

MARINE FOOD RESOURCES AND CONSERVATION ALONG THE WEST COAST OF INDIA

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INTRODUCTION

In the last quarter century, rapid growth of new industries in the coastal belt of India has created a serious problem for the sea food resources. Large cities have developed and more are coming up and the major fishing efforts are also concentrated near these cities. New industries which manufacture chemicals, paper, fertilisers, oil products, etc. are also increasing near these cities. The effluent from these industries are discharged either into the adjoining sea or estuary, which get polluted and adversely affect the food resources and also create health hazards (Halder and Tejam, 1974). Immediate re-thinking is needed for future development policy and planning to include suitable measures for conservation of our natural resources. An effort is made in this paper to highlight the existing sea food resources, its potential and the adverse effects of pollution on the environment. Suggestions have also been offered for conservation of these resources for reducing the harmful effects of the effluents.

Sea Food Resources:

The marine fish landings in India are around 1.2 million tonnes against the total catch of 3 million tonnes from the Indian Ocean. The east and the west coast of India differ in catches, the reasons for differences in productivity were discussed by Panikkar and Jayaraman (1966). The west coast accounts for about 70-75% of India's total marine fish catch and the east coast contributes 20 to 30%. The total area of continental shelf around the Indian Coast is about 447.6 thousand sq.km. (Chatterjee, 1968). The country in coastal area has a population of 1.6 million fishermen, majority of whom use indigenous fishing vessels and small nets. Their limit of fishing is approximately 15 km. from the coast. These small crafts are supplemented by approximately 12,000 mechanised boats, which operate at the present time in the coastal areas with a view to obtaining higher returns. As a result, the near shore areas are over-fished in some cases. It is also well known that the marine fish catch including pelagic and demersal fisheries comes from a small part of the shelf and a larger shelf area between 35 to 200 m depth zone remains practically unexploited.

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Various estimates of the fishery potential of the Indian Ocean put the figures between 4 to 40 million tonnes. However, recent estimated potential is around 11 million tonnes (Prasad *et al.*, 1970) as against the present production of 3 million tonnes. Therefore, the production can be increased many times. Based on the recent growth of fisheries in the near future, the estimated increase for the production of trawl fish in inshore region in million metric tonnes is 0.21 for inshore region upto 20 m depth, 0.60 for region from 20 to 80 m depth and 1.80 for deeper part of the shelf from 80 to 200 m. Thus the total additional potential for the continental shelf upto 200 m depth is 2.61 million metric tonnes. These estimated catches can be increased substantially by pelagic fishery also.

It is thus seen that the fishery of continental shelf are under-exploited and bold initiative for investments is necessary for technological inputs in the form of large fishing vessels, gear and ancillary facilities for better utilisation of the potential in off-shore areas, while near-shore areas need conservation. Therefore, in order to precisely determine potentialities, maximum sustained yield and the pattern of seasonal production and to evaluate conservation measures, it is absolutely essential to develop

a multi-disciplinary ecological plan at the national level. In the past, the absence of a national ecological plan led us into a situation that we had not paid enough attention to solve the outstanding problems like failure of mackerel and sardine fishery and the red tide and poor catches from Bay of Bengal.

Pollution:

The narrow inshore and coastal areas account for major food production and need great attention. Recently in some areas, particularly near large cities a downward trend in fish production has been observed from inshore areas. For example, off Bombay, fish production upto 20 m depth is poor and good catches are obtained only in fishing grounds located further away. This is due to the change in near-shore marine environment due to indiscriminate discharge of domestic sewage and industrial wastes and effluents from the industries situated near the coastal line. Along the west coast of India, major pollution occurs due to the discharge of industrial effluents, domestic sewage, oil wastes from navigation and shipping and thermal and radio-active wastes from power plants. Coastal areas around cities like Bombay, Baroda and Cochin are examples of severe pollution due to discharge of wastes. The population of the Bombay city is about 6 millions and 80% of the industries of

Maharashtra State are situated around this city. The total water requirements for industries and domestic use is over 500 million gallons per day. A large part of this water is discharged in the near shore area as industrial and domestic waste. Most of the domestic effluent is discharged in Mahim and Worli bays and the industrial waste into the Thana Creek (Fig. 1). A study of the extent of pollution was carried out in the areas around Bombay both in the Thana Creek and the west coast. It is observed that the Thana Creek has become more or less unproductive because of high pollution (Desai, 1971; Desai and Wagh, 1972). The creek water is highly deficient in dissolved oxygen which is a true indicator of water health. The dissolved oxygen recorded in this area varies from 1.5 to 2.5 ml/L during most of the year excepting monsoon season, when, as a result, of heavy rain fall and large influx of fresh water, the creek water becomes rich in oxygen for a short period. On the west coast of the city, large amounts of domestic waste are discharged, as a result no worthwhile fishery exist in the near shore area upto about 15 miles from the shore. The condition can be easily improved by regulating and improving the effluent treatment technology before the disposal of waste into the sea. Presence of oil refineries and shipping activities in the harbour area have also resulted in oil pollution (Dwivedi and Parulekar, 1973).

