Indian Forester, 139 (10) : 861-865, 2013
http://www.indianforester.co.in

ISSN No. 0019-4816 (Print)
ISSN No. 2321-094X (Online)

CHALLENGES IN WILDLIFE CONSERVATION IN SEASCAPES OF INDIA: SCOPE FOR INTEGRATED STRATEGIC FRAMEWORK

V. NAGANATHAN

Arasu Rubber Corporation, Tamil Nadu
E-mail: nag_ifs@rediffmail.com

ABSTRACT

Indian subcontinent is having a long coastline of 8129 km^2 and its Exclusive Economic Zone (EEZ) along with continental shelf supports nearly 3.5 million fishermen population spread over 9 states and 2 island union territories in the country. Marine Protected Areas (MPA) are very different from the terrestrial protected areas. As the marine living systems have no defined space for survival, it warrants a comprehensive and holistic management of the entire marine space. Protected area approach is not followed in true sense in the marine areas. The recent Wildlife Protection (Amendment) Act, 2006 offers management options namely conservation reserves and Community Reserves which provides for achieving the participatory management of the marine areas. Marine Spatial Planning (MSP) is a newly evolved strategy to analyze and manage the three dimensional marine spaces to specific uses to achieve ecological, economical and social objectives through a participatory process. This article attempts to critically study the present marine conservation scenario in India and discuss to propose strategies to overcome the existing difficulties.

Key words : Marine Protected Area, Marine Spatial Planning, Seascape, Conservation Reserve, Community Reserve

Introduction

Marine protected areas (MPA) are very different from terrestrial protected areas. Important factors which contribute to the difference are the nebulous nature of boundaries in the fluid sea and the continuous nature of the ecosystem. Even inland freshwater ecosystems have distinct outer bounds. But there is difficulty in fixing the sanctum sanctorum in case of the marine ecosystem. It is not possible to fence-in the living resources or the critical ecological processes that support them. It is also difficult to have control over the degradation of the ocean system from land based pollution, changes in hydrology or many other ecological disruptions. Long distance dispersal and the vastness of linkages between critical habitats in marine ecosystem require comprehensive management of all their parts. (Costanza *et al.*, 1993; Mooney, 1998).

More critically the marine system in India is not controlled by single statute or legislation. Overlapping of legal jurisdiction of enforcement machineries makes the task more complex. Even though the efforts have been initiated in marine protected areas; they could not be consolidated to ensure conservation in real sense. As the marine living systems have no defined space for their survival, it warrants the management to comprehend the issues holistically to ensure management of the entire marine space, which include both within MPA and outside MPA, as MPA has no real boundaries placed in the marine system. This article attempts to study the present marine conservation scenario in India and suggest possible strategies to overcome the difficulties.

Indian Marine Scenario

The Indian marine area is widespread and it includes the west coast, east coast, Lakshadweep and Andaman and Nicobar Islands. The length of the coastline is 8129 km with Exclusive Economic Zone spread over 2.02 million km^2, of which the continental shelf in itself is 0.50 million km^2. There are 3202 fishing villages with a fishermen population of 3.5 million dependent on the marine resources. Infrastructure for fishing has grown to 1332 landing centres, 6 major fishing harbours, 27 minor fishing harbours, 58911 mechanised vessels, 75591 motorised vessels and 104270 non motorised vessels (CMFRI, 2010). Annual fishery catch varies from 0.53 metric ton to 3.3 metric ton and averaged at 2.7 metric ton during 2000 to 2007 where as the global catch has stagnated at 82 metric ton in the last 15 years.

Of the total 2.7 million km^2 area of marine space, only 6217 km^2 is only brought under Marine Protected Area (MPA) network through 31 MPAs, which is very insignificant and is only 4% of the total area of Terrestrial Protected Areas (Singh, 2003). Coastal and ocean areas range in openness from relatively fixed and land-like systems to highly dynamic and complex systems. The organisms in coral-reef ecosystems, for example, are largely confined to the specific habitats of reef, surrounding soft or hard benthos, and coastal wetlands (Roberts, 1995). The structural framework for reef

Marine spatial Planning (MSP) is the strategy to analyze and manage marine spaces to specific uses to achieve ecological, economical and local objectives through participatory process.

systems is fixed in place and can be mapped much as a terrestrial forest and provides a relatively fixed framework for the interactions of the forest community. The functional links between the water column in reef areas and the benthos are strong, so one can treat the ocean space together.

