



## Impact of Human Activities on Mangroves Ecosystem

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### ABSTRACT

*Mangroves, also termed as mangal, helps in combating problems caused by climate change. There is an urgent need for conservation and protection of mangroves in coastal zones. The present paper will help in developing strategies to effectively rehabilitate degraded mangrove habitats.*

**Keywords : Mangroves, Coastline, Sundarban**

### Objectives of the Study:

- (1) To understand the causes of destruction of mangroves.
- (2) To highlight the need for conservation of mangroves.



### Introduction:

The distribution of mangrove ecosystem on Indian coastlines indicates that the Sundarban mangroves occupy very large area followed by Andaman-Nicobar Islands and Gulf of Kachchh in Gujarat. Rest of the mangrove ecosystems are comparatively smaller. Over 1,600 plant and 3,700 animal species have been identified from these areas. "MANDATE" is a database on Indian mangroves analysing information from available literature using the specific parameters as have been depicted. Once established, mangrove roots provide an oyster habitat and slow water flow, thereby enhancing sediment deposition in areas where it is already occurring. The fine, anoxic sediments under mangroves act as sinks for a variety of heavy (trace) metals which colloidal particles in the sediments scavenged from the water. Removal of mangroves disturbs these underlying sediments, often creating problems of trace metal contamination of seawater and biota. The mangrove's massive root system is efficient at dissipating wave energy. Likewise, they slow down tidal water enough that its sediment is deposited as the tide comes in, leaving all except fine particles when the tide ebbs. In this way, mangroves build their own environment. However, mangroves' protective value is sometimes overstated. Wave energy is typically low in areas where mangroves grow, so their effect on erosion can only be measured over long periods. Their capacity to limit high-energy wave erosion is limited to events like storm surges and tsunamis. Erosion often occurs on the outer sides

of bends in river channels that wind through mangroves, while new stands of mangroves are appearing on the inner sides where sediment is accreting. The unique ecosystem found in the intricate mesh of mangrove roots offers a quiet marine region for young organisms. In areas where roots are permanently submerged, the organisms they host include algae, barnacles, oysters, sponges, and bryozoans, which all require a hard surface for anchoring while they filter feed. Shrimps and mud lobsters use the muddy bottom as their home. Mangrove crabs mulch the mangrove leaves, adding nutrients to the mangal muds for other bottom feeders. In at least some cases, export of carbon fixed in mangroves is important in coastal food webs. Mangrove plantations in Vietnam, Thailand, the Philippines and India host several commercially important species of fish and crustaceans. Despite restoration efforts, developers and others have removed over half of the world's mangroves in recent times.

### Causes of Mangrove Destruction:

Globally mangroves are destroyed by man made activities, which pose significant threats and they are detailed briefly as follows:

#### (1) Urbanization:

Coastal mangroves have been cleared for human habitation in many areas like Singapore, Jakarta, Bangkok, Rangoon, Kolkata (Calcutta), Mumbai (Bombay), Lagos, Maracaibo, Recife, Free town, Douala etc. In India, Mumbai is one of the best examples for the mangrove destruction due to urbanization. All the seven islands of Mumbai were reclaimed and linked to a continuous landmass after destroying mangroves in the process.

#### (2) Agriculture:

The history of restriction of Sundarbans is nothing but the history of conversion of mangrove forests for agricultural purposes. This reclamation process was initiated in 1770 and it continued till recent past. In the largest delta region of the world, existing between India and Bangladesh, 1,50,000 ha of mangroves were destroyed during the past 100 years, and these were mainly reclaimed for agriculture. The mangrove areas are deforested and reclaimed with rainwater to drain the salt content of the soil and these areas are protected from seawater intrusion by constructing embankments. Once the salt is leached to a sufficient level, the land is cultivated either with paddy or coconut.

