

NATURAL AND ANTHROPOGENIC HAZARDS ON FISH AND FISHERIES

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MARINE FISHERIES AND ITS IMPACT ON COASTAL PEOPLE

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Abstract

The Indian EEZ is about 2.2 million km². The coastal zone has multiple use of resources and habitats. There are diverse end users, activities, inputs and impacts. Millions of people in the coastal habitats depend on the seas and coasts for various activities and resources. Unregulated access to the coasts and its resources in the past have resulted in compounded impacts and deterioration of the resources and habitat. All major maritime countries and developed civilizations have adapted well planned regulations in the coastal habitats for informed and sustainable resource and habitat management. The development scenario in India should be viewed in the context of global environment and resource management plans *vis-a-vis* the development and sustainability issues in our country. A knowledge based master plan is the need of the hour for ensuring resource resilience, sustainability, environmental health and habitat management, at the same time ensuring adequate income and opportunities in the zone.

KEYWORDS : Coastal resources, anthropogenic impacts.

Introduction

The coastal zone is one of the most populous and dynamic environments on the surface of the globe. Numerous environmental, climatic, habitat and anthropogenic factors impact the coastal habitats and consequently the coastal people. Man has been exploiting the bounties of the seas from time immemorial. The advent of modern technology resulted in unplanned and unmanaged utilization of the living and nonliving resources of the seas with scant regard to the environmental and sustainability concerns and this has resulted in a situation where the continuation of these activities in an unregulated manner is presently threatening the very health of the seas and its living resources. The compounded impact of the loss of critical habitats, biodiversity and ecofriendly resource utilization on the life and well being of the coastal people is a matter of concern not only to research managers, but also to planners, anthropologists, ecologists, environmentalists and futurologists.

The Indian EEZ has an area of 2.2 m km² providing extensive natural resources, both living and nonliving to our country. Fish from the sea has been a traditional natural food resource for human beings from time immemorial. The Indian marine fisheries has a long history, originating as a traditional livelihood activity in the coastal villages for hundreds of years. Pillai and Katiha (2004) have described the history of the Indian fisheries elaborately. The era of modernization commences with the introduction of the mechanized fishing fleet in early 1950s which was a turning point in the annals of the marine fisheries of India. The process of mechanization.

Status of the Present Human Exploitation of the Major Marine Resources

A detailed account of the marine fisheries status of the country has been presented by Joseph and Jayaprakash (2003). The pelagic fisheries contribute 46-56% (annual average 1.1 million t) of the total marine fish production of the country. Main resources- oil sardine, lesser sardine, mackerel, Bombay duck, anchovies, carangids, ribbonfishes, seerfishes and tunas. These fisheries support the livelihoods of coastal and small scale fishermen community and crucial to nutritional security. Stocks of small pelagics like anchovies sardines, mackerel and Bombay duck are annual crops capable of withstanding relatively high fishing pressure. Stocks are all optimally exploited presently. Stocks of small pelagics show strong interannual variations and suitable fishery prediction models using rainfall, sunspot and El-Nino data required. PFZ advisories to be disseminated among fishermen to improve fishing efficiency. Instances of extreme glut in production in certain seasons create very low price for the landings causing withdrawal of effort and economic hardships to fishermen. Infrastructure to process or temporarily store the surplus and transport to interior markets is required. Motorization of traditional fishing crafts and adoption of innovative gears like ring seines and purse seines have resulted in socio-economic upliftment of coastal fisherfolk. But, the recent trend in unregulated increase in net sizes and declining mesh size is not healthy considering the increasing capture of juveniles. Pelagics like tunas and seerfishes of high unit value and for export. The harvest of tunas is hardly 23% of the potential (2.8 lakh t) in the Indian EEZ. Development of indigenous technical expertise (tuna longlining) and a suitable fishing fleet (conversion of idling shrimp trawlers of 17-20 m OAL) to tap oceanic resources urgently needed.

Threatened Resources and Destructive Fishing Practices

Marine catfishes (*Tachysurus* spp.) – 23 species are recorded in Indian waters of which 11 appeared in commercial fisheries. Species diversity in commercial fisheries has dwindled since the 90s to about 6 species along the south east coast and four species along southwest coast.

