecosystem.
10. Helps in water cleaning- Mangrove's complex root system filters nitrates and phosphates that rivers and streams carry to the sea. Mangroves protect sea water and freshwater ecosystem from water pollution effects.
11. Mangrove roots collect the sediment and silt which is carried by rivers towards the sea during tides. By holding soil in place, tree stabilize shorelines against erosion. Mangroves provide a buffer zone which protects the land from wind damage and wave damage.

Threats faced by Mangrove forests-

Mangroves have vanished at an alarming rate. By some estimates, less than 50 percent of the world's mangrove forests were intact at the end of the 20th century and the remaining 50 percent remain in poor condition. Mangrove forests are the most threatened habitats in the world. Thailand has lost 84 percent of its mangroves. The Ivory Coast, Guinea-Bissau, Tanzania, Mexico, Panama, Malaysia, Myanmar, Pakistan, and the Philippines have each lost more than 60 percent of their mangrove forests. (6)

1. Shrimp farming- Shrimp farming reduces the local peoples' capacity to support themselves. Because shrimp is a cash crop, not a subsistence crop, the profits from shrimp farming are exported, and it generates temporary jobs. Fishermen use nets which damage the ocean floor and trap several species of shrimp. The average Asian intensive shrimp farm endures only two to five years before pollution and disease force it to shut down. Local people are left with a devastated landscape that can no longer support fishing, farming, or wood gathering, and many are forced to move away.
2. Shrimp Industries-Rapidly growing shrimp aquaculture industry is biggest threat to mangroves. Places where mangroves have been cut down for shrimp farms are far more vulnerable to destructive cyclones and tidal waves. Thousands of acres of wetlands have been cleared to make an artificial pond for densely stocked shrimp. Shrimp farmers dig channels to supply freshwater and sea water. These diversions change the natural flow of water which maintains the health of the surrounding mangrove ecosystem. Shrimp farmers also use huge amounts of chemicals and antibiotics to keep the overcrowded shrimp healthy. This chemical with vast quantities of organic waste, pollutes surrounding freshwater and coastal waters. (6)

3. Agriculture- Many mangrove forests have been demolished to make way for rice paddies, palm oil plantations, rubber trees etc. Farmers frequently use fertilizers and chemicals, and runoff comprising these contaminants makes its way into water supplies. Mangroves tolerate a limited number of pollutants without dying, which is coming from agricultural areas.



Fig.2 – Mangroves degradation

4. Coastal Development- It includes developmental activities like construction of ports, water transportation route construction, hotels etc. While doing such coastal development, coastal areas, wetlands are filled by concrete; sometimes whole mangroves were damaged and cut for such developmental activities. Developmental activities lead to the loss of habitat for many animals. Waterways are diverted for irrigation or paved over for roadways, which change the natural flow of water. Mangroves are adapted to tidal fluctuations; they can be damaged by such modifications in their habitats.
5. Tourism- Irresponsible tourism led to loss of natural beauty of the spots as tourists are throwing waste material into such areas. Sometimes tourists damage trees, collecting shells, anchoring on reefs, lighting fires such activities cause harm to mangroves.
6. Charcoal and lumber industries- Mangroves yield high quality charcoal. Cutting down mangroves for timber and charcoal is an important cottage industry for several coastal people. Mangrove wood is used as fuel, for building materials and fencing.
7. Natural calamities and Climate change- In natural calamities like floods, cyclones or tsunamis mangroves play an effective role in reducing their effects; as mangroves roots have a capacity to absorb water pressure. But in heavy floods and during high-speed cyclones, mangroves also have the capacity to absorb pressure up to some extent; further effects of such calamities result in damage to mangrove ecosystem. Gradually effects of climate change also observed in mangrove forest areas, it causes effects on biodiversity.

