

Status of Mangrove Research in India

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Introduction

Mangroves along the Indian coast are one of the most neglected living resources, which have been over exploited for various purposes. The total mangrove area along the Indian coast has been estimated tentatively to be 700,000 ha (Sidhu, 1963) and 355,500 ha (Blasco, 1975). The east coast, including Andaman-Nicobar Islands, contributes about 82%, while west coast has only 18% of mangroves. There are about 45 species of mangrove flora and numerous other groups of floral and faunal components. The major factors responsible for the distribution and destruction of mangroves are the geomorphological and environmental characters, as well as, deforestation, reclamation and pollution. In the absence of any national plan, land use plan, as well as, conservation and utilization strategy, mangroves along the Indian coast have reached an alarming stage, particularly along the west coast (Untawale, 1985).

A brief review of the status of various aspects of mangrove research suggests certain areas for future investigations. A tentative National Mangrove Plan is proposed for implementation of the R & D programmes in this field.

Physical Environment

There are three major physical factors in mangrove ecosystems like climate, soil and water which are of great significance. Although there is sufficient data available on the climatological variation of the Indian subcontinent, the coastal climate, particularly microclimate from mangrove regions needs to be investigated (Koteswaram, 1984). Information on the effect of cyclones, which are quite common along the east coast, on the mangrove ecosystem is lacking. It has been observed, that inspite of a number of severe cyclones in this region the mangrove formations of west Bengal, Orissa, Andhra Pradesh and Tamil Nadu are still in their pristine growth (Venkatesen, 1966). Similarly, other climatic factors like rainfall, temperature, wind and humidity need to be studied in relation to the structure and function of Indian mangroves. The effects of tidal variation and tidal inundation might be very interesting and useful.

The soil characteristics of the coastal mangrove forests of India are varied (Blasco, 1975; Joshi, 1976; Rao, 1971). Impact of,

conversion of mangrove forest for other uses like agriculture is seen in the formation of acid sulfate soil. Other aspects like this might be worth investigating.

The mangrove waters have not been studied fully for its physical characteristics (Varadachari and Keshav Das, 1984). The tides, currents and waves are directly and indirectly responsible for various processes in mangrove environment. The aspects like sedimentation and erosion need more efforts.

The broad geomorphological characters of the Indian coast are well known (Ahmed, 1972), however, certain activities like tectonic movements, changes in the river courses and the sea level rises in relation to the mangrove formations are less known areas. Similarly, some scanty information is available on the fossil forms of mangroves, (Ramanujam, 1954; Mahabale and Deshpande, 1957), however, more efforts are necessary in this field, to understand the geological past of mangroves.

Biotic Environment

Biological and ecological characteristics of mangrove ecosystem have received maximum attention recently (Blasco, 1977; Rao *et al.*, 1966; Untawale *et al.*, 1973; Mall *et al.*, 1982). In spite of these efforts, there are several gaps in our knowledge regarding the energetics of the diverse groups organisms of the mangrove food web. Microbial organisms play an important role particularly in the biodegradation process resulting in the formation of protein rich detritus, which is the major food for many organisms. Detailed biochemical investigations are needed in such processes (Chandramohan, 1984; Matondkar *et al.*, 1980; Gomes and Mavinkurve, 1982).

The chemical investigations of the mangrove water, soil, flora and the fauna have been undertaken on a limited scale. The biochemical (Untawale *et al.*, 1978, 1980) and pharmaceutical studies on different components of this ecosystem might be quite useful. The studies on carbon and nitrogen cycles are quite important in this environment. This might throw some light on the productivity (Pant *et al.*, 1980), energy flow, and nutrient cycling, as well as, trophic relationship (Rao and Nair, 1984). Effect of different toxic and nontoxic pollutants on mangrove elements is equally important.

Other interrelated ecosystems like lentic, pelagic and supratidal communities have received limited attention (Parulekar, 1984). The culture and capture fishery of mangrove regions is economically important with great potential, however, additional information for its proper exploitation and management is needed. Similarly, commercially important products of mangroves like timber, firewood, charcoal, poles, woodchip, honey, leaves and fodder have not been surveyed and evaluated for marketing purpose.

Although, vast mangrove areas have been converted for fish farming, agriculture, urbanization, salt pans and other usages, there is no authentic information available on this. Moreover, the after-effects of constant usage of these areas have not been studied.

Status of Mangrove Research

On the basis of the information available, the status of different aspects of mangrove research shows that there are only four areas with high status, 13 areas with medium status and 26 areas having low status, as indicated below.