An example of an estuarine pollution is provided by developing cities like Baroda. Baroda is situated about 50 km away from the sea. A large industrial complex is developing around the city of Baroda and the city is progressively facing the problem of discharge of effluents and sewage. It was therefore proposed that a 52 km. long canal (Fig. 2) may be built to discharge the effluent and sewage in Mahi estuary. Studies were undertaken in Mahi estuary to determine a point where the discharged effluent will be washed offshore. Based on short term investigations, it has been suggested that the proposed discharge system is not suitable. The Mahi is dry for the most part of the year excepting during monsoon season and the water flow in the region towards the Gulf

is mainly tidal. As a result about 80% of the area is exposed during the ebb-tide and is covered under water during the high tide. Therefore very little dilution of the effluent takes place. At present about 17 tonnes of Ammonia per day are being discharged in this river from a fertiliser plant, where even 5 ppm of ammonia was found to be harmful to fish life (Shaikh *et al.*, 1974). As a result approximately 35 km long stretch of Mahi estuary has become unproductive. This again can be easily regulated and fish can be conserved by suitable measures of effluent treatment and disposal.

A similar problem of marine and estuaries pollution was observed at Goa. A fertiliser plant producing urea and superphosphate, discharges treated effluent into the sea. However, the treated effluent contains traces of arsenic and ammonia; as a result, the water gets polluted in some areas. The cumulative effect of arsenic can also endanger human health. Fish mortality was reported from the area during the year 1973 and 1974 and the fish are also reported to accumulate arsenic in their body. Instances like this, need extremely careful investigations to avoid recurrence of similar circumstances elsewhere. In another case, a new fertiliser factory is being started at Mangalore and the effluent from this factory contains ammonia. The technology of effluent treatment is known but it is difficult to obtain equipment against the date-line of production. Therefore, very careful investigations are necessary to develop alternate methods to meet the situation and avoid pollution and conserve prawn breeding grounds in this area.

The refineries, navigation and other activities connected with shipping result in discharge of oil wastes into the sea. The effect of oil pollution along the Indian coastline was first noticed by Nair *et al* (1971). Subsequently observation has shown that it is an extensive phenomenon occurring along the east and west coast of India. The lighter fractions of the oil evaporate and the tar balls get deposited on the beaches and rocky shores. Tar ball deposition of the order of 500 gm per sq.m. has been observed at many places. The pattern of deposition of oil wastes and tar balls varies with the direction of the coastal currents. At a few beaches at the high tide level, the sand was found mixed with an oily substance. This is probably caused due to the washing ashore of the thin oil film, which is generally present near the harbours, the examples are Panjim, Karwar and Bombay. At Marmagao Harbour, occurrence of degraded oil had been seen many times. Therefore more stringent precautions should be taken to avoid discharge of oil and oil wastes from ships in coastal areas.

Pollution of beaches:

The visible effects of pollution is readily seen on beaches. Biologically the beaches are a very dynamic environment, which undergo vast

changes every day. The beach fauna and flora have a very large degree of adaptation and maintains a high degree of biological activity and turnover of energy. But this environment also has certain limits beyond which it cannot sustain changes, without damage. In some parts, this stage of maximum tolerance has been reached. Human activities have, therefore, to be very carefully regulated to avoid adverse effects. The treatment of waste before discharge of effluents should also be recommended, so that the combined action regulates the disposal of effluents in marine environment in such a way that the adverse effects to human health, marine living resources and recreation activities are avoided.

The beaches have various types of human activities. Some excellent beaches situated near big cities and villages are polluted due to human excreta, and others due to domestic waste. A large number of beaches along Kerala Coast are highly polluted. Calicut is an example of extreme pollution due to human excreta. At a few other beaches influence of shipping and fishing is evident. Sometimes the entire beach emits a foul smell due to activities connected with shore seines, fish storage and handling of fish for transport to marketing centres. To understand the effects of these varying conditions, studies have been started along some beaches of Goa. Bacteriological investigations at Siridao and Colva beaches indicated presence of high bacterial counts at Siridao. *Coliforms (Escherichia coli)* were also high at Siridao (Gore and Singbal, 1973).

Specialised ecosystems:

The Indian coastline has specialised ecosystems created by the extensive growth of mangroves near the coastline. These ecosystems greatly influence and modify the coastal zone and need very careful consideration for management of the coastal areas. The entire coastline of India has mangroves in varying degrees. These ecosystems are highly productive and modify the web (Macnae, 1968). Along the west coast of India, they are abundant particularly off Saurashtra, Goa and Mysore coasts. Even around Greater Bombay extensive low lying backwaters are full of *Avicennia* sp. Mangroves once established in any natural habitat, keep on increasing. The examples are estuaries between Honavar and Mangalore and backwaters in some areas near Bombay. The typical examples are large mangrove areas in backwaters behind Versova. During the process of slow expansion, succession of species is seen. At first *Rhizophora* sp. grow and these are followed by *Avicennia* and other species. Thus their expansion is a continuous process. To make the best use of these areas, it is essential to understand the mechanism of their growth, and develop methods to check their further expansion and also find new economic uses for mangrove swamps. Studies conducted around Goa (Untawale *et al.*, 1973) show that dense growth of fringe mangroves may also result in organic pollution in estuaries and at many

places benthic pollution also occurs. The quality and quantity of benthic life becomes extremely poor and the only animals that survive are the polychaetes and crabs. Sometimes, due to heavy growth of mangroves, organic pollution due to accumulation of dead organic matter has been noticed at Carazalem, Goa, and near the mouths of Netravati and other estuaries in Karnataka State. Thus in the coastal zone particularly in estuaries and backwaters, mangroves present a threat to the environment.

It is thus seen that the west coast of India has problems relating to disposal of domestic and industrial wastes, reclamation of land, use of beaches as open air lavatories and various uses for fishing industry and production of marine food. These conflicting uses need very careful planning to ensure optimum multi-use of the sea and preservation of the coastal areas.

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ARABIAN SEA

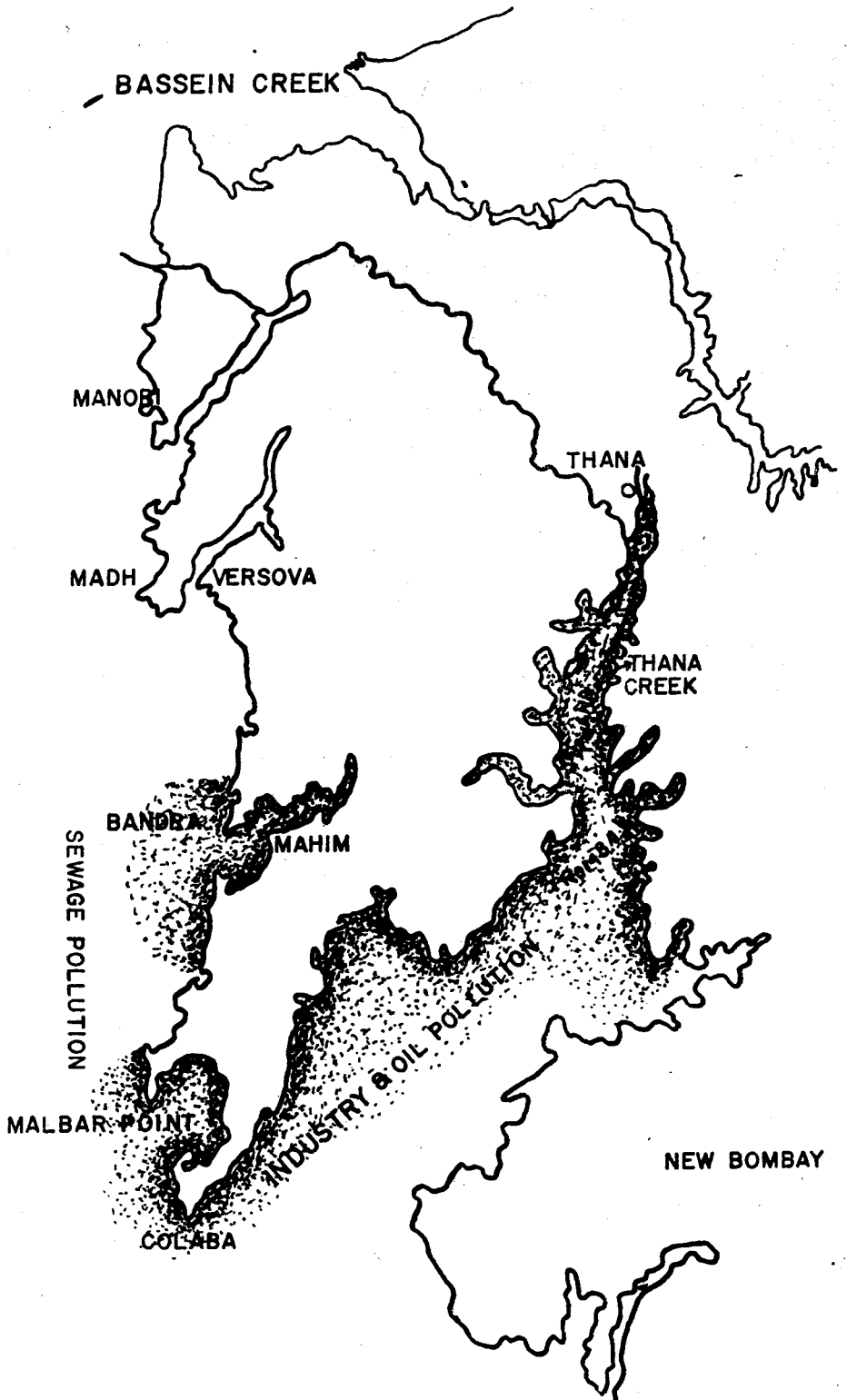


Fig. 1: Pollution in coastal waters around Bombay.

