MANGROVES AND ITS IMPORTANCE TO FISHERIES

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Introduction:

Mangroves act as a buffer zone between sea and shore, protecting the shore from erosion and also plays a valuable role as a shield from disasters like cyclone and tsunami. The ecological significance of mangroves in many tropical countries has been qualitatively well documented and recognized. Mangroves are the breeding and nursery grounds for many wildlife species including many fishes, crustaceans and mollusc population. Thus the habitat loss of this unique ecosystem has direct repercussions in the fishery of the region.

Litter fall, Litter Decomposition and Nutrient leaching

Mangroves shed and drop about seven and a half tons of leaf litter per acre per year. Litter fall quantity is a valuable index of mangrove productivity since it is a major fraction of mangrove net productivity which supports aquatic organism (Bunt et al, 1979).Mangrove leaves, wood, propagules, flowers, bracts, and other organic materials fall continuously to the intertidal forest floor. These leaves and other litter cannot be digested by herbivores and are thus unavailable nutrient sources for higher trophic levels. When bacteria and fungi metabolize the leaf litter, however, it releases nutrients via a pathway that has been called the detrital food loop. The detritus is eaten by shrimp, mullet, and numerous organisms within the mangrove prop root community and thus passed into the food web.

The dissolved organic matter (DOM) is produced due to the decay of the litter and the recycling of the leached nutrients reaches the mangrove floor and the adjoining habitats. Thus the nutrient contribution in clear tropical waters is enormous as the concentrations are usually on the lower range. The role of grapsid crabs in burrowing affects soil aeration which in turn affects the productivity and reproductive output of *Rhizophora*. (Smith et al,1991)

Supporting the fishery:

The mangrove areas have shallow water levels, warm water temperatures due to various decaying activities and the water flow is slow and hence ideal place for growing of algae and for spawning for fish and marine animals. They are breeding, feeding and

nursery grounds for many estuarine and marine organisms. The penaeid prawn life cycle involves the estuarine or nearshore habitat phase in the postlarvae to juvenile where they spend 6-20 weeks and then emigrate to offshore where they breed. The mangroves are the nursery grounds for most of the penaeid prawns. Mangroves provide nursery habitat for many wildlife species, including commercial fish and crustaceans, and thus contribute to sustaining the local abundance of fish and shellfish populations (Lal, 1990). In Selangor, Malaysia 119 species were recorded as associated with mangrove ecosystems while 83 species were recorded in Kenya, 133 from Queensland Australia, 59 species in Puerto Rico and 128 from the Philippines (Chong,1990). In the Pichavaram mangroves alone nurture 30 species of prawns, 30 species of crabs, 20 species of mollusks, and 200 species of fish were recorded (Kathiresan, 2000). Seventy-five percent of the game fish and ninety percent of the commercial species in South Florida are dependent on mangrove ecosystems (Law and Pyrell,2006).

In the mangrove area the fishery is dominated by detritivorous species of fishes, crabs, crustaceans and molluscs. Nearly 80% of the fish catches are directly or indirectly dependent on mangrove and other coastal ecosystems worldwide (Kjerfve & Macintosh, 1997). Some of the most common fishes in Indian mangrove waters are Liza, Mugil, Lates, *Lutjanus* sp, *Hilsa* sp, *Etroplus suratensis* etc. A special group of fish species found abundantly in the mangroves are the mudskippers (Family Periopthalmidae) which are physiologically and morphologically adapted to an amphibious existence in this intertidal zone with variable environmental conditions. (Clayton, 1993). Prawns are represented by the species of Penaeus and Metapenaeus while the crabs are represented mainly by *Scylla serrata*. The molluscans of mangrove waters are mainly represented by *Crassostrea madrasensis*, *Gelonia* sp and the gastropod *Cerethedia* sp.

Mangroves provide two noticeable facilities for fishes. The aerial roots establish a protected habitat for larvae and early juveniles and secondly the litter fall forms the source for the detrital food web on which many fish depend. The fish larvae in the marine plankton when it meets a suitable habitat will metamorphose into their juvenile forms within mangrove and seagrass habitats and thus recruits to the fishery. As juveniles grow into young adults they often continue to forage in mangrove and sea grass communities, until final migration back to open reef environments, where they will spawn and renew the cycle.

Mangrove and coastal aquaculture:

Many methods of mariculture have been practised in the mangroves areas which included the botton culture of bivalves and seaweeds in the open bays, floating cages and pen culture, raft, stakes and cultch for mussels, oysters and seaweeds in the open bays and estuaries, pond culture of finfishes and prawns in the intertidal region and shore based fish and prawn hatcheries close to mangrove areas. Many of these have very limited adverse impacts on the mangroves as these were practised for centuries and were sustainable and thus providing sustainable livelihood for rural populations. The

major issues were concerned with the clearing of the mangroves for construction of ponds and other infrastructure.(FAO,2000).

In the coastal area of the Mekong delta of Vietnam, the area of mangrove has depleted from 190,812 ha in 1953 to 29,534 ha in 1995, and during the 42 years period 161,277.5 ha of mangrove forest have been destroyed for shrimp farming and other activities (Minh *et al*, 2001)

The traditional tidal prawn ponds known as *tambaks* in Indonesia which traped fish and prawn seeds in mangrove areas are similar to the pokkali ponds of Kerala. Later these ponds were converted to intensive form of cultivation. Mangrove soils being acid sulphate soils are mostly not favourable for mariculture. Hence many countries have prohibited the conversion of these inter tidal mangrove into pond culture.

Sediment trap:

Studying the Ba Lat estuary of the Red River, Vietnam it was observed that the bare mud bank of an estuary is highly dynamic until mangroves cover it. Sediment delivery to the vegetated zones is low but the protective effect of vegetation against erosion by waves and currents is strong. This results in small sustained long term accretion. (Van Santen et al 2007).The mangrove traps debris and silt, stabilizing the near shore environment and clarifying adjacent open water, which facilitates photosynthesis in marine plants. This process helps in supply of clean and nutrient rich water for the associated ecosystems like coral reefs, seaweeds and sea grass beds. Thus the mangroves play an important role in stabilization of the shoreline and prevention of shore erosion. The dense network of prop roots, pneumatophores and stilt roots give mechanical support to the plant and also trap the sediments.

The mangroves have specially-adapted aerial roots and salt-filtering tap roots that enable these trees to occupy the fluctuating intertidal zones where other plants cannot survive. These resilient forests are literally living in two worlds at once. They connect between sea and land, playing an invaluable role in protecting coastal areas from erosion, storm damage and flooding. Thousands of kilometres of tropical and sub-tropical coastline are stabilized by their interwoven roots giving shelter to myriads of fauna and flora forming a unique biome in the process.

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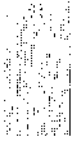

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