Indian Scenario

India has a mangrove cover of about 6,749 km². India has the fourth largest mangrove area in the world (7). In recent studies, it is observed that India has a total mangrove cover of 4,628 km² (8), or 0.14% of the country's land area 3% of the global mangrove area, and 8% of Asia's mangroves., of which about 60% is along the east coast (Bay of Bengal); 27% is along the west coast i.e. Arabian Sea, and the remaining 13% is in the Andaman and Nicobar Islands. These mangrove habitats include three distinct zones: east coast habitats having a coast line of about 2700 km, facing Bay of Bengal; west coast habitats with a coast line of about 3000 km, facing Arabian Sea; and Island Territories with about 1816.6 km coastline. The state of West Bengal has the largest cover (2,097 km²), followed by Gujarat (1103 km²) and the Andaman and Nicobar Islands (604 km²) (8).

As per Government of India report (9) India lost 40% of its mangrove area in the last century (10). A large portion of the mangroves in India were destroyed due to aquaculture and agriculture expansion and by other manmade activities. In India and Bangladesh, about 1,50,000 ha of mangroves were destroyed for agricultural purposes during the past 100 years. Mangroves are destroyed and reclaimed with rain water to reduce the salinity of the soil. Then, these areas were protected from soil water intrusion by forming embankments. After salt is leached from the soil, these areas are used for raising plantations of coconut or paddy. These activities are very common in South Indian states of Goa, Karnataka, and Andhra Pradesh (11,12,13).

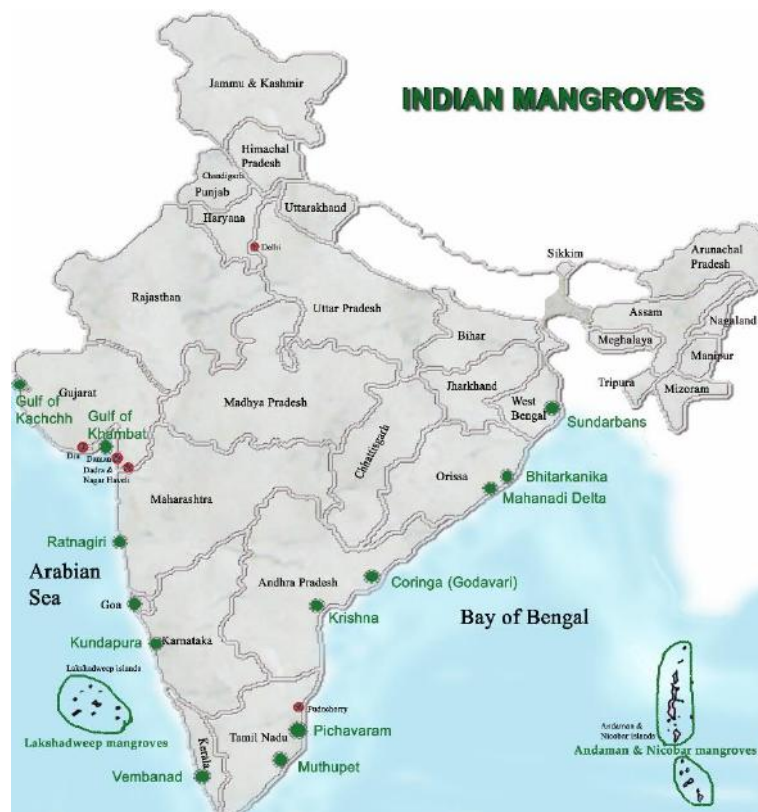


Fig.3 Indian Mangroves (Source- ENVIS Centre, Ministry of Environment & Forest, Govt. of India)

It is important to assess the status and trends of mangroves in India. Further, assessment of mangrove areas at country level is a prerequisite for its restoration, management, and conservation. (14) Mangrove patches in cities such as Mumbai and Kolkata are affected by discharge of large amounts of solid wastes and effluents from various sources. Pollution has made habitats difficult for mangrove survival and growth (15) Maharashtra has a long coastline of about 720 kilometers, which is home to a diverse range of coastal ecosystems such as mangroves, corals, rocky shores, sandy shores, mudflats, etc. The coastal and marine environment not only supports an astounding variety of flora and fauna, but also provides a number of ecosystem services, which are crucial to the sustenance of life and render livelihood security to coastal communities. (16)

According to India State of Forest Report (ISFR), which assesses the forest and tree resources of the country, overall mangrove cover has increased in the Maharashtra state. Mumbai suburbs recorded the highest loss of mangroves among the six coastal districts at 1.08 square km. According to the report, Mumbai city has a mangrove cover of 2 square kilometers. In the Mumbai suburbs, it is spread across 63.22 sq kms -down from 64.30 sq kms in 2019. Across the state, Raigad has the highest concentration of mangroves spread across 126.99 sq kms, an increase of 6 sq. km. from 2019.

In 2019, too, Raigad recorded the highest increase in mangrove cover by 14.97 sq.km from 2017. The second-largest mangrove cover in the state is found in Thane, which has recorded a decrease of 0.98 sq. km. In Sindhudurg, the mangrove cover has dropped by 0.12 sq.km, while Ratnagiri logged an increase of 0.18 sq.km in the past two years. (17)

4. CONCLUSION :

Mangroves are important natural resources which are gifted by nature on this earth. Directly and indirectly, mangroves have numerous benefits for man. Usually, people have used mangroves for the benefit of the local community around the mangroves area. but growing populations have led to an increasing non-sustainable exploitation of the mangrove resources. Day by day this important resource is vanishing at alarming rates with deforestation and development, which not only vanishes this resource but it reduces biodiversity from the mangroves area. Mangrove forest cutting is adversely affecting the coastal area and many people's whose livelihood and survival depend upon these species are also suffering.

Efforts to conserve and restore this important resource is need of today's time. Awareness in local communities about the threats faced by these resources is required.



Proper plan of action to minimize negative effects on these resources and their implementation from the local authorities and from local people are required to save this precious resource.

REFERENCES:

1. <https://ocean.si.edu/ocean-life/plants-algae/mangroves>
2. "Mangal (Mangrove). World Vegetation. Mildred E. Mathias Botanical Garden, University of California at Los Angeles". Botgard.ucla.edu. Archived from the original on 2012-02-09. Retrieved 2012-02-08.
3. <https://www.amnh.org/explore/videos/biodiversity/mangroves-the-roots-of-the-sea/why-mangroves-matter>
4. <https://oceana.org/marine-life/mangrove-forest/>
5. <https://www.aims.gov.au/docs/projectnet/mangroves-uses.html>
6. <https://www.amnh.org/explore/videos/biodiversity/mangroves-the-roots-of-the-sea/mangrove-threats-and-solutions>
7. Naskar KR, Mandal RN (1999) Ecology and Biodiversity of Indian Mangroves. Daya Publishing House, New Delhi, India.
8. FSI (2013) India State of Forest Report 2013, Forest Survey of India, Dehradun, India
9. Govt. of India (1987) Mangrove in India. Status Report, Ministry of Environment & Forest, Govt. of India, pp. 1-150.
10. Kumar R (2000) Distribution of mangroves in Goa. Indian J of Forestry 23:360-365.
11. Bhatt JR, Kathiresan K (2011) Biodiversity of mangrove ecosystems in India. In: Towards conservation and management of mangrove ecosystem in India.
12. Swain PK, Rao NR (2013) Floral diversity and vegetation ecology of mangrove ecosystems in the states of Goa, Karnataka and Andhra Pradesh, India: In Mangroves in India: their biology and uses: 95-110.
13. Tarakanadha B, Singh BT, Rao KS (2013) Coastal vegetation of Nellore district, Andhra Pradesh, East Coast of India: In Mangroves in India: their biology and uses: 233-244.
14. Sahu SC, Suresh HS, Murthy IK, Ravindranath NH (2015) Mangrove Area Assessment in India: Implications of Loss of Mangroves. J Earth Sci Clim Change 6: 280. doi:10.4172/2157-7617.1000280
15. Vyas P (2013) Sundarban Biosphere Reserve, India: Conservation and management of mangrove ecosystem: In: Mangroves in India: their biology and uses, pp.33-56.
16. <https://mangroves.maharashtra.gov.in/Site/1076/About-Us>
17. <https://indianexpress.com/article/cities/mumbai/mangrove-cover-in-maharashtra-improves-marginally-from-2019-7722115/>
18. ENVIS Centre, Ministry of Environment & Forest, Govt. of India, 2nd June 2022. http://www.casmbenvi.nic.in/database/Mangroves_3893.aspx?format=Print