Decline in landings caused by poor recruitment due to (1) Indiscriminate exploitation of juveniles and sub adults by bottom trawlers and (2) capture of brooders in purse seines. Gill nets and hooks and lines best gear to exploit the resource. Mechanized

bottom trawling within 30 m depths has to be regulated. Purse seines should avoid catching brooders.

Tunas - An Untapped Potential Resource

The revalidated potential yield details are as below. Coastal tunas 0.65 lakh t, Yellowfin 1.15 lakh t, Bigeye 0.13 lakh t, Skipjack 0.85 lakh t, Total 2.78 lakh t. Current tuna production (Av.1998-2000) by Indian fleet from Indian EEZ about 57,000 t of coastal tunas and about 10,000 t oceanic tunas (SKJ-6096 t, YFT-4106 t). Thus, presently, only about 23% of the total Annual Potential Yield of tunas is harvested while with regard to Oceanic tunas it is a mere 6%. Development of indigenous technical expertise (tuna longlining) and a suitable fishing fleet (conversion of idling shrimp trawlers of 17-20 m OAL) to tap oceanic resources urgently needed.

Juvenile Fish Destruction

Juveniles of Shrimps: Operation of mini trawls with a cod end mesh of 10 mm operated along Kerala coast and *Thallu vala* (Gulf of Mannar-Palk Bay) cause destruction of juveniles of *Karikkadi* shrimp (*Parapenaeopsis stylifera*) and green tiger prawn (*Penaeus semisulcatus*) respectively and these gears should be banned. Estuaries and backwaters are nursery grounds for many commercially important shrimps. However large scale destruction of juveniles takes place in non-selective gears like stake nets operated in these grounds. Today unauthorized stake nets exceeds licensed ones and suitable alternate fishing practices or income generating activities for the fishermen involved will have to be formulated. Trawling within 10 m depths by commercial trawlers as well as mini trawlers has to be completely stopped to prevent juvenile prawn destruction. Usage of mosquito nets along the east coast to catch shrimp seeds of cultured varieties. Undesired shrimp seeds are discarded subsequently affecting the shrimp fisheries adversely.

Small meshed (70-100 mm) gill nets *Podivalai* and trawlers at Tuticorin land very small sized King seer which is detrimental to recruitment to the fishery and has to be discouraged. Mesh size of the large meshed gill nets currently in use are 65-170 mm and catch highly valued seerfishes below the length at first maturity (about 70 cm) which can adversely affect the stocks.

At Tuticorin egg capsules of chanks are also landed (daily 10-20 egg capsules) which is used for medicinal (?) purposes. This will adversely affect the population and should be banned. Capture of undersized chanks and fishing holiday during January to February to conserve egg capsules and baby chanks necessary.

Bycatch and Discards

Mainly from bottom trawlers. About 2.5 lakh t of discards estimated from bottom trawlers operated off Kerala coast during 2000-02 of which contribution was as follows: finfishes 103 species - 38%, gastropods 65 species- 9%, crabs 12 species - 14%, Juvenile shrimps

8 species - 2%, cephalopods 5 species- 1%. Shrimp trawl by-catch had about 214 species along Kerala coast compared to 85 species along Visakhapatnam coast. In experimental shallow water trawls conducted off Mangalore, biodiversity indices such as Shannon Weiner and Simpson indices (species richness, evenness and numbers) showed significant decrease indicating the great extent of damage caused to the bottom biota by trawling.

Demersal Fisheries

The potential yield of demersal fishes is estimated at an annual 9 lakh t while present landings are only about 6.5 lakh t indicating scope to enhance production by exploiting resources beyond 50 m depth. Sharks, rays, catfishes, perches, sciaenids, flatfishes silverbellies, lizardfishes, pomfrets etc. Culture of groupers and snappers offers scope to increase production through sea farming. Discards of juvenile forms of many commercially important demersal finfishes and shellfishes which form significant part of discards by trawlers is a threat.