The marine conservation responsibility is vested with the state forest department in their jurisdiction. The existing system with the state departments are not well equipped to assess and understand the biological diversity of the area and their interactions to perform professional management interventions for ensuring real marine conservation. The field team, for example, in Gulf of Mannar Marine National Park in Tamilnadu is undertaking its protection and management works in the MPA with a limited number of less than 30 contract labour which will not address the purpose of MPA in a holistic way. The higher authorities in charge of the area are also less aware of the intricacies in the issue. The expertise for undertaking underwater monitoring and the huge financial requirement for recurring expenditure on the infrastructure are also important considerations for keeping the required mechanism far from priority. The invisible nature of the happenings in the marine system is also a critical reason for the negligence from the dependent fishermen population and the policy makers.

Existing legal framework

The constitution of India has kept the subjects related to the marine area in all three lists such as union list, state list and the concurrent list. The union list covers the subjects on entering agreements with foreign countries, implementing treaties and conventions; shipping and navigation on inland waterways; maritime shipping and navigation; regulation and development of inter- state rivers and river valleys and also the fishing and fisheries beyond territorial waters. The state list includes subjects related to public health, sanitation, land and fisheries in marine area. The concurrent list covers shipping and navigation on inland waterways as regards to mechanically propelled vessels and factories. There are various ministries involved in the implementation and monitoring of various laws in the marine area as shown in the Fig. 1.

Implications of Wildlife Protection (Amendment) Act, 2006

The earlier forest and wildlife legislations in the Indian subcontinent did not attach due importance to the marine bio-diversity conservation. First marine wildlife protection initiative was brought on record in the Wildlife Protection Act, 1972, which mentioned irrawady dolphin and sperm whale in the schedule which did not gain any attention because of the lack of information on the animals and the difficulties in establishing network for monitoring them as the major concentration of the

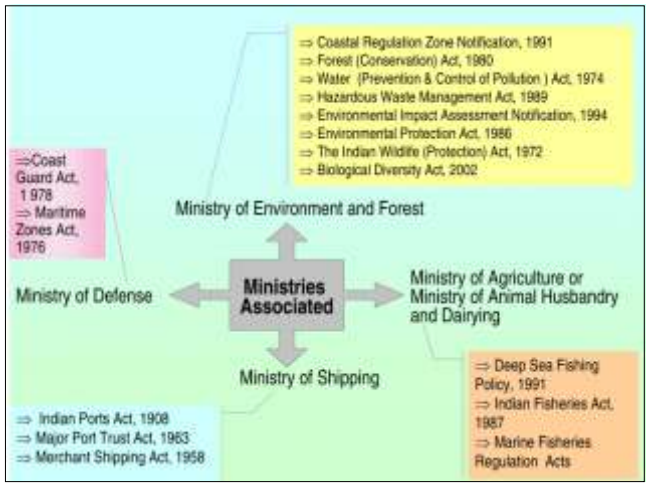

Fig. 1: Ministries and legislations involved in marine system (Source: TERI, 2010)

state forest departments was mainly on the terrestrial wildlife conservation. The recent amendments brought in the Wildlife Protection Act in 2001 and 2006 have included many of the marine organisms such as corals, sea cucumbers, sea fans, sea horses, sea turtles, whales, sponges, etc. This has created awareness among the department functionaries and public and paved way for evolving effective monitoring mechanism.

Legislation always lie in paper until it is executed with due commitment. In the present scenario, the protection status of MPAs and the scheduled marine animals is not in the way as desired in the legislation. The sanctum sanctorum status of the core areas of the MPAs is not effectively protected in the field and the boundaries are porous on all sides. The physical demarcation on the marine space with floating buoys is still a dream unattained, for example in Gulf of Mannar National Park, it was attempted to install buoy boundary demarcation with the project support from United Nations Development Programme (UNDP), which could not materialise because of the unwillingness of the political system and non co-operation of the local fisher folk. The concepts of conservation reserves and the Community Reserves in the Wildlife Protection (Amendment) Act, 2006 for achieving the conservation goals in marine seascape through people participation are yet to be made use of. As legislation has legally binding implications and has a strong social restriction; it needs special understanding for its efficient use to address the growing conservation needs and to regulate the activities in the marine area. Educating and involving the local fishermen population in the planning and responsible handing of marine resources through the existing legislative framework may hold a viable management solution for the existing problems in the seascape management.

