

Information Brief on Mangroves in Sri Lanka



Introduction

Mangrove ecosystems played a vital role in buffering the force of the tsunami waves and in protecting the human inhabitations. Even before the Tsunami, Sri Lanka has been experiencing rapid loss of mangrove ecosystems mainly due to anthropogenic factors including unprecedented growth of the tourism sector. In addition to the provision of ecosystem functions, the mangroves are instrumental in supporting the livelihoods of the local coastal communities. These mangrove systems also perform vital hydrological functions and serve as breeding grounds for fish & other marine species.



Almost 40% of the world's mangroves are concentrated in Asia, the region also has accounted for the highest loss of mangrove area over the last decade. The mangrove systems covering an area of 6000-7000 ha are interspersed along the coastline of Sri Lanka. The largest mangrove system is located in Puttalam Lagoon – Dutch Bay – Portugal Bay complex and covers an area of 3385 ha. The other large concentrations are in Batticaloa and Trincomalee districts. The mangrove forests in Bentota are highly threatened as a result of unchecked growth of the tourism sector.



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In spite of the known ecological and economic value of mangroves there has been indiscriminate exploitation of mangroves for commercial, industrial, housing needs mainly due to the lack of knowledge of the ecological role of the mangroves amongst the decision-makers. Until recent times, mangrove areas have received very little or no attention in terms of their conservation or sustainable management. As a result, most of the mangrove areas have been lost due to indiscriminate clearing and reclamation for industrial, urban, tourist resorts, roads, aquaculture ponds, and fishing ports development. Although the legal jurisdiction of the mangrove ecosystem falls under the Forest Department, Department of Wildlife Conservation, and the Coast Conservation Department, there is inadequate legal protection for mangroves in the country.

Ecological Value

Mangrove ecosystems suffer constant exposure to conditions of high salinity, low oxygen, strong winds, and high light intensity. Although the mangrove ecosystem is exposed to the hostile environmental conditions, it is one of the most productive wetland ecosystems in Sri Lanka. In order to survive in these harsh conditions, mangroves have developed remarkable adaptations to survive, and provide shelter for other mangrove associate organisms. Some of these adaptations are: the aerial roots for absorbing atmospheric oxygen; prop; buttress; and knee root system to anchor in soft soil, and “viviparity” of seed germinations. . Viviparous plants have a unique adaptation to allow seeds to grow until young roots and shoots are formed while attached to the parent plant.

Viviparity may have evolved as an adaptive mechanism to prepare the seedlings for long-distance dispersal, and survival and growth within a harsh saline environment. During this viviparous development, the propagules are nourished on the parent tree, thus accumulating the carbohydrates and other compounds required for later autonomous growth. The structural complexity achieved by the seedlings at this early stage of plant development helps acclimatize the seedlings to extreme physical conditions which otherwise might preclude normal seed germination



Mangrove Biodiversity

Mangroves represent a rich and diverse natural resource. Mangroves are home to many uniquely adapted biodiversity. The mangrove ecosystems play a key role by being a connecting link between marine and terrestrial ecosystems. This link will provide the maintenance of the stability, not only to the mangrove habitats itself, but also to the other related coastal ecosystems, such as sea grass beds, coral reefs.

This ecosystem plays a significant role in replenishing various fish population for the coastal and lagoon fish industry. The nutrients given to the lagoon as detritus from the mangrove ecosystem is carried in to the coastal waters by the tidal currents. They become food for marine microorganisms, which is the first step of the marine food chain. The shallow inter-tidal reaches that characterize the mangrove wetlands offer refuge and nursery grounds for juvenile fish, crabs, shrimps, and mollusks.

Mangroves are also prime nesting and migratory sites for hundreds of bird species. Additionally, Monkeys, Fishing cats, water monitor, Sea Turtles, and Mud-skipper fish utilize the mangrove wetlands.

This unique ecosystem is home to over 20 true mangrove species of Sri Lanka. The major genera that represent these species are *Avicennia*, *Rhizophora*, *Bruguiera*, and *Sonneratia*. According to mangrove abundance and distribution, they can be categorized as very common, common, and rare; the very common species of Sri Lankan mangroves are *Avicennia marina*, *Bruguiera gymnorrhiza*, *Excoecaria aggalocha*, *Lumnitzera racemosa*, *Rhizophora mucronata*, *Rhizophora apiculata*, and *Sonneratia caseolaris*.