Crustacean Resources

The average annual production of edible marine crustaceans (shrimps, lobsters and crabs) of India during 1995-2000 was 3.6 lakh t which formed 9% of total world crustacean production. The All-India annual penaeid shrimp production during 1991-2002 rose from 1.73 lakh t (1993) to 2.25 lakh t (1999) with an annual average of 1.94 lakh t. (Annual Potential Yield - 1.94 lakh t). Nearly 75% of the catch from the west coast (mainly Kerala & Maharashtra). Shrimps and lobsters highly valued resources. Single day trawling paved to multi day trawling and to offshore deeper waters resulting in catches of deepsea prawns. Urgent need to formulate national policy to effectively implement regulatory measures like mesh size of trawls (min. 35 mm), trawling grounds (beyond 5 km. from shore) and sustainable fishing practices. Ban on monsoon trawling has prevented capture of undersized prawns and increased availability of larger prawns in post-ban period.

Major issues: Average annual yield of most of the commercial shrimp species has reached MSY levels. The green tiger shrimp (*Penaeus semisulcatus*) fishery in Palk Bay and Gulf of Mannar is declining due to destructive hand trawling (*Thallumadi*) for juveniles in the inshore sea grass beds. Ban on this destructive fishing and sea ranching of hatchery produced post-larvae desirable. Collection of shrimp seeds from mangrove nursery areas and surf zones are creating conflicts with fishermen as it is perceived that such activities are hindrances to the natural recruitment process to the fishing grounds. Also seed of the species that are not cultured are also collected by this practice and subsequently discarded. Due to reduction of cod-end mesh of trawls to 12-15 mm and encroachment of trawlers in traditional fishing areas large quantities of *Acetes* occur in trawls along the Saurashtra coast. This species is of little economic importance only but crucial in marine food webs and therefore should be exploited in a more sustainable manner. Discards of fish juveniles of many important commercial species of demersal finfishes by shrimp trawlers.

Lobster Resources

Lobsters are highly valued crustacean resources but catches have declined from about 2400 t during 2000-01 to 1360 t during 2002-03. On the north-west coast lobsters are by-catch in trawl net and regulations cannot be effective in conserving resource. Closed season for the peak breeding period of lobsters (August -September) is not possible due to official trawl ban of Maharashtra coast being during June to mid-August only. Releasing of berried females and young ones back to sea has to be done. Establishment of lobster sanctuaries in certain specified locations required. Implementation of Minimum Legal Weight (MLW) for different species of lobsters (*P. homarus*-200g; *P. polyphagus*-300g) to be implemented by respective maritime states. (Recently MLW implemented for exports but not in vogue for fishing practices). CMFRI has taken up extension work along the coast of Gujarat, Maharashtra and Tamil Nadu to prevent indiscriminate exploitation of berried females and juveniles.

Molluscan Resources

Export varieties of squids, cuttle fishes and octopus. Catches are showing an increasing trends and no marked decrease in average sizes contributing to the fishery has been observed. Indiscriminate bottom trawling that severely disturbs the habitat that facilitates egg laying and also effects the food availability is a threat. Technology for breeding and rearing of cuttle fishes like *Sepiella inermis* and *Sepia pharaonis* developed but high production costs at present.

New Resources to be Tapped

Exploratory surveys in deeper waters indicate good abundance of non-conventional fishes such as Bull's eye (*Priacanthus* spp.) Green eye (*Chlorophthalmus* spp.), Indian drift fish (*Ariomma indica*) and Indian ruff (*Psenopsis* spp.). A potential of 100 million t of myctophids (*Benthoosema pterotum*) available in central Arabian sea offers immense scope for harvest and utilization in fish meal. Certain varieties of deep sea pandalid prawns of commercial importance available. Oceanic sharks and billfishes are yet another group which are underexploited. There is scope for targeted fishery for these fishes in the offshore waters of the Indian EEZ.

DISCUSSION

Key Issues in Indian Marine Fisheries

Multi-gear, multi-species, open access fisheries

The present nature and status of the marine fisheries pose very many problems such as: Increased and excessive fishing pressure in the coastal areas up to about 50 m depth zone, optimal exploitation of resources in the inshore waters, indiscriminate exploitation of juveniles of many commercially important species by reducing the mesh size, damage to

the benthos and benthic ecosystem by continuous sweeping of the same ground by shrimp trawlers, decrease in area available in the sea per active fisherman and boat for conducting fishing operations, conflicts among different categories of fishermen particularly between the artisanal and mechanized groups of fishermen, conflicts between those engaged in coastal artisanal fishing and coastal aquaculture, ecosystem degradation. Lack of an implementable fishery management system (Participatory Fisheries Management or Community Based Coastal Resource Management), lack of National Marine Fisheries Policy, need for popularization of the FAO code of conduct for responsible fisheries, absence of an informed management regime at decision making level.