LEGEND

- 1 FERTILIZER
- 2 REFINERY
- 3 DISCHARGE POINT OF EFFLUENT
- 4 SUHRID GEIGI
- 5 UNIVERSAL DYES
- 6 SEWAGE TREATMENT PLANT

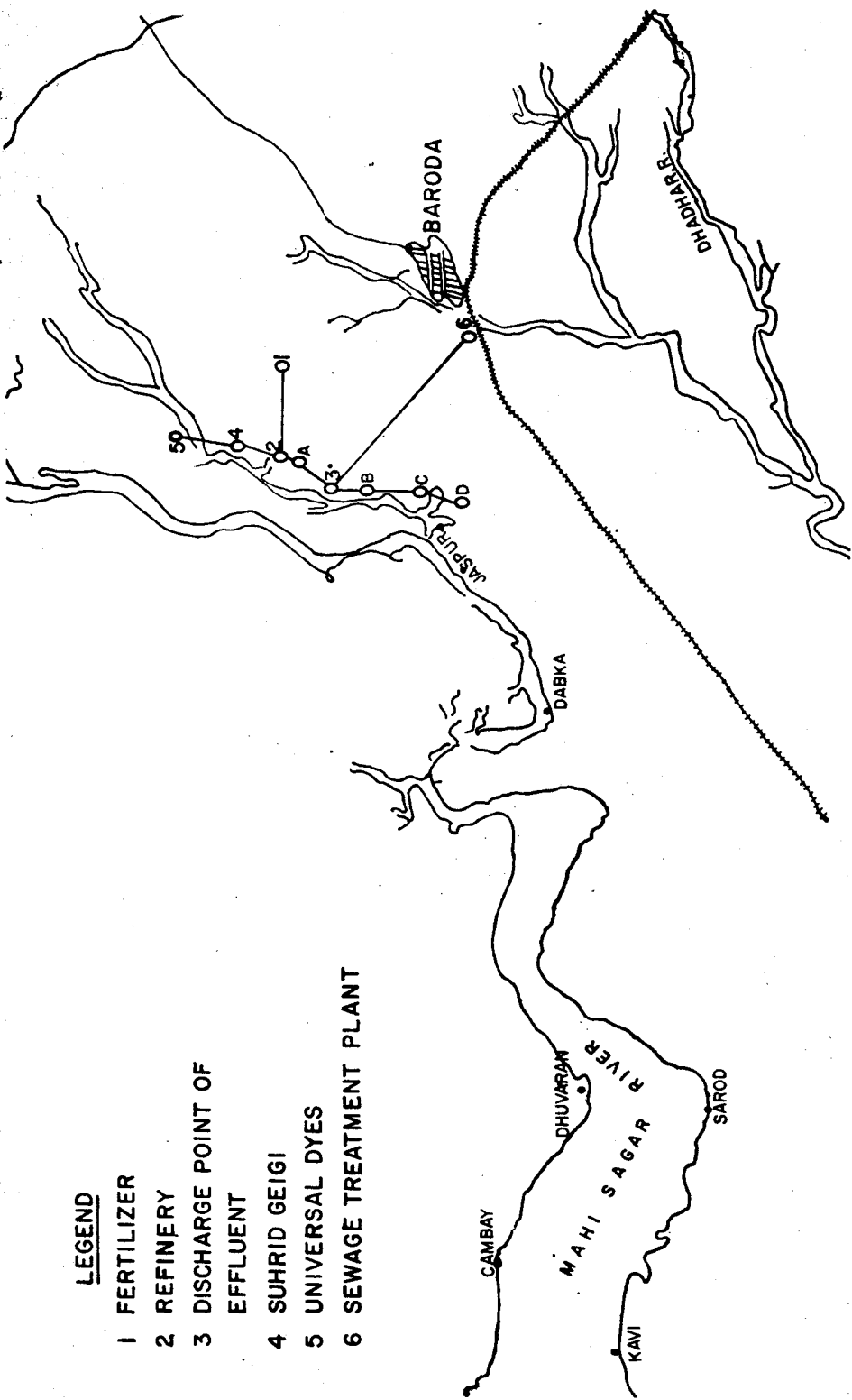


Fig. 2: Industrial effluents disposal from Baroda.