

PENAEID PRAWNS AND THEIR CULTURE IN MANGROVE AREAS

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INTRODUCTION

The estuaries in the tropics and sub-tropics are fringed with lush green mangrove vegetation and hence are known as mangrove estuaries. The fishery resources of these estuaries are tremendous and provide a major source of income to the majority of the coastal population. However, it is only recently that the importance of mangroves in the development of inland and coastal fisheries is beginning to be understood.

Mangrove estuaries are the nursery for many commercially important marine organisms, and penaeid prawns (marine prawns) are the most important among them. Most species of penaeid prawns spend the early part of their life in the mangrove estuaries and the adult life in the sea. The females mature and spawn in the sea and the larvae - as they develop - are passively brought into the nearby estuaries. They grow in the shallow mangrove zone initially and later move to the deeper areas of the open estuary before migrating back to the sea, thus completing their life-cycle. However, their residing time in the estuary and subsequent size attainment vary with species. In the estuaries of Goa, *Metapenaeus dobsoni* has a maximum residence period of 6 months; it is 8 months for *M. monoceros* and 7 months for *penaeus merguensis*. The actively migrating sizes for prawns to pass from the mangrove areas to the open estuary are 20-30 mM for *M. dobsoni*, 30-40 mM for *M. monoceros* and 40-50 mM for *P. merguensis*, respectively. However, after a further period of growth in the open estuary and attaining a size of 40-50, 60-70 and 70-80 mM respectively, their active migration to the sea commences.

PENAEID PRAWNS

The mangrove phase of the life-cycle of juvenile of several species of penaeid prawns is well studied. It has also been established that the capture fisher potential of marine prawns is directly related to the existence and expanse of a healthy mangrove ecosystem. Mangrove ecosystem provides the essential nutritional inputs to the estuaries. This ecosystem is rich in particulate organic matter, otherwise known as detritus. Detritus is nutritionally very rich and is the major source of food for the juvenile prawns. The mangrove substratum is also rich in microflora and meiofauna which further enriches the nutritional quality. Other favourable conditions like shallow and calm water, soft bottom for burrowing, protection and shelter provided by the mangrove roots and leaves, less number of predatory animals, etc., make this ecosystem the ideal nursery for the penaeid prawns.

Not only penaeid prawns but several other commercially important marine fishes and crustaceans are also closely associated with the mangrove environment. It is thus apparent that the coastal fishery resources particularly prawn fishery, are dependent on the existence of a healthy mangrove ecosystem and any damage or destruction to this ecosystem will have devastating

consequences. Increasing industrialisation, urbanisation and population explosion have put severe pressure on land in coastal areas of the Asia and Pacific regions and mangrove areas have been the hardest hit. Added to this is the misconception that mangroves are only wastelands. Although it has now been widely accepted and understood that mangroves form the backbone of the estuarine and coastal ecosystems, considerable damage has already been caused on a global scale due to human interference.

AQUACULTURE IN MANGROVE AREAS

Mangrove estuaries are nature's own aquaculture systems. Aquaculture, particularly prawn culture, has tremendous commercial prospects, and at the same time has also the great potential for area expansion. Potential risks of area expansion for aquaculture in mangrove areas have been clearly demonstrated in many countries in South-east Asia. For instance, in the Philippines about 250,000 of precious mangrove forests consisting more than 40% of the total area, were deforested mainly for conversion into prawn culture ponds. In Thailand the destruction was between 167,000 and 179,000 ha. Other countries like Malaysia, Indonesia and Ecuador have also destroyed the mangrove ecosystem for prawn farming purposes.

CONSTRAINTS

Another question to be addressed in this context is whether mangrove areas are suitable sites for aquaculture. It is a known fact that mangrove soil is not always conducive to construction of aquaculture ponds. The soil is mostly acidic, sometimes toxic and shows nutritional imbalances. Development of mangrove land into aqua farms may lead to severe physical constraints during the period of reclamation. Poor accessibility and the danger involved in felling of trees, low load bearing capacity make it impossible for mechanisation of clearing and land preparation. Presence of interwoven pneumatophores make manual tilling extremely difficult and expensive. These are some of the negative aspects of converting mangrove areas for aquaculture.

The micro topography of the mangrove land may also pose problems for aquaculture ventures as the initial investments will be exorbitant for levelling of the land especially on unripened soil for largescale development. Another deterrent is the presence of a large number of burrowing animals, particularly crabs, which would necessitate extra strengthening of bunds. Also, birds can be a nuisance as they prey on the cultured animals, leading to heavy revenue loss.

The general consensus based on cost-benefit ratio and production levels is that disadvantages are more in starting largescale aquaculture ventures in mangrove areas. Scientifically managed aquaculture farms in mangrove areas may be justified in underdeveloped countries only because of the availability of cheap unskilled labour.

SOLUTION

In this context, we should look at alternative plans which would be in the interest of both the mangrove ecosystem and aquaculture. It is evident that aquaculture, whether prawn culture or fish culture, in the mangrove region would not only disturb and destroy this ecosystem but also work out to be very expensive or uneconomical. Hence, it is advisable to select flat land suitable

in all other aspects and which is close to the mangrove environment for aqua farms rather than the mangrove area itself. Such lands are plentiful at the middle and upper reaches of our estuaries, with no mangrove vegetation. These are the ideal sites for conversion to aquaculture ponds as this would necessitate minor alterations to the ecosystem and at the same time make use of all conducive conditions prevailing in the adjacent mangrove environment. This would also considerably minimise initial investments in the preparation of sites, resulting in better profits. Another novel method is the pen/cage culture method practiced in countries like Malaysia. This method also prevents cutting of mangrove vegetation or major landscaping, although it may be slightly more expensive than the one mentioned above.