LARGE MARINE ECOSYSTEMS :

EXPLORATION AND EXPLOITATION FOR SUSTAINABLE DEVELOPMENT AND CONSERVATION ON FISH STOCKS

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INTEGRATED COASTAL ZONE MANAGEMENT (ICZM) – A VIABLE APPROACH FOR SUSTAINABLE RESOURCE UTILISATION FROM LARGE MARINE ECOSYSTEM OFF MUMBAI

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ABSTRACT

Integrated Coastal Zone Management (ICZM) includes actions that can lead to effective management of coastal resources and strengthening of the national capacity for comprehensive resources management.

We have the regulations like CRZ regulations but there are many considerations in operative implementation of these regulations which influence the decision making. The proper answers to many conflicting issues lies in research and monitoring but ocean research is costly and hence it is necessary to have an exchange of data between the institutes and also establish networks among them.

The ocean off Mumbai has become a major dumping ground thereby affecting the livelihood of fisherfolk and other coastal communities. Hydrographic observations in relation to recurring fish mortalities at Versova frequently pointed to a no oxygen situation in the creek and stressed exigency for new strategies of conservation.

Now a World Bank project plans to shift the sewage discharge 3 to 5 km in the sea and affecting larger marine ecosystem and resources. The proper answers to many conflicting issues lies in ICZM because an appropriate balance between environmental and developmental requirements is the need of the hour and the same has been discussed in the present communication.

Introduction

Integrated Coastal Zone Management (ICZM) is a dynamic and continuous process by which progress towards sustainable use and development of coastal areas may be achieved. A number of international efforts initiated in

the beginning of the present decade were aimed at working towards the development of appropriate strategies and programmes by the year 2000.

Relevant documents from international fora include Chapter 17 of Agenda 21 of the United Nations Conference on Environment and Development (United Nations, 1993), the Noordwijk Guidelines for Integrated Coastal Zone Management (World Bank, 1993), the report of the World Coast Conference (IPCC, 1994) and numerous technical reports released by international organizations, including UNEP (1995), FAO (Clark, 1992; Boelaert-Suominen and Cillinan, 1994), OECD (1993), IUCN (Pernetta and Elder, 1993) and ICZM (1994). Several GESAMP reports (e.g. GESAMP, 1980, GESAMP 1991a; GESAMP, 1994) have addressed the interrelationships between the condition of coastal and marine environment and human activities.

The ICZM includes an important concept of *sustainable development* which implies that present use of marine environment and its resources shall not prejudice the use and enjoyment of that environment and its resources for future generations. Past practices that have neglected this principle are the fundamental cause of many current environmental problems.

A coastal zone comprises various systems, including natural systems such as estuaries, watersheds, coastal seas and socioeconomic systems, such as agricultural and marine production systems and urban settlements. Each of these systems has distinctive properties. A number of developmental activities provide the typical characteristics to the coastal area, which is the subject of management.

The basic task of management is to allocate scarce resources among competing (and often conflicting) users, with the ultimate goal of optimizing the utilization of these resources for the benefit of the society as a whole, both now and in the future because development *inevitably* implies environmental change. The challenge for marine and coastal zone management is to balance short-term development needs against long term sustainability of ecosystems, habitats and resources such as the range of choices and opportunities available to the future generations is not diminished by the consequences of present development choices.

ICZM is a dynamic process that requires continual updating and amendment and differs from a sectoral programme because it has a system perspective and a multisectoral approach. ICZM calls for strengthening of the national capacity for comprehensive resources management. Suggested national measures include multidisciplinary studies, institutional body or mechanism for ICZM, continuing monitoring and assessment, ongoing research programme, policy for accessibility of information, active support for local initiative, education, training and public awareness and coordination of financial support.

Materials and methods

Participatory Rapid Rural Appraisal (Cruze, 1993) approach was adopted to find out the issues; regular coastal environmental monitoring from the creek and nearshore areas in relation to fisheries was done by following standard methods as a part of ongoing research programme, regular meetings and discussions during open sessions held with fisherfolk under extension programmes and various integrative activities were undertaken to identify the organizations for linkages.

Results and discussion

Comprehensive area-specific marine management and planning is essential for maintaining the long-term ecological integrity and productivity and economic benefit of coastal regions. Mumbai coastal area is an unique example where developmental activities started much earlier than the other Indian cities but still traditional and cultural practices and values are intact and prevalent among the fisherfolk.

Mumbai coastal area (Fig.1) is a marine ecosystem with two major fisheries harbours; the Sassoon Docks and the New Ferry Wharf located in the city of Mumbai. During the peak fishing season the operative gears from Mumbai are mainly trawls, purse seines, dol nets, gill nets and hooks and lines.