Marine spatial planning

The spatial expanse of sea under national jurisdiction can result in new user conflicts which can add to the already existing conflicts. Even then it is pertinent to work on a feasible holistic planning to address the existing scenario with intensity. Marine Spatial Planning (MSP) can be used as an appropriate process and instrument to avoid user conflicts, to manage marine activities more sustainably and to implement area based protection and conservation of marine resources (Frank, 2008). MSP can be defined as "a process of analysing and allocating parts of the three dimensional marine spaces to specific uses, to achieve ecological, economical and social objectives that are specified through a participatory process". It will result in a comprehensive plan or a vision for a marine region. It will also deal with presenting an integrated vision of the spatial aspects of sectoral policies in the areas of, e.g., maritime transport, environmental protection, energy, fisheries and tourism. The sustainability oriented marine spatial plan shall be designed to provide a clear vision of the desired future for the area based on the major site values; a set of strategies and actions for achieving this objective and clear guidance to assist managers in dealing with opportunities and eventualities that arise during the plan period (Zaccharoula *et al*., 2013)

Socio-economical dimension

Indian subcontinent has 9 states and 2 island union territories dependent on fishery resources. Nearly one fifth of the Indian population is surviving on the Indian marine resources. Fishing pressure very significantly affects the population dynamics of the target fishery stock as well as those species that interact with the target stock directly (Borisov, 1979; Goeden, 1982; Holt, 1990; Fogarty *et al.,* 1991). Exploitation will become overexploitation especially with the sessile organisms and those species that are naturally rare, with low reproduction rates or slow growing (Jamieson, 1993; Pauly, 1995). It is also clear that the fisheries exploitation affects food webs and entire ecosystem as a whole (Goeden, 1982). Even quite small – scale fisheries can cause dramatic changes to community ecology and ecosystem productivity when destructive methods of fishing are employed (Saila *et al.,* 1993). The ecological and economic cost of such changes however is only now being calculated and even where such costs have been found to be high, scaling back commercial fishery exploitation has proven difficult. The open nature of the marine fisheries is one of the main cause for much of the difficulty (Beddington, 1995) and has resulted in two major problems which are very difficult to solve.

(1) The attitude of the fishing interest groups who consider marine resources as their common property and their access to such property is an inalienable right.

(2) The overcapitalisation of fisheries, which makes it nearly impossible for those with investments in fisheries to reduce effort to get better harvest.

Sea scape management strategies

What is the minimum information necessary to establish effective marine protected area? Firstly, information must be compiled to provide a rationale for site selection of reserves in the broadest bio-geographic or the landscape means. MSP process shall be considered to comprehend the overall spacial coverage and management protocol. The strategies for designing network of MPAs and other people participatory legal areas such as conservation reserves and 'community reserves' shall consider three approaches;

(1) Preservation of ocean and coastal bio-diversity rich areas such as coral reefs, pearl oyster beds etc., which is proactive in nature to protect and restrict further degradation.

(2) Resolution of conflicts among users, which is interactive in nature to arrive at agreeable regulations in different areas of use by keeping the conservation and livelihood benefits to co-exist and make it a sustainable mechanism aided by people participation.

(3) Restoration of degraded and overexploited area, which is reactive in nature to cure the ill effects of the damages so far done and to facilitate resilience and restoration to regain the bygone.

Regulatory measures such as MPAs, protected species, closed season, closed fishing areas, ban on certain fishing gears and methods, minimum mesh size, minimum legal size of capture (as in chanks) and use of Turtle Excluder Devices (TED) in trawls are also useful strategies for reducing the damages of over exploitation. Spatial closure followed in different states for different vessels (Table 1) is also a strategy, but it has a space component which cannot be verified in the field.

The use of Global Positioning System (GPS) in the fishing vessels to know the area of operation as well as to get an alarm signal whenever the vessel enters the prohibited area as used in Australian marine areas is also a technology linked strategy which can very well act as a monitoring tool for the department functionaries to have a better monitoring network and fool proof system in place for the whole of the seascape in the area.

Table 1: Spatial closures (Source: CMFRI, 2010)

State	Reserved for traditional vessels	Available to mechanized vessels
Goa	Up to 5 km	Beyond 5 km
Kerala	Up to 10 km	<25 GRT: 10-22 km; >25 GRT: beyond 23 km
Karnataka	Up to 6 km	<15m LOA: 6-20 km; >15m LOA: beyond 20 km
Maharashtra	Up to 5-10 fathom	Beyond 10 fathom depth
Tamil Nadu	Up to 3.4 nautical miles	Beyond to 3.4 nautical miles
Andhra Pradesh	Up to 10 km	<20m LOA: 10-23 km; >20m LOA: beyond 23 km
Orissa	Up to 5 km	<15m LOA: 5-10km; >15m LOA: beyond 20 km

GRT- Gross Registered Tonnage; LOