Volume 5 - Issue 12-December,2024
SABUJEEMA
An International Multidisciplinary e-Magazine

Article ID: SIMM0477 Popular Article

Mangroves – A Super hero for Ecosystem

D.Jenisha, V.Ezhilarasi and R.Jeyashakila
TNJFU – Dr.M.G..R. Fisheries College and Research Institute, Ponneri

Open Access

Introduction

Mangroves play a vital role in coastal ecology and in sustaining and securing coastal communities. They reduce the harmful effects of coastal erosion, storms and flooding and are one of the most cost-effective methods of managing disaster risk along coastlines. Mangroves make a critical contribution to climate regulation through carbon capture. Unlike terrestrial forests, which store most of their carbon in the trunk and branches, mangroves store most carbon in their root systems and neighbouring soil – acting as carbon 'sinks', locking it away for generations. Also, unlike terrestrial forests, the risk of fire – and the accompanying loss of stored carbon – is much less likely to occur, making them a safe long-term carbon 'investment'.

Mangrove

The word Mangrove is considered to be combination of the Portuguese word "Mangue" and the English word "grove". The specific regions where these plants occur are termed as "Mangrove ecosystem. "Mangroves are salt-tolerant evergreen forests found in intertidal environments at the land–sea interface. They grow at tropical and subtropical latitudes in areas along sheltered coastlines, shallow-water lagoons, estuaries, rivers and deltas, mainly on soft substrates

Geographic Distribution:

They are commonly found throughout the world between latitudes 32°N and 38°N. According to the report of the World Resources Institute, mangrove covers an area of 1,90,000 to 2,40,000 sq. Km., occupying about an one quarter of the world's coastal line. According to FAO, the estimated total global area of mangroves in 2020 was 1.48 million ha. Mangroves in India spreads over an area of about 4975 sq. km along the coastal states. Sundarbans in West Bengal accounts for a little less than half of the total area under mangroves in India. It is the 1st largest mangrove forest in the world. The Pichavaram mangrove forest near Chidambaram in Tamil Nadu is the world's second largest mangrove forest. Pichavaram mangrove forest is located between two prominent estuaries, the Vellar estuary in North and Coleroon estuary in the South.

Features and Adaptations:

Mangroves are salt-tolerant evergreen forests found in intertidal environments at the land–sea interface. They grow at tropical and subtropical latitudes in areas along sheltered coastlines, shallow-water lagoons, estuaries, rivers and

deltas, mainly on soft substrates. The prop roots of some mangrove species such as *Rhizophora spp.,* or red mangrove and the pneumatophores (unique breathing roots) of others such as *Avicennia spp.,* of black mangrove contain small "breathing" pores called "lenticles". These air space tissues in the cortex called "aerenchyma". The lenticles are inactive during high tide. Healthy mangrove forests are a key for a healthy marine ecology. The stature and composition of mangroves vary according to climate, salinity, topography and the edaphic features of the area in which they exist.

Ecological benefits of mangrove

Forest product

Mangrove wood, which is typically dense and durable, was in high demand in colonial times for ship building and other uses. As the number of large trees in mangrove stands diminished, however, so did the use of mangroves for sawnwood. Nevertheless, mangrove wood is still used as poles for light construction and as fuelwood (either burnt directly or converted to charcoal). Other mangrove forest products include Tannins and Dyes; Pharmaceuticals; Thatch; Sugar and Alcohol (from Nipa palm sap).

Biodiversity support

They are among the world's most productive ecosystems, and their high primary production sustains a rich food web from detritus decomposers to fish, mammals and birds. Mangroves support biodiversity conservation by serving as habitats, spawning grounds, nurseries and sources of nutrients. They host an estimated 341 threatened reptile, amphibian, mammal, fish and bird species.

Supports fisheries

Mangroves play crucial roles in many marine food chains and support the production of a wide range of commercial and non-commercial fish and shellfish. They do so through two main mechanisms: their primary production; and the structure provided by their aerial roots, which creates a physical environment suitable for many fish species. Mangroves can be thought of as "Fish factories" generating very large quantities of commercially important species. They serve as the nursery, feeding and breeding grounds for crabs,prawns, molluscs, finfishes and mammals.The Sundarbans in India and Bangladesh provide a home for globally threatened species including tigers, fishing cats, Gangetic dolphins, Horeshoe crabs. The fishes and seafoods sourced from mangrove ecosystems are oftenrich in essential nutrients,such as protein, omega – 3 fatty acids, vitamins (Eg. Vitamin D and B12) ANDminerals (Eg. Iron and Zinc). Mangroves decrease the risk of predation for many fish species and mangroves can enhance the abundance of fish near coral reefs. Mangroves support the food security and nutrition of coastal communities by providing fish that are widely consumed by these households. The dense tangle of roots in mangroves traps sediment, creating soft soils that are ideal for molluscs and crustaceans to burrow in. Oysters also grow on the roots.