Options for the management of marine fisheries

Sustaining production would need many interventions such as: Responsible fishing, restriction on fishing effort, restriction on fishing area, restriction on fishing gear, enforcement of MFRA. Increasing production, through a difficult task, can be to some extent achieved through: Deep sea/ oceanic fishing, utilization of discards & by-catch, artificial fish habitats, sea ranching, alternatives such as open sea and coastal water sea farming.

Fisheries sensitive areas covered by CRZ

Many coastal areas are sensitive areas. These include beaches, mangroves, lagoons, estuaries, intertidal habitats, rocky outcrops, swamps, mudflats, coral reefs, islands, jetties, wharfs, oceanic islands, small highly populated islands ("Thuruthu") of west coast backwater systems.

Fisheries related activities affected by CRZ

The coastal region has many fisheries related activities which have direct and indirect impacts on the environment, ecosystem and society. These include construction, repair of fish landing jetties, construction of sheds for dry docking boats and storage of fishing gear, engines, construction of fish drying platforms, construction of fish curing tanks, storage sheds, construction of ice plants, cold rooms, ice storages, erection of repair yards for small crafts, diesel and kerosene supply installations, boat building and repair, construction of sheds for net mending, storage, auction of fish, construction of dwelling houses for fishers, public facilities, community halls, places of worship.

Aquacultural activities affected by CRZ

The coastal habitat is impacted by activities related to coastal aquaculture also. These include construction of permanent hatcheries, seawater intake systems, effluent treatment tanks, nursery ponds, grow out ponds, pump houses, seawater reservoirs and similar constructions.

Coastal livelihoods affected by CRZ

People living on the coastal region are impacted in many ways which directly or indirectly (through opportunity loss) affected by restrictions imposed by the CRZ. These include traditional curing of fish in pits and tanks, drying of fish on drying cement platforms, racks, peeling of shrimp in sheds, handling and packaging of processed and semi-processed fish/shellfish in sheds, ice storage, cold room storage of fish and ice vending, storage of dried fish before weekly sale to wholesalers, net mending, outboard engine repair, boat building and repair, traditional fish processing in “*Chappas*” by small scale fish processors, crab and lobster fattening in tanks with seawater pumping, any construction by migrant fishers for dwelling units on beach. These cause immense miseries to the coastal people, especially fishers.

Other fish related activities affected by CRZ

Among other activities, the following deserve special mention. Beach ponds for recreational fish keeping, educational ponds for marine biodiversity, dolphinarium, oceanarium, marine aquaria, turtle conservatories, constructions related to open sea mariculture, laboratories working on live marine fish and shellfish breeding, wet labs where flowing seawater is needed, pollution control labs, coastal fish survey and monitoring stations, fisheries patrols.

Need for Building up an Action Plan for coastal Environment and Resource Management

A detailed and well thought of comprehensive master plan is needed for ensuring environmental and livelihood security in the coastal region. Such a plan should consider, among others, the following elements: Agenda for habitat conservation. Prevention of coastal pollution, habitat deterioration improving coastal resource sustainability, management plans for resource conservation, sustainability, informed utilization, increasing coastal productivity, identification of threatened habitats and restoration, fisheries management and MFRA, environmental issues like bottom trawling, ghost fishing, discharges, spills, other anthropogenic impacts like tourism, aquaculture, mining, coir retting etc., CRZ and implications, impacts of shipping, harbours, tourism, fisheries, recreation on the coastal habitats and resources, comprehensive environment and resource management plans. Such an approach would need synergy between many Ministries and Governmental agencies, public and private sector, NGOs, Vas and the coastal people. Only such a holistic approach would yield the anticipated outcomes for overall sustainability of our coastal zone and its livelihood.

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