

# Accent on Brackishwater Fish Farming

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Fresh water fish culture has made rapid strides in this country following the researches carried out by the Central Inland Fisheries Research Institute and the development of the technique of composite fish culture. It has been demonstrated that a several fold increase in yield is possible by mixed farming of Indian and exotic varieties of carps. Although investigations have revealed the possibility of stepping up pro-

duction from brackishwaters, a breakthrough is yet to be made in this field which would enable better evaluation and utilization of the productive potential of this area.

## THE ENVIRONMENT

The term 'brackishwater' has somewhat wide connotations. From the stand point of fisheries potential we are concerned with such aquatic environments like river open-

ings or true estuaries, tidal inlets, backwaters and salt water lakes which are in close proximity to the sea and are under its constant influence. Photograph 1 shows a typical tidal inlet. Being the meeting place of distinct water types, namely the sea and the fresh water, the hydrobiological characteristics of these areas would depend upon the dominating influence of either of the component water masses. The lack of



Fig. 1. A tidal inlet

longterm stability arising out of this is the most important feature which in turn has profound influence on the life of the organisms inhabiting those regions. Despite such a dynamic pattern of physical and chemical characteristics of the environment, a variety of organisms have successfully established themselves under these conditions which include, besides representatives of the major invertebrate phyla, a number of fishes. These often provide scope for a natural fishery in many of these brackishwaters and in certain cases constitute a very lucrative fishing industry. The importance of this environment from fisheries angle would be obvious because in recent years considerable attention is being devoted for the study of the mangrove biotope, one of the many types of brackishwater environment. Mangrove forests are known to provide the source of energy and nutrients for maintaining the high productivity including fisheries of the associated coastal waters.

Notwithstanding some of the peculiarities of the brackishwater regions, the biological productivity in many such areas is considered to be of a high order. The high concentration of humic substances present in this type of environment is believed to be a significant ecological entity influencing phytoplankton productivity. Depending on the drainage into this basin, these brackishwaters, bays and estuaries usually serve as ideal surroundings for an overall biological productivity. Detailed studies of such environment have led to extensive classifications which may be summed up to state that the productivity of most of this brackishwater system is largely determined by the relative environmental stability of

the various zones. For example, the marine zone which resembles the neritic waters in hydrological properties has the maximum stability and productivity following the neritic plankton cycle. The productivity in the tidal zone extending from the upper boundary of the marine to the lower boundary of the adjoining gradient zone, which is shallow and in a state of turbulence, is governed by microbiological activity on the surface of the nutrient rich mud substrata. The zone representing the transition between the marine and the fresh water is relatively inferior in productivity because of the maximum variations in environmental conditions usually brought about by the tidal forces.

Of all the environmental factors, perhaps salinity is the most important as far as the life of fish and other organisms is concerned while temperature, transparency, nutrient level of the water, etc., are all contributing factors in determining the biological productivity. Many fish, crustaceans and molluscs are fairly sensitive to environmental changes and this naturally limits the number and species that can successfully thrive in such an environment which is subjected to constant fluctuations. That is why a study of environmental factors which are closely linked with the physiology of the organisms living in this region becomes important for understanding the nature of fisheries of the brackishwaters.

#### THE FISHERY POTENTIAL

The Indian coast line has several major and minor estuaries, tidal inlets, backwaters, mangrove swamps and saltwater

lakes. Reliable information on the fishery resources of even the major estuaries, saline lakes and backwaters is lacking as collection of statistics from such areas is fraught with many practical difficulties. Among the major estuaries mention must be made of those of the river systems of the Hooghly-Matlah, Mahanadi and Godavari. The salinity in all these estuaries varies from season to season; from more traces to nearly that of sea water, depending on the extent of tidal influence. The deltaic areas of the Hooghly-Matlah in West Bengal are estimated to be about 8030 sq. km. with a tidal influence extending to about 300 km. interior from the river mouth, with the high and the low tides of about 4.3 and 1.6 m respectively. The Mahanadi estuary, on the other hand, shows much less tidal oscillations and the tidal effect is felt only up to about 32 km upstream. The estuarine area associated with the Godavari extends over 180 sq. km with a tidal amplitude of only 0.8 m. and the saline waters extending about 48 km upstream. Many of the smaller rivers on the east and west coast get connected with the sea during monsoons and true estuarine conditions are obtainable only during brief durations of the year.