The very common species appear to grow under a wide range of soil and hydrological conditions, and are widely distributed in Sri Lanka indicating that they are the most appropriate species for mangrove reforestation. The common category of mangrove species represent *Aegiceras corniculatum*, *Avicennia officinalis*, *Bruguiera cylindrica*, *Bruguiera sexangula*, *Ceriops tagal*, *Heretiera littoralis*, *Pemphis acidula*, *Sonneratia alba*, *Nypa fruticans*. Although these species are widely distributed in Sri Lanka, they are low in abundance. There are few species of mangroves categorized as rare species since they are in low abundance and restricted to few locations in Sri Lanka. The rare species of mangrove namely *Lumnitzera littorea*, *Xylocarpus granatum*, and *Scyphiphora hydrophyllaceae* in Sri Lanka.



Mangroves represent unique ecological niche for many species of terrestrial fauna. Most attractive animals in the mangroves are many species of water and shore birds. Mangrove forests support animal population of considerable size and variety. The mangrove fauna represent almost all the phyla, ranging from simple protozoa to birds, reptiles and mammals. Some of these mangrove fauna spend at least part of their life in the mangrove ecosystem. Species composition and the diversity of mangrove fauna are not comprehensively studied in Sri Lanka.

There are five species of mangrove associated crabs, and five prawn species that have been identified. The mud lobster (*Thalassina anomala*) is unique to the mangrove environment. These burrowing lobster mounds can easily be observed in the mangrove habitats. Birds are the most attractive vertebrates associated with this mangrove ecosystem. The most common resident bird species that can be observed in the mangrove habitats include herons, egrets, cormorants, teals, waders, kingfishers and terns that feed on aquatic organisms.

The Water Monitor (*Varanus salvator*) is the most common reptile in mangroves. The two species of crocodiles, Estuarine Crocodile (*Crocodylus porosus*) and Mugger Crocodile (*Crocodylus palustris*) also occurs in mangroves in Sri Lanka. Among the other common reptiles in the mangroves are, the Common Bronzeback (*Dendrelaphis tristis*), Checkered Keelback (*Xenochrophis piscator*), and common garden lizard (*Calotes calotes*).

The noteworthy mammals that are associated with mangroves include Purple-faced Leaf Monkey (*Trachypithecus vetulus*), Sri Lanka Golden Palm Cat (*Paradoxurus zeylonensis*) and the Sri Lanka Slender Loris (*Loris tardigradus*). The mangrove habitats also serve as important refuge for carnivorous mammals such as Fishing Cat (*Prionailurus viverrinus*), and Eurasian Otter (*Lutra lutra*). Apart from these mammals, a few species of bats and shrews are also commonly found with the former playing a key role in mangrove pollination as well. The mangrove associated fishes are a very important part of the mangrove biodiversity.



There are 3 major types of fishes in mangrove areas; freshwater forms, brackish water forms, and marine-brackish migratory species. The typical freshwater species included Striped Rasbora (*Rasbora daniconius*), Giant Danio (*Danio malabaricus*), Horadandiya (*Horadandiya athukorali*), Barbs (*Puntius* spp.) and the Walking Catfish (*Clarias brachysoma*). These species can be observed in the relatively low salinity zones, due to the inflow of freshwater from the streams. Typical brackish water forms include ambassids (*Ambassis* spp.), Pony fish (*Leiognathus* spp.), Mono (*Monodactylus argenteus*), Target fish (*Therapon jabua*), Mud skipper (*Periophthalmus koelreuteri*) and the Milk fish (*Chanos chanos*). Mangroves are home to few species of migratory species including both “catadromous” species (species that migrate from fresh to marine habitats for reproduction) and “anadromous” species (marine species which move into brackish/fresh water for spawning or to spend their juvenile period). A typical catadromous species is the Short-finned Eel (*Anguilla bicolor*), while anadromous species include the Snappers (*Lutjanus* spp.), Trevally (*Caranx* spp.), Silver Beddy (*Gerres* spp.), Surgeon fish (*Acanthurus* spp.) and Barracuda (*Sphyraena* spp.).

Mangrove Degradation

One of the most recent and significant causes of mangrove forest loss in the past decade has been the consumer demand for luxury shrimp, or "prawns", and the corresponding expansion of destructive production methods of export-oriented industrial shrimp aquaculture. Vast tracts of mangrove forests have been cleared to make way for the establishment of coastal shrimp farming facilities, especially in the north western coastal belt in Sri Lanka. One tragic irony of industrial shrimp aquaculture is that the process requires clean water, yet it has become a source of severe water pollution. The often unrestricted use of chemical inputs, such as antibiotics, pesticides and water additives, when combined with the buildup on the pond bottoms of unused feeds and feces, has led to epidemic shrimp diseases and many early pond closures because of harmful accumulation of toxic effluents.

The lucrative earnings of shrimp culture are short-lived, while the real costs in terms of consequent environmental damage and social disruption are long-term. While the immediate profits from shrimp farming may satisfy a few, vast numbers of coastal residents, once dependent on healthy coastal ecosystems for fishing and farming, are being displaced and impoverished.

Expansion of human settlements in mangrove areas is wide spread, and covers the entire coastal belt of Sri Lanka. These human settlement areas consist mainly of permanent and semi permanent fishing villages. Human settlement expansions also directly contribute to the pollution of mangrove ecosystem mainly through releasing untreated waste and waste disposal. A significant amount of mangrove areas have been reclaimed for tourism expansion and agriculture purposes. Small percentage of mangrove lands experience illegal encroachment by the coastal communities. Often at times, authorities are reluctant to enforce law and order due to the social and economic state of the encroachers. Some authorities seldom understand the existing policies related to conservation of mangrove ecosystems in Sri Lanka.

Conservation of Mangroves

Mangroves are resistant to small degree of disturbances, and are very sensitive to deforestation, pollution, and land reclamation. There has been significant reduction of mangrove ecosystems in the past two decades due to various reasons. This reduction is caused by the increasing non-sustainable human activities in and around the mangrove habitats. Aquaculture, agricultural expansion, urbanization, unregulated discharge of pollutants, unregulated waste disposal, and illegal encroachments are some of the major threats to this unique ecosystem. Today, the mangrove ecosystem is facing serious threats from development pressure, and there is a national need to conserve these sensitive ecosystems. National effort is required to increase the public awareness to conserve the mangrove habitat, and its unique biodiversity.



Mangrove restoration

It is clear that in the aftermath of the tsunami, loss and degradation of this vital coastal ecosystem impacts heavily on the livelihoods of the coastal communities. The estimation of the extent of mangrove ecosystem damage due to the tsunami has not been completed by the authorities with the eastern and the southern coastal mangroves being considerably devastated. Even though much of the restoration information is not available on mangroves of Sri Lanka, there are many NGO's and other local institutions that are conducting localized small scale mangrove restoration activities with the aid of funding from external donor agencies.

Restoration of mangroves means bringing back mangrove habitats in the areas where it existed before. However, when compared to the other plantations, mangrove plants need special environmental conditions to grow. Although many methodologies have been developed to restore the mangrove ecosystem, it is vital to modify those methods to the site specific requirements.

The community based restoration approach has been widely used in restoring mangroves. Local communities engaged in fishing activities that are located around the mangrove areas are generally aware of the importance of mangroves as they are dependant on the mangroves for the provision of goods and services. The selection of the local community based organization should be based on capacity of these organization to handle projects of this nature, membership strength, good representation of women members and their experience in working with government agencies, such as Department of Wildlife Conservation, Forest Department, and the Coast Conservation Department.

The capacity building on ecosystem restoration and project implementation of the implementing agency is vital for the success of the restoration activities.

The strengthened capacity of representative organization of the local communities will ensure that they are more aware of the inter-relationships between mangrove ecosystems and their lives, enhance their success rate of planting mangroves, and being able to serve as best practice examples and transfer their knowledge to other communities in the area and elsewhere.. The involvement of women in mangrove restoration and ecosystem restoration work is an empowerment effort as it provides them economic opportunities that further enhance their bargaining power in the context of the society at large. The youth need to be integrated into mangrove restoration related work as they need to be part of a process of defining a more sustainable future with enhanced ecosystems and improved livelihoods based on mangrove and ecosystem reliance.