#### (3) Aquaculture Practices:

A large scale destruction of mangroves was made for aqua-

culture in several countries. To cite an example, in the Philippines, between 1968 and 1983, 2,37,000 ha of mangroves were lost for pond construction. This is almost half of the total national mangrove area (Fernandez, 1978). One major issue associated with the farms located in mangrove habitats is acidification of pond waters that kills aquatic organisms. In Ecuador, the decline in mangrove areas was largely due to the construction of 21,587 ha of shrimp ponds, compared to only 1,157 ha for urban expansion in 1969-84. In Thailand, around 50% of the total denuded mangrove area of 1,71,472 ha was converted into aquaculture ponds during the period 1961-87. Possible factors responsible for degradation of mangroves and depletion of fishery resources at Pichavaram situated in southeast coast of India. This specific area has already lost 75% its green cover within the last century and about 90% of the forest area is degrading (From Kathiresan, 2000). Over-fishing, reduced fishery resources, low litter and detritus production, stunted growth and destruction of mangroves, tree felling, cattle grazing, cyclone, poor dispersal of propagules, low nutrient supply, high soil salinity, poor supply of fresh water, land use of fresh water, poor supply of sea water, narrow estuarine mouth, stunted growth and destruction of mangroves, poor rainfall, poor flushing, high soil salinity, evaporation, high temperature, solar radiations etc are the reasons. The United Nations Environment Program estimated that shrimp farming causes a quarter of the destruction of mangrove forests.

#### (4) Cutting for Timber, Fuel and Charcoal:

Mangroves are cleared for timber, charcoal and firewood. Because of higher calorific value, the mangrove twigs are used as firewood. The mangrove wood is rich in phenols, and hence is highly resistant to deterioration, and it is widely used as timber for construction purpose. The mangrove wood is highly suitable for chipboard industry and quality paper. As a result, several companies have been established for paper mills and chipboard factories in Indonesia. Within two years, the timber companies obtained timber by clearing 1,37,000 ha of mangroves (Erftemeijer et al., 1989). Every year, over 1,000 tons of mangrove wood cut for fuel wood and to meet timber demands.

#### (5) Prevention of Freshwater Flow and Tidal Flow:

Mangroves are best developed in areas that receive freshwater run off and tidal water flushing. Embankment construction or siltation at the river mouths restricts the inflow of tidal water in mangrove swamps. Dam and barricade constructions in upstream areas for diverting water for irrigation purposes have resulted in poor flow of freshwater into mangrove swamps. The poor flows of tidal and freshwater result in high salinity of mangrove swamps and thus reduce the growth of mangroves. To cite an example, in Colombia, large parts of mangrove forests along the lagoon of Cienaga Grande de Santa Marra, have died within 3 decades (Mastaller, 1989). Another good example is at Pichavaram, south India, where the mangroves are largely dying due to hypersalinity and other associated factors like increasing of temperature, poor precipitation, poor flushing of mangrove soil by tidal waters etc.

#### (6) Oil Pollution:

Oil or gas exploration, petroleum production, and accidents by large oil tankers cause significant damage to mangrove ecosystems. To cite an example, Nigeria's richest oil wells are situated close to inshore where rich mangroves once existed. Similarly oil tanker accidents in the Gulf of Mexico and in the Caribbean areas resulted in oil spillage that severely damages the coastal systems. As a result, the entire mangrove ecosystem got affected, causing defoliation of trees, mortality of all sessile and benthic organisms and contamination of many water fowls. Once the mangrove forest is affected by oil pollution, it will take a long time of at least 10 years for recovery of the forest.

#### (7) Pollution Issues:

Mangrove habitats serve as a dumping ground for solid wastes and for discharging the effluents from various sourc-

es. The best examples of this are from Brazil and Singapore. In India as well, the mangroves that existed in major coastal cities like Kolkata and Mumbai are adversely affected by pollution.

#### (8) War Problems:

The best example for this kind of mangrove destruction occurred in the Vietnam War. During the war period (1962-71), about 71 million liters of defoliant chemicals were sprayed over the coast, that resulted in the destruction of 1,04,000 ha of mangrove forest (Ross, 1974).