Aquaculture

Mangrove ecosystems play a tremendous role by providing numerous ecological supports that give an impact towards a successful coastal aquaculture activity.The abundance of organisms in the mangroves will benefit the aquaculture product (fish or shrimp) by providing additional nutrients for feeding. After the process of spawning finish, the eggs dispersed all around mangroves and after a certain period of time, they would turn to planktonic larvae. The planktonic larvae would move or carried by currents into other parts of mangroves or in the aquaculture cage in the mangrove area that could be an additional source of food for other aquatic habitats as well as for fish and shrimp in the aquaculture cage. The complex biodiversity of mangroves does not only provide additional food to fish or shrimp in aquaculture ponds, but also provide natural production of larvae and juveniles

Integrated Mangrove Aquaculture (IMA):

Integrated mangrove fisheries farming system- In this system , mangroves are planted inside ponds to stabilize the soil and provide food and nutrients for the aquaculture systems. Mangrove regeneration in aquaculture ponds which is called Integrated Mangrove Aquaculture (IMA) could be a good way to increase mangrove coverage in the shrimp culture areas of southwestern Bangladesh. Integrated mangrove-shrimp cultivation, also known as organic aquaculture, is an option for mangrove restoration to compensate for mangrove area lost through conventional shrimp aquaculture. Shrimp farming with the integration of mangroves is a promising mechanism to reduce blue carbon emissions. Integrated mangrove aquaculture is environment friendly shrimp farming with the incorporation, conservation and restoration of mangrove forests. It is a sustainable farming system where shrimp and other fish species are grown in natural habitat of mangroves.

Ecotourism

Mangrove-based ecotourism is a potentially valuable and sustainable source of income for local communities. Mangrove-related ecotourism activities that can be combined with homestays in nearby villages include exploring mangroves on boardwalks or by boat; observing wildlife; kayaking; and viewing fireflies. Mangroves are also crucial habitat for a number of species of game fish; game fishing can bring significant financial benefits.

Coastal protection and climate-change adaption

The role of mangroves in protecting coastal communities from storms and coastal erosion will be increasingly important as extreme weather events become more intense and frequent due to climate change. Mangroves also offers protection from tsunamis – for example, the Indian Ocean tsunami in 2004 demonstrated the protective role of mangroves and other coastal forests and trees in mitigating disaster risk and enhancing resilience. Mangroves and other coastal forests cannot fully protect against all levels of hazard. The extent of protection they offer depends on factors such as the width and density of vegetation; the diameter of tree

trunks and roots; wave features; land elevation; and underwater topography.

Carbon sequestration

Mangrove forests are highly productive, with carbon production rates equivalent to tropical humid forests. Mangroves allocate proportionally more carbon belowground, and have higher below- to above-ground carbon mass ratios than terrestrial trees. Most mangrove carbon is stored as large pools in soil and dead roots. Mangroves are among the most carbon-rich biomes, containing an average of 937 tC ha-1, facilitating the accumulation of fine particles, and fostering rapid rates of sediment accretion (~5 mm year-1) and carbon burial (174 gC m-2 year-1). Mangroves account for only approximately 1% (13.5 Gt year-1) of carbon sequestration by the world's forests, but as coastal habitats they account for 14% of carbon sequestration by the global ocean.

Threats:

- Large scale clearing: to accommodate human population, agriculture and aquaculture. This has led to forest fragmentation, concomitant loss of animals and destabilization of mangrovedominant shorelines.
- Anthropogenic pollutants, especially nitrogen, are increasingly threatening mangrove ecosystems
- Cyclones, typhoons and strong wave action especially in the geographically vulnerable Andaman and Nicobar Islands.

Conclusion

Mangrove forests are among the most important coastal ecosystems in the tropics and subtropics. These ecosystems sustain an immense diversity of life, support local fisheries, and have economic benefits for nearby regions. Unfortunately, increased human activities within mangrove forests threaten these ecosystems. Urban development, pollution, overexploited fisheries, agriculture, aquaculture, and deforestation all contribute to the loss of mangroves.

References

- https://openknowledge.fao.org/items/477d2ce2-8009-4a8b-96c4-2965595b423e
- Alongi, D.M., 2012. Carbon sequestration in mangrove forests. Carbon management, 3(3), pp.313-322.
- Kumar, J.I.T.E.N.D.R.A., Kumar, V.M.E., Rajanna, K.B., Mahesh, V., Naik, K.A.S., Pandey, A.K., Manjappa, N. And Jag, P., 2014. Ecological benefits of mangrove. Life Sciences Leaflets, 48, pp.85-88.

	
Mangrove	**Ecotourism**