

# Role of Mangroves in Brackish Water Fish Culture

SAYEEDA WAFAR

National Institute of Oceanography

Dona Paula, Goa 403 004

**M**angroves is a specialized marine ecosystem consisting of a group of plants growing in muddy, loose and wet soils in tropical and subtropical areas, comprising of shallow, coastal waters, deltas, estuaries or lagoons.

Besides ecological importance in trapping and accreting sediment material to reduce the erosion, mangrove ecosystem plays a significant role in Aquaculture. A linear relationship exists between shrimp production and the size of the mangrove forest area (Turner 1977, Marto Subroto & Naamin 1977). The fishery potential of these areas are tremendous providing the livelihood to the majority of the coastal population. The fishes lay their eggs in tangled roots of mangrove trees and later hatch and grow with needed nutrients available (Leh & Sasekumar, 1984). Thus mangroves act as natural nursery grounds.

Mangroves afford shelter to the juveniles of a wide variety of marine organisms, notable among them being certain species of penaeid prawns and species of *Metapenaeus*. The prawns after spawning migrate towards nearby mangroves where salinity is lower (Achutankutty and Nai 1983). In fact, low salinity of estuaries had been reported to be one of the main factors influencing the larval migration of Penaeid prawns in this specialized ecosystem (Pearse and Gunter 1957).

Mangrove ecosystem and the neighbouring water masses receive the input from two basic sources i.e. inorganic from surface runoffs and organic material from mangrove vegetation itself in the form of mangrove litter. It is estimated that in India mangroves

export an average of 12 tonnes of litter per hectare annually, representing a nutrient influx having an average of carbon, nitrogen and phosphorus as 5076 kg ha<sup>-1</sup> yr<sup>-1</sup> carbon yield, 97.63 kg ha<sup>-1</sup> yr<sup>-1</sup> and 7.28 kg ha<sup>-1</sup> yr<sup>-1</sup> (Water 1989).

The detritus formed after the decomposition of the mangrove litter following microbial activity is nutrient rich, on which the entire food chain evolves. According to Odum and Heald (1975) the trophic structure of the faunal community of mangrove waters indicates that atleast one third of them are detritus consumers. A variety of fishes such as Mulletts, Clupeoids, Eel, Catfish, Carangide are captured from the mangrove fringed estuarine systems. Along east coast of India, Jeyaseelan and Krishnamurthy (1980) have recorded 133 species of fish from waters of Pichavaram mangroves.

Mangrove swamps and other low-lying areas along the estuaries are generally preferred for brackishwater fish farming. This is an age old practice in India and is called "filtration" or "trapping" in the intertidal zones of coastal waters. The species cultivated are *Liza par-sia*, *L. nade*, *Mugil cephalus*, *Chanos chanos*, *Penaeus monodon* and *P. indicus*. This brackishwater aquaculture is called by different names in different states like "Bheris" or "Bhasabada" in West Bengal, "Cheemankettu" in Kerala, "Gazani" in Karnataka and "Khajan" in Goa. Till recently the wild stocking during highest hightide water was used to get seed mixtures. Dwivedi (1982) has introduced the concept of hatchery earning Rs. 20,000 or more by fish and prawn culture.

Majority of coastal population depend for their livelihood on the fishery resources of mangrove estuaries. Thus, it becomes very obvious that any kind of damage or destruction for mangroves may affect the capture or culture fishery resources.

Aquaculture development is recently becoming the more fashionable landuse of mangroves. Prawn culture is being practiced throughout the world but there is a potential risk of area expansion for prawn culture and it has been clearly seen in Indonesia, Malaysia, Philippines, etc. Here large mangrove areas were converted into prawn culture ponds, which has resulted into reduced capture fishery resources.

Though mangrove ecosystem is considered suitable for Aquaculture, it may not be right everytime. Suitability of mangrove ecosystem for aquaculture depends on soil characteristics and economic viability. Hence one has to look critically into it before taking up construction of Aquafarms in mangroves.

Taking into account the cost benefit ratio and production levels and the imbalance caused due to destruction of mangroves into aqua farms may be disadvantageous in the long run. The question is to what extent mangroves can be exercised for aquaculture development without compromising productivity of adjacent waters. The answer is *bare minimum*.

For aquaculture purposes, mangroves which have been denuded, reclaimed or presently underutilized should be preferred. The following are the precautions to be taken while planning for Aquaculture :

1. Site selection survey to be carried.
2. Benefit/cost analysis to be conducted.
3. Socio-economic impact of reclamation particularly on the lives of people to be studied.

Considering the significance of mangroves in brackishwater fish and prawn culture, it becomes very obvious that any kind of damage or destruction for mangroves may affect the capture and culture fishery resources.

Mangroves in India are at present in a degraded condition as a result of increased population pressure, modern developments and industrialization. Mangroves have also suffered a loss from reclamation, deforestation and pollution which in turn has adversely affected coastal and estuarine fisheries.

The present situation certainly calls for an urgent measure of conservation mainly evolving management guidelines. Management options include legislation for water and land use, restriction on reclamation, prevention of dumping of pollutants in estuaries, reforestation of denuded areas and afforestation of new, open mudflats. Creating an awareness of the importance of the mangroves among local people is very essential. The second important aspect is afforestation since it is the only way to bring back the degraded mangroves, which in turn will help in the fisheries aspects.

## References

- Achutankutty, C.T. and S.R. Sreekumaran Nair, 1983. Larval migration and growth of marine prawn in the estuarine habitat. *Mahasagar Bull of the Math. Inst. of Oceanogr.* 16 : 243-250.
- Dwivedi, S.N. 1982. Prospects and perspectives in prawn culture. *Proc. Management of Brackishwater Farms*, CIFE, Kakinada, 1-8.
- Leh, Charles, M.V. and R. Sasekumar, 1984. Feeding ecology of prawns in shallow waters adjoining mangrove shores. In *Proc of Asian Symp. on Mang. Envi. Research and Managt.* Kuala Lumpur, pp. 331-353.
- Odum, E.P. and E.J. Heald, 1975. The detritus based food-web of an estuarine mangrove community. In *Estuarine Research* (ed. M. Wiley), Academic Press, Vol. I, 256-286.
- Martosubroto, P. and M. Maamin, 1977. Relationship between tidal forests (mangroves) and commercial shrimp production in Indonesia. *Mar. Res. Indonesia* 18 : 81-86.
- Pearse, A.S. and G. Gunter, 1957. In : *Treatise on Marine Ecology and Paleontology* (ed. J.W. Hedgepath), Geological Society of American Memoirs, 67(1) : 129-158.
- Prince Jeyaseelan, M. and K. Krishnamurthy, 1980. Role of mangrove forests of Pitchavaram as fish nurseries. *Proc. Indian natn. Sci. Acad.* B 46(1) : 48-53.
- Turner, R.E., 1977. Intertidal vegetation and commercial yield of penaeid shrimp. *Trans. Amer. Fish. Soc.* 106 (5) : 411-416.
- Wafar Sayeeda, 1989. *Ecology of Mangroves along the estuaries of Goa coast* Ph.D. thesis pp. 289.