I) Biological and ecological studies-	High	Medium	Low
a) Mangrove ecosystem	4	5	6
b) Mangrove forest	-	4	12
II) Socio-economic and Land use	-	4	7
III) Policies, Rules and Regulations	-	-	1
	4	13	26

Land Use Plan

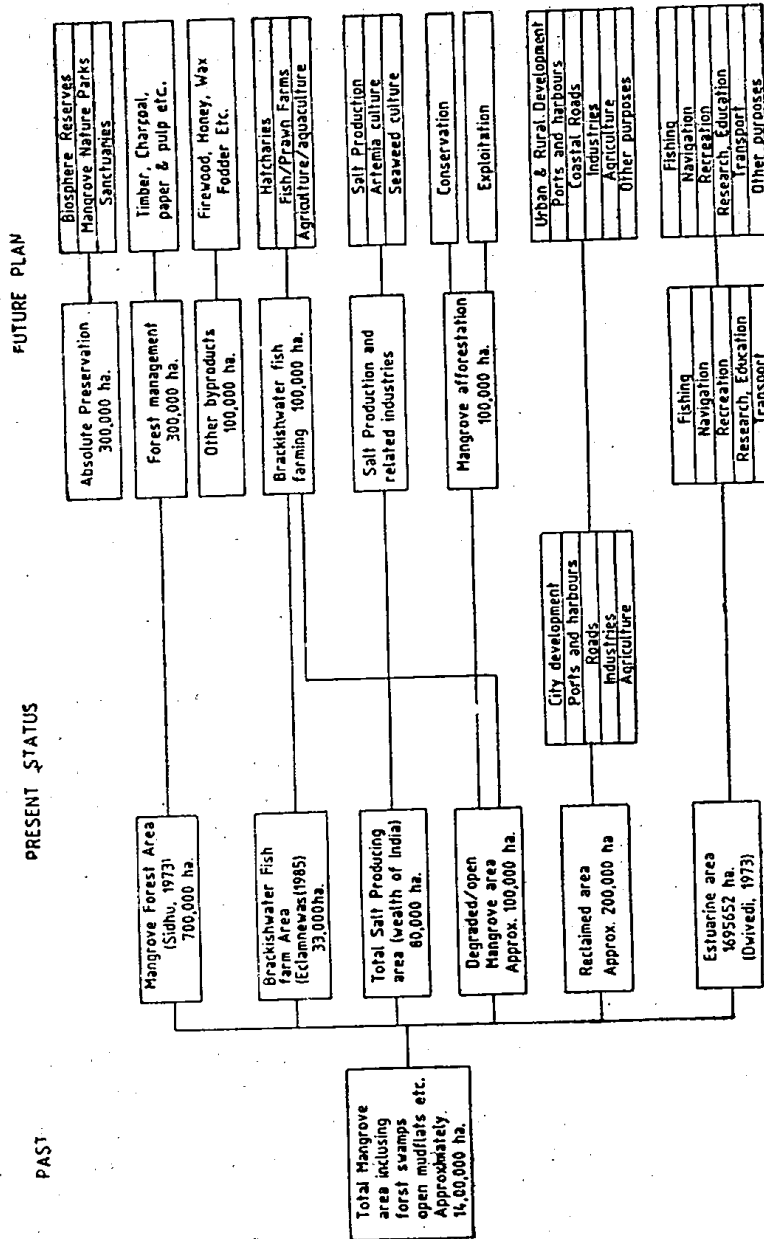
It is, therefore, necessary to prepare land use plans for the mangrove areas along the Indian coast for the purpose of management, preservation and utilization, keeping in view the socio-economic implications. It has been roughly estimated, on the basis of available information, that the original mangrove area in the past might have been approximately 14,00,000 ha. (Fig. 1). Out of this, at present only 700,000 ha area is covered by mangroves, while remaining area has either been reclaimed or converted for different purposes as indicated in Fig. 1.

National Mangrove Plan

Taking into consideration the conflicting interests and the multiple use practices of mangrove areas a tentative 'National Mangrove Plan' (Fig. 2) is proposed here, which indicates different guidelines for conservation and exploitation of various mangrove areas on the basis of the national priority. It is also suggested to follow the 'Action Plan' (Fig. 3) for careful implementation of the above plan in India. This model considers each area separately, involving the local expertise available. The coordination of the regional and state level committees, however, should be the responsibility of a National Mangrove Committee. The implementation of this set up would positively restore the coastal ecological balance, improve the environment and also the economy of the coastal population.

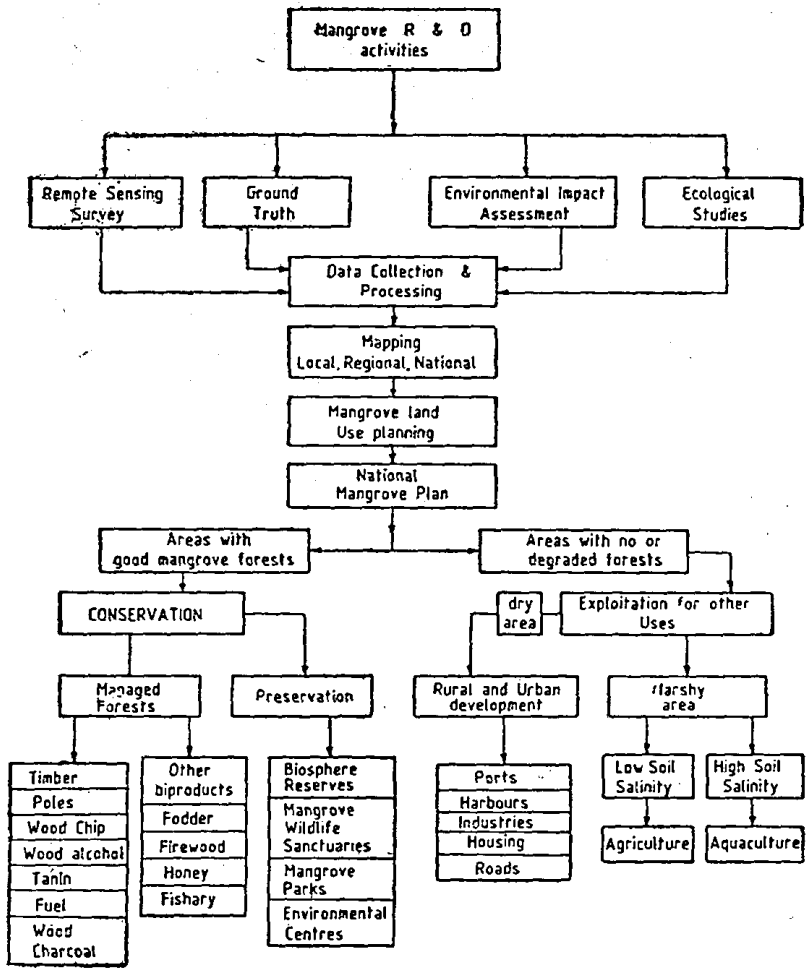
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LAND USE OF INDIAN MANGROVE REGIONS

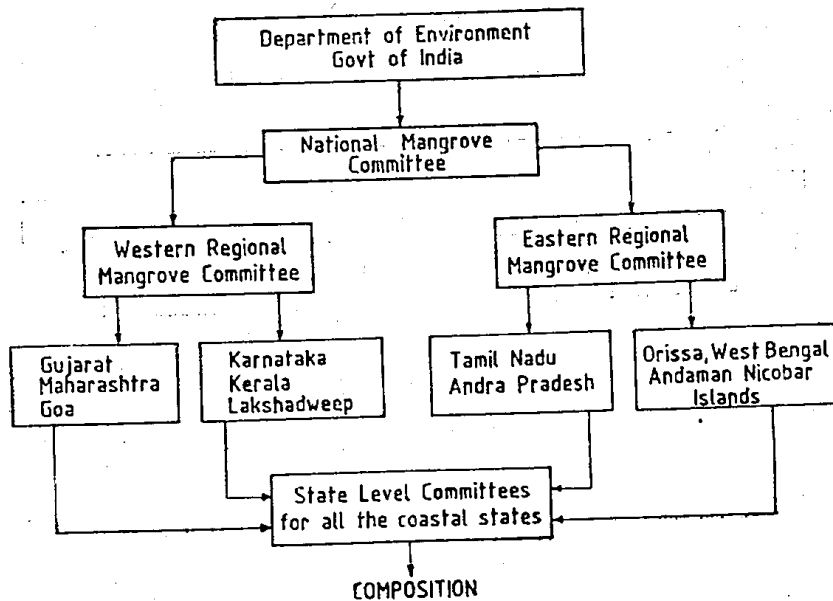
Fig. 1.



SYSTEM FLOWCHART FOR NATIONAL MANGROVE PLAN

Fig. 2.

THE MANGROVES



1. Forest Dept.
2. Land Survey Dept.
3. Agriculture Dept.
4. River Navigatio Dept.
5. Capt. of Ports
6. Industries Dept.
7. Pollution Board
8. Environment Dept.
9. Research Organisations
10. Teaching Institutes
11. Social Organisations

PROPOSED ACTION PLAN FOR MANGROVE PROJECT

Fig. 3.

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