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MANGROVES FOR LIVELIHOOD AND COASTAL PROTECTION

The ecotones between aquatic and terrestrial environments are unique habitats. The ecosystem includes mainly mangroves, estuaries and other wetlands. Mangroves dominate the coastal areas in tropical countries, they also represent rich and diverse living resources and are essential to both economy and protection of coastal areas. Mangroves have a world wide circum-tropical distribution, the highest concentration being located in the Indo-pacific region. These wetlands dominate almost 1/4 of world's tropical coastline. The total mangroves in the world span thirty countries including various island nations with an area of about 18.15 million ha. In 1960, the total area of the Indian mangroves was estimated as 6,81,976 ha in which nearly 45% was in Sunderbans in West Bengal. A recent survey shows the total area of Indian mangroves as 4,37,400 ha which include the Andaman and Nicobar islands. Despite the benefits that they provide, deforestation and over exploitation have resulted in the formation of open marshy lands and shrinkage of this wetland ecosystem throughout the world.

Recent survey on the biodiversity of selected Indian mangroves revealed depletion and almost extinction of several economically important species especially among finfish and crustaceans. The existing biota comprised 153 species of plants which include 36 true mangroves and rest associates, 77 species of micro-algae dominated by diatoms, 125 species of zooplankton including larvae/spawn/fry of ichthyofauna, 242 species of finfish, 98 species of crustacea, 70 species of shell fish, 10 species of reptiles, 4 species of amphibia, 57 species of birds and 30 species of mammals.

The uses and advantages which mangroves provide are varied. The heterogenous assemblage of flora and fauna are highly tolerant to the vagaries of nature, especially the fluctuations of abiotic parameters in the ecosystem. The macrophytic vegetation is the pivotal component of the mangrove biota. The gregarious growth of true mangroves and other bio-invasive plants substantially provide cool shade, stable and humid conditions that are favourable for arboreal, epifaunal and infaunal organisms. Though belonging to various families, the mangrove vegetations possess discernible similarity in their physiological characteristics and structural adaptations. The vegetation comprises of species such as *Sonneratia*, *Avicennia* with widest trunk and spreading crown and *Bruguiera* and *Rhizophora* along with less spreading crown that together covers the top canopy of the forest. The shrubs and small trees such as *Aegiceras*, *Aegilotis*, *Acrostichum* etc. and the saline tolerant terrestrial species like

Calophyllum sp. *Thespesia*, *Pandanus*, *Casuirina* etc. contribute to the diversification of mangrove forest. These halophytes exhibit wide tolerance to salinity and possess thick cuticle layered leaves, large mucilage cells, salt glands, viviparous germination, pneumatophores, buttress, silt, prop and knee roots as adaptations to survive in the most inhospitable and un-predictive environment. The tangled mass of roots provides safe havens and refuge for spawn, fry, fingerlings and juveniles of many species of finfish, shellfish and crustaceans. Rich productivity is achieved by these plants by a huge amount of litter fall, algal colonization besides derivation of detritus. Thus the mangrove forests perform multiple ecological functions.

Mangroves are the breeding, nursery, feeding and refuge ground for a wide array of ichthyofauna. To sum up, these wetland ecosystems are among the most productive and diverse in the world and more than 80% of the marine catches are directly or indirectly dependent on mangroves and other coastal aquatic ecosystems. Many artisanal fisheries thrive on mangroves and estuaries in several parts of the world.

Mangroves serve as natural barriers against the intrusion of the sea and dissipate wave action, mitigate the impact of storms, cyclones and prevent soil erosion. The network of root system helps in binding the nutrient laden soil from the uplands, which otherwise find their way to the sea. Probably, the mangroves are the best bio-shield for coastal stabilization by preventing sea encroachment and definitely it can reduce the impact of natural calamity such as the devastating tsunami waves, besides accretion of sediments to form mud banks and new lands to meet the challenge of sea level rise due to global warming.

Mangrove forests have survived natural phenomena such as storms, cyclones, tsunamis but not the destructive greed of man. Anthropogenic activities have been increased manifold in the mangroves and coastal zone is home for 65% of the global population. It provides native population with a seemingly endless variety of derived products such as timber, thatching materials, charcoal, medicine, animal fodder, besides bird's egg, honey, edible fruits, tuber crops from forest and fish in addition to other similar edible organisms from the aquatic areas. They not only strengthen the economy of coastal population but also provide the habitats for the diverse marine and terrestrial biota. It has great resilience with the ability to rejuvenate and restore itself after wanton destruction, as long as seeds are available and tidal flow maintained. The population pressure and the lack of awareness over the alarming depletion of the mangroves (Contd...)

through gratuitous deterioration have led to the apprehension that, whether these seashore forests, which provide a green belt protection for coastal areas and vital habitat for a multiple biocoenosis, would soon become extinct. The shrinking of mangroves is a cause of serious environmental and economic concern to many third world countries. Nevertheless, there is growing awareness among coastal inhabitants, especially due to severe cyclonic storms, tsunamis and also because of the linkages between the mangrove forest and sustainable fisheries. Therefore,

the mangrove ecosystem security has to be linked with the livelihood security of people around the mangroves.

Reclamation of degraded mangroves by afforestation and other rehabilitation/restoration procedures and application of proper management measures for conservation of this productive natural wealth must be taken urgently with the active participation of coastal communities before these wetland ecosystems disappear from the face of the earth.