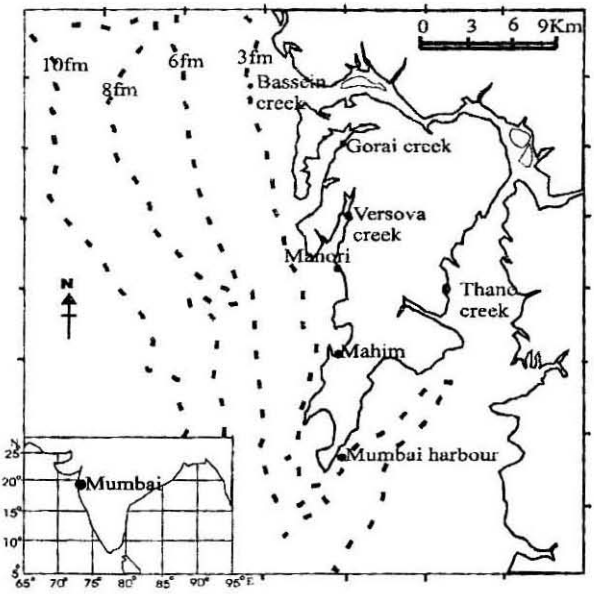

Fig.1 Mumbai coastal area

There are 23 fishing villages in the Mumbai district and there is a high degree of co-operation among the fisherfolk here. A number of co-operative societies are excellently functioning in the district and some of them like from Versova are example for others and are recipient of National awards. There had been a thriving creek and nearshore fishery and major areas in Mumbai included the stretch from Manori-Gorai creek, Versova creek, Mahim creek, Mumbai harbour area to the adjacent Thane creek. However, the scenario is different now and these areas have thoroughly been investigated and are discussed here in detail.

Environmental researches have shown that Arabian sea off Mumbai has a poor dissolved oxygen level. It also has a higher biological oxygen demand (BOD) and chemical oxygen demand (COD) compared to the ideal levels. Moreover, Mumbai produces 2,200 million liters of sewage a day making it India's number one city in sewage production. A study commissioned in March 1997 by the Brihanmumbai Municipal Corporation (BMC) and conducted by the National Environmental Engineering Research Institute (NEERI) evaluated environmental status of coastal areas of Mumbai and ranked beaches in decreasing order of cleanliness from Madh to Bandra, Juhu, Breach Candy, Versova, Worli, Dadar, Girgaum and Mahim. The ranking was based on two criteria – water quality and aesthetic appeal. Both were ranked separately and then combined to give final ranking. The variety and abundance of marine life off Mumbai has suffered alarmingly in the last 30 years. Already fishermen from Mumbai have to steam more than 3 km into the sea in the hope of better catch.

Based on coastal monitoring, Singh and Raje (1998) have stressed the exigency for new strategies of conservation in view of recurring fish mortalities at Versova. Due to coastal pollution in Versova creek only seven out of twelve types of fishing nets are now remaining in operation and their numbers has been reduced. Considering the fact that coastal and marine ecosystem provide biological, protective and food benefits, Municipal Corporation of Greater Mumbai has undertaken the ambitious marine outfall projects at Worli and Bandra to discharge sewage 3 km away from the coastline. As this World Bank assisted project plans to shift the sewage discharge 3 to 5 km in the sea, it will be affecting larger marine ecosystem and resources though the area which is already polluted heavily will gain some respite. These pipelines will be discharging 1,490 m liters of sewage a day which will not only contain the organic waste but industrial discharge from nearly 8,000 industries will also be added to it.

There are number of reasons for the nearshore pollution and coastal degradation which affect marine living resources. Some of the important issues apart from those discussed above are degradation of beaches, the large scale

presence of plastic bags, immersion related ecological problems during Ganeshotsav celebrations, coastal construction and shipping related issues and social conflicts.

We have the regulations like CRZ (Coastal Regulation Zone) notification but there are many considerations in operative implementation of these regulations which influence the decision making. The provisions of the notification has the potential to affect the activities of numerous industries including hotel and tourism, fisheries, construction, real estate, ship building and manufacturing sector and infrastructural projects in Mumbai.

A time has come that National Government is planning to extend the boundaries of the coastal regulation zone to the limit of territorial waters defined under the Maritime Zone Act 1976, under proposed ocean regulation zones (ORZ). Centre proposes to clamp on certain activities / processes which will be detrimental to the environment in the ocean part of the coastal zone. However, more regulations cause conflicts among stakeholders and prospective users. Under such conditions, a proper answer must be found out.

The proper answers to many conflicting issues lies in research and monitoring but ocean research is costly and hence it is necessary to have an exchange of data between the institutes located at Mumbai. There are number of organizations or their centers in Mumbai like BNHS (Bombay Natural History Society), IIT (Indian Institute of Technology), FSI (Fishery Survey of India), CMFRI (Central Marine Fisheries Research Institute), NEERI (National Environmental Engineering Research Institute), CIFE (Central Institute of Fisheries Education), SFD (State Fisheries Department), PCB (Pollution Control Board), various co-operative societies etc. which are related to fisheries and ocean research. There is an urgent need to establish networks among them. The effectiveness of management actions to protect the ocean cannot be assessed without scientific analysis and knowledge. Accordingly, comprehensive protection strategies should incorporate scientific principles as decision making frequently involves considerations other than scientific arguments. Even for the Mumbai area close interaction among scientists and decision makers is essential and if the existing infrastructure of all national and regional agencies is pooled effectively a viable approach for sustainable resource utilization from large marine ecosystem off Mumbai can be worked out. The proper answers to many conflicting issues lies in ICZM because an appropriate balance between environmental and developmental requirements is the need of the hour.

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