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ECOLOGICAL BENEFITS OF MANGROVE

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Mangrove forests are among the most productive and biologically important ecosystems because they provide goods and services to human society. The word "Mangrove" is considered to be a combination of the Portuguese word "Mangue" and the English word "grove". Mangroves are salt-tolerant plants of tropical and subtropical intertidal regions of the world. The specific regions where these plants occur are termed as 'mangrove ecosystem'. 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 Kutch in Gujarat. Rest of the mangrove ecosystems are comparatively smaller. However, good number of studies has been carried out in almost all ecosystems. Over 1600 plant and 3700 animal species have been identified from these areas.

The mangrove forests help to stabilize shorelines and reduce the devastating impact of natural disasters such as tsunamis and hurricanes. They also serve as breeding and nursing grounds for marine finfish and shellfish species of commercial importance. Mangroves, including associated soils, could sequester approximately 22.8 million metric tons of carbon each year. Covering only 0.1% of the earth's continental surface, the forests account for 11% of the total input of terrestrial carbon into the ocean and 10% of the terrestrial dissolved organic carbon (DOC) exported to the ocean. The rapid

disappearance and degradation of mangroves could have negative consequences for transfer of materials into the marine systems and influence the atmospheric composition and climate.

Distribution of Mangroves in India:

Total area of mangroves in India is about 6,740 sq. km, which is about 7% of the world's total area of mangroves. Luxuriant patches of mangroves are found on all the other continents but the best mangroves are found in Asia, especially in India and Bangladesh - the Sunderbans are the largest mangrove forest in the world both in size as well as biodiversity.

Along the west coast of India, mangroves are found growing on the banks of estuaries, deltas, backwaters, creeks and other protected areas. In all 34 species, 25 genera and 21 families have been reported from the west coast of India. The estuarine systems of the Karnataka coast have fringing mangroves. About 18 species have been reported and the dominant species are *Rhizophor amucronata*, *Sonneratia alba*, *Avicennia marina*, *Excoecariaa gallocha* etc.

Mangroves in Karnataka:

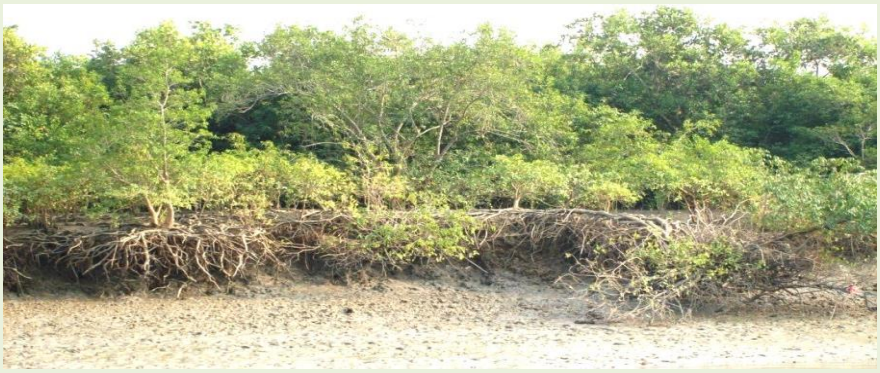
Karnataka has a coastline of over 320 kilometers. Fourteen rivers and several small rivules, which originate in the Western Ghats cut across the Coast to join the Arabian Sea. Towards the coast, the salt water tides from the sea travel several kilometers interior through the river mouths providing congenial habitats for mangroves. Most Mangroves are of the fringing type in linear formations along the river or estuarine banks.

Importance of Mangroves:

- Acts as kidneys for the coastal waters
- Important nursery grounds for finfishes and shellfishes
- Renewable resource of fuel
- Offers protection against coastal erosion
- Play important role in livelihood of Coastal communities
- Mangrove foliage as feed for domestic animals
- Provide opportunities for Tourism, Education and Scientific Study

Threats:

- **Large scale clearing:** to accommodate human population, agriculture and aquaculture. This has led to forest fragmentation, concomitant loss of animals and destabilization of mangrove-dominant shorelines.
- **Small scale harvesting and grazing:** for timber, fuel wood, fodder and impact of individuals and their livestock, who make forays into the forests?
- **Industrial threats:** pollution due to effluents, mining, industrial development, oil spills.



Mangrove conservation and management issues:

- Cyclones, typhoons and strong wave action especially in the geographically vulnerable Andaman and Nicobar Islands
- Browsing and trampling by wildlife (e.g. deer, which are numerous in the Middle Andamans) and livestock (goats, buffaloes and cows), which are often left to graze freely, especially in areas close to human habitation
- Drying and mortality of mangrove trees
- Infestation by barnacles which attach to young seedlings, interfering with respiration and photosynthesis and delaying seedling growth
- Crabs, which attack young seedlings, girdle the root collars and eat the fleshy tissues of the propagules- a serious problem in the middle Andamans, although not noticed in Goa
- Insect pests such as wood borers, caterpillars (which eat the mangrove foliage and damage the wood as well) and beetles

- Weeds such as *Acrostichumaureum* and *Acanthus* species, which often occupy deforested mangrove areas and restrict the re growth of economic mangrove tree species.

CONSERVATION:

Mangroves are under constant flux due to both natural and anthropogenic forces. In the last three decades, forest losses because of anthropogenic factors have increased significantly. The remaining mangrove forests are under immense pressure from land-use change, hydrological alterations, chemical spill and climate change. In the future, sea-level rise could be the biggest threat to mangrove ecosystems. There is urgent need to generate a baseline data to develop adaptive management strategies in anticipation of sea-level rise, set conservation priorities, monitor deforestation and forest degradation, improve terrestrial carbon accounting and quantify the role of mangrove forests in saving lives and property from natural disasters such as tsunamis.

There are direct, indirect and altruistic benefits from mangrove forests to some of the important stake holders such as fisherfolk and shrimp farmers who would be willing to contribute some amount toward mangrove reforestation. The stakeholders perceive the indirect income from associated livelihoods to their community and their personal interest in the employment. Farmers would participate in mangrove restoration since it would provide valuable erosion control. The perception that mangroves provide erosion control benefits has greater influence on willingness.

The Karnataka Biological Diversity Act, which came into force in February 2003, aims to promote conservation, sustainable use and equitable sharing of benefits arising from biodiversity resources. It has advisory role in matters relating to the conservation, sustainable use and equitable distribution of biological resources.

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