#### (9) Mining Operations:

This was a serious problem in countries like Thailand. Until the late 1980's, 4,27,000 hectares along the Thailand coasts in the vicinity of mangrove belts were mined for tin.

#### Need for Mangrove Conservation:

The value of mangroves has gone unrecognized for many years and the mangrove forests are disappearing in many parts of the world. Mangroves help in a great way in order to reduce the GHG effect of climate change and global warming. These impacts are likely to continue, and worsen, as human populations expand further into the mangroves. In regions where mangrove removal has produced significant environmental problems, efforts are underway to launch mangrove agroforestry and agriculture projects. Mangroves can help buffer against Tsunami, cyclones, and other storms.



#### Efforts to Save Mangroves:

One village in Tamil Nadu was protected from Tsunami destruction - the villagers in Nalvedapathy planted 80,244 saplings in order to get into the Guinness Book of World Records. This created a kilometre wide belt of trees of various varieties. When the Tsunami struck, much of the land around the village was flooded, but the village itself suffered minimal damage. Grassroots efforts to save mangroves from development are becoming more popular as the benefits of mangroves become more widely known. In the Bahamas, for example, active efforts to save mangroves are occurring on the islands of Bimini and Great Guana Cay. In Trinidad and Tobago as well, efforts are underway to protect a mangrove threatened by the construction of a steelmill and a port. In Thailand, community management has been effective in restoring damaged mangroves.

#### Conclusion:

Mangrove systems require intensive care to save threatened areas. So far, conservation and management efforts lag behind the destruction; there is still much to learn about proper management and sustainable harvesting of mangrove forests (Kathiresan and Bingham, 2001). Even where efforts have been made to slow the destruction, remaining forests have a number of problems. In some areas, the health and productivity of the forests have declined significantly. The causes of these tragic losses differ from habitat to habitat but are generally tied directly or indirectly to human activities. Individual study is required to determine the most effective remedial

measures. Where degraded areas are being regenerated, continued monitoring and thorough assessment must be done to help us understand the recovery process (van Speybroeck, 1992). Conservation of mangroves to be successful needs participatory approach from the local community, government, stakeholders and NGOs.

## REFERENCES

1. Drunen, M. A., Climate Change in Developing Countries
  2. Beniston, M., Climatic Change and its Impacts - An overview
  3. Barrie Pittock, Climate Change - Turning up the heat
  4. Hardy, John T., Climate Change - Causes, Effects, and Solutions
  5. Löschel, Andreas, Climate Change Policy and Global Trade
  6. Anil Markandya and Kirsten Halsnaes, Climate Change and Sustainable Development: Prospects for Developing Countries
  7. Pugh, David, Changing Sea Levels - Effects of Tides, Weather and Climate
  8. Steffen, W., Jäger, J., Carson, D. J., Bradshaw, C., Challenges of a Changing Earth
  9. Morris, Dick, Changing Environments
  10. Munn, Ted, Encyclopedia of Global Environmental Change
  11. Richard Loulou, Jean-Philippe Waaub and Georges Zaccour, Energy and Environment
  12. M. Santamouris, Energy and Climate in the Urban Built Environment
  13. Steffen, W., Sanderson, A., Tyson, P., Jäger, J., Matson, P., Moore III, B., Oldfield, F., Richardson, K., Schellnhuber, H.J., Turner II, B.L., Wasson, R.J., Global Change and the Earth System
  14. Harris, Frances, Global Environmental Issues
  15. John T. Houghton, Global Warming -The Complete Briefing
- WEBLIOGRAPHY  
1. www.teriin.org 2. www.ipcc.ch 3. www.iea.org 4. unfccc.int 5. www.bbc.co.uk/climate/impact/flooding.shtml 6. www.unep.org/climatechange 7. www.climatechange.com.au