at Yeratta having a stretch of 350 mtrs. of bench walk passing through the natural mangrove forest. This Mangrove Bench Walk which is an important tourist attraction gives the visitors a fantastic feel of mangroves.

To appreciate and enjoy the diversity of mangroves of Andamans one should not miss the Dhaninallah Mangrove Nature Walk, which is located at Betapur (aprx. 22 kms. from Rangat) having a walk way of 712 metres length one of the longest board walks in the country.

THE VALUE DYNAMICS OF MANGROVES

**Total Economic Value**

- Use Value
  - Direct use
  - Indirect use
- Option use value
- Non use value
  - Bequest Value
  - Existence Value

- Goods
  - Fish
  - Prawns
  - Crabs
- Services
  - Flood Control
  - Storm Protection
  - Tsunami Protection
  - Eternam Support
- Future Personal Recreation
- Nature Preservation
- Biodiversity Preservation

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The information provided in the brochure is taken from the booklet


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MANGROVES OF ANDAMAN AND NICOBAR ISLANDS

Mangroves are salt-tolerant forest ecosystems found mainly in tropical and sub-tropical inter-tidal regions of the world. They are trees or shrubs that have the common trait of growing in shallow and muddy salt water or brackish waters, especially along quiet shorelines and in estuaries. They exhibit remarkable capacity for salt water tolerance. Typically they produce tangled masses of arching roots that are exposed during low tides. Some mangrove roots extend above the water in the form of specialized vertical branches, called pneumatophores, which act as aerating organs and therefore are also known as respiratory roots. Among mangroves, there are some that prefer a daily tidal wash while others find their optimum conditions in shallow areas subject to occasional high tides. This process governs their distribution. Mangroves do not appear on sandy beaches and rocky shores. A muddy substratum of varying depth and consistency is necessary for their growth. They are rarely found near the open sea or mouth of an estuary, but abundantly found in sheltered places like creeks and estuaries. The eco-system is highly fragile, subjected to long duration of intrusion as well as incessant physiological and morphological stresses, salinity effect, aeration and onslaught of wave action.

SALIENT FEATURES OF MANGROVES

- Mangroves are practically evergreen with thick leathery leaves designed to minimize transpiration.
- Root system is adapted to the peculiar conditions found in the mangrove forests such as stilts roots in Rhizophora and knee roots in Bruguiera. Pneumatophores (breathing roots) are seen in profusion in Sonneratia and Avicennia.
- Viviparous germination where the seed germinates while still on the tree and falls down in the germinating condition with a long radicle - a characteristic of Rhizophoraceae.

STATUS OF MANGROVES OF THESE ISLANDS

Total area under mangrove vegetation in India is 4639 sq.km. as per the latest estimate of the Forest Survey of India (2009). Out of this, 615 sq.km. area of mangrove vegetation occur in Andaman & Nicobar Islands. In Andaman group of Islands alone, area under mangroves is 612 sq.kms., while in Nicobar group of Island mangroves occupy only 3 sq.kms. Area wise, A & N Islands are third in the country after West Bengal and Gujarat, but as far as density and growth are concerned, mangroves of these islands are probably the best in the country. The mangrove vegetation of these islands constitutes 7.5% of the land area or 6.6% of the total forest area. Mangroves occurring in these islands are mostly fringing the creeks, backwater and muddy shores. Along the creeks, the width range from 0.5 km to 1 km. At places, this salt tolerant community is found on rocky shores subjected to tidal action and regular deposits of mud. Luxuriant mangroves can be seen in Shoa Bay (South Andaman), Yerrataa (Middle Andaman) and in Austin Creek (Mayabunder).

IMPORTANT MANGROVE SPECIES OF A & N ISLANDS

About 60 species of mangroves occur throughout the world. Asia is the richest region of mangrove species diversity with 44 species reported to occur. As per available information from various sources 24 tree species, 60 shrubs, 1 climber and 2 species of palms and ferns each belonging to 17 genera are reported to occur in the mangrove ecosystem of these islands. Important mangrove species found in these islands include:

- Rhizophora Muconata, Bruguiera Gymnorhiza, Avicennia Officinalis, Ceriops Tagal, Sonneratia Caseolaris, Excoecaria Agalocha, Aegiceras Comunclatum, Nypa Fruticans
- Rhizophora Apiculata, Bruguiera Parviflora, Avicennia Marina, Heritiera Litoralis, Sonneratia Aba, Xylocarpus Granatum, Scophiphora Hydrophyllacea, Acanthus Ilicifolius.
MANGROVE FAUNA

Mangrove fauna is generally represented by aquatic, semi-aquatic and terrestrial communities adapted at stress conditions. As many as 8 species of mammals, 53 species of birds, 7 species of reptiles, 3 species of amphibians, 253 species of fish, 13 species of polychaetes, 410 species of arthropods and 53 species of meiofauna are reported from the mangroves of Andaman & Nicobar Islands.

Salt-water Crocodile

Mud Skipper

ZONATION

In general, the following 03 conspicuous zones are identified:

1. Proximal Zone
   This zone is towards water front, subject to regular tidal effect where intensity of soil accumulation and inundation is a continuous process. The mangrove species in this zone are specially adapted with stilt roots and prop roots for stability and anchorage. Main species with these features are Rhizophora apiculata and Rhizophora mucronata. On rocky and reef substrata, Avicennia, Sonneratia caseolaris are also found. Both Avicennia and Sonneratia produce pneumatophores.

2. Middle Zone
   Above the Rhizophora/Avicennia line luxuriant group of Bruguiera gymnorrhiza, Bruguiera cylindrica, Lumnitzera racemosa, L. littoralis, Ceriops tagal and Aegiceras corniculatum occur. Soil formation in the Core Zone is congenial for mangrove growth wherein the trees attain a height of 10-15 metres in compact blocks. Ceriops and Bruguiera develop a strong hold fast in the form of knee roots or bent roots as a special adaptation for supporting the erect bole.

3. Distal Zone
   Towards island area mangroves like Excoecaria agallocha, trees like Heritiera littoralis and Xylocarpus spp., in association with Phoenix paludosa, Nypa fruticans, Acanthus ilicifolius and ferns like Acrostichum aureum occur; the latter occurring precariously in thick patches. Both Heritiera and Xylocarpus produce buttresses and help in containing soil in their cavities. Generally the salinity is on lower side in this Zone occurring towards hill sides where run off of fresh water is for a prolonged period. The duration of tidal submersion is low in this Zone compared to water front mangroves.

SIGNIFICANCE OF MANGROVES:

- Being living resources, mangroves are self-maintaining and renewable. For example as a coastal protection barrier, mangroves maintain themselves at no cost and in the event of tropical storm, the damages sustained will be self repaired without costs. Similarly both the direct and indirect harvest of products from mangroves are renewable, yet the mangrove resource is renewable only if the ecological processes governing the system are maintained.

- The leaf fall from the mangrove trees also contributes substantially to formation of detritus which supports coastal fisheries.

- Mangroves constitute a unique habitat for wild animals and birds. They provide nesting and breeding places for birds.

- Mangroves provide breeding grounds for fish & other marine animals.

- Mangroves serve as potential recreation site for fishing, boating, bird watching, sightseeing and photography. This has special significance for the Andaman & Nicobar Islands having immense tourism potential.

- Mangroves provide vast scope for scientific and socio-economic studies.
THREATS

Extraction of mangrove fuel and land development including agriculture has contributed to extensive damage of mangroves in some areas. Although damage to mangrove ecosystem from insecticides and pesticides used in agriculture and their run off, deliberate and operational discharges from ships, oil spills due to accidents and industrial outflows are not reported in the islands, but these have caused extensive damage to mangrove ecosystem in other areas. Mangroves are traditionally used for aquaculture. There is tremendous demand for mangrove fish in international market. The prospectus of potentially quick economic gains have caused a rapid rate of clearing of mangroves for development of brackish water fish products. Excessive exploitation of mangroves could, result in lower litter production and consequently could affect productivity of coastal fisheries.

CONSERVATION & MANAGEMENT OF MANGROVES

Chengappa, in 1961 had estimated that Bruguiera species constitutes about 26 to 30% of mangrove area of South and Middle Andaman Division. He prescribed clear felling and selection-felling of Bruguiera trees along with other natural mangrove trees. Although no systematic working of mangroves was followed in the subsequent years, a small area was worked in North and South Andamans under selection system by removal of marked trees. Later shelterwood system was adopted in which 40 well formed Rhizophora and Bruguiera poles per hectare were left out as standard uniformly spaced. Precautionary measures were also taken to leave protection belt of 20 metres width along the main creek on either side and 10 metres width along the smaller creek on either side to guard against sea erosion. Brush wood barriers across the creeks were also left to hold the seeds of mangrove species from getting washed away with the tides.

In the past the mangrove forests were worked for extraction of fuelwood around Port Blair to meet the domestic requirement of the people. The Andaman Timber Industries and Chatham Power House were also using mangrove fuel wood for running their boilers. However, the mangrove fuelwood extraction and sale of mangrove have been totally stopped in the islands at present.

The limited extraction of mangroves in the past for wood and poles from government forest has caused any damage to mangroves. But in the revegetation areas, the destruction of mangroves is conspicuous and a few places the area had been reclaimed for agriculture as well as settlement. The extent of such mangrove areas is not precisely known.

Exploitation of mangroves has been banned since 1986. Mangroves are given protection under Coastal Regulation Zone (CRZ) Notification, 1991 and have been included in CRZ-1 category where all construction activities are prohibited.

As a step towards creating awareness among general public about mangroves, the Department of Environment & Forests has constructed a Mangrove Interpretation Centre (MIC) at Yeratta (Middle Andaman). It has attractive display panels depicting various species of mangroves found in these Islands. The nurseries and plantation of various species add to the importance of this Centre. The Mangrove View Watch Tower situated adjacent to the MIC is unique of its kind. From this Watch Tower, the visitors can have a panoramic view of mangroves and adjacent forest. The Department has also developed a Mangrove Nature Trail...