One of the principal saltwater lakes of consequence to fisheries is the Chilka lake, with a minimum water spread of nearly 2336 sq. km which shows periodic changes in salinity, reaching nearly to that of sea water during summer. The same is true of the Pulicat lake which covers an area of about 1,120 sq. km. Both these lakes support a good fishery of which shrimps constitute about 28% of the catch, with mullets

coming next in importance. The estimated annual landings of fish and prawns from the Chilka Lake are reported to be of about 3,000 tonnes. In the Pulicat lake, the annual catches are estimated to be of the order of 1,500 tons. While these two lakes are located on the east coast, the Vembanad lake on the south-west coast is no less important, although it is relatively small in size. Further, as the lake is connected to the sea only near its northern end, the lower portions into which some of the river systems empty, remain somewhat unaffected by the tidal influence. However, in the areas of tidal ingress, some of the richest clam beds are known to exist.

In contrast to those are the backwaters of Kerala which, in close association with the smaller river systems and salt water lakes provide an almost continuous stretch of water mass of nearly 50,000 ha. of fishable area. Some permanent and some seasonal connections with the sea provide continual replenishment of salt water and at the same time considerable organic matter is also washed into this area making these waters one of the richest coastal water bodies. The salt water 'bheris' of the Sunderbans are also somewhat comparable to these waters in natural productivity and in both these regions some organized capture and culture fisheries operations are in existence from very early times. The routine prawn filtration in the backwaters of Kerala as well as the 'basabadha' fisheries of the Sunderbans are only too well known. But, more than the capture fisheries, the brackishwaters constitute a rich potential for culture fisheries.

In the light of experience and the technical knowledge already gained, a time has come to start a few experimental farms located at various centres representing

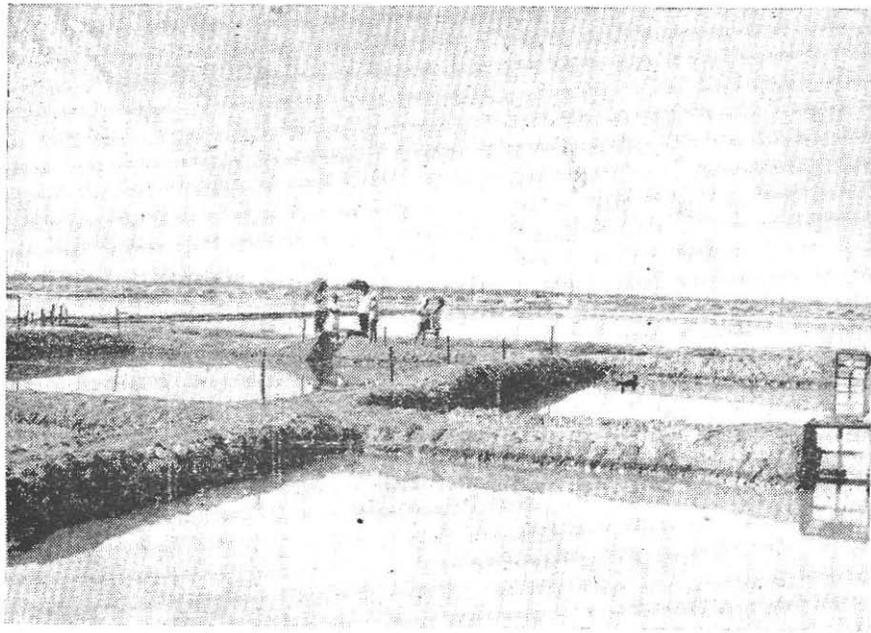


Fig. 2. Saltwater Fish Farm at Veppalodai, Tuticorin.

different brackishwater biotopes. Photograph 2 shows one such well laid out farm. Farm construction and management are aspects for which the present know how does not appear to be adequate, but some pragmatic and economic system will have to be evolved, perhaps after some trial and error, to suit the ecological conditions of the different regions. Based on the existing information a package of practices encompassing all aspects of scientific brackishwater fish culture should be developed and demonstrated in a few model fish farms. This would pave the way for progressive farmers to adopt these techniques and eventually help in spreading the process to other regions.

While these would enable some increase in production, in order to make it sustain-

able at a higher level it would be necessary to initiate simultaneously a comprehensive programme of resources survey and a critical study of (i) the mechanics of production, (ii) the biology of the endemic species as well as those which could be acclimatised to the environment and (iii) the environmental factors including

their variations in time and space. Improved collection techniques and effective nursery management practices could further lay the foundation for a profitable trade in fish fry for commercial purposes.

Recognizing the fact that in order to achieve these ends there should be more research support, the Indian Council of Agricultural Research has initiated an all India Coordinated Research Project on 'Brackishwater fish farming' with centres located in West Bengal, Orissa, Andhra Pradesh, Tamil Nadu, Kerala and Goa. With the development of better technical know-how, suitable land leasing policies and inflow of required capital through the many agencies now available, fish culture operations in the brackishwaters can make a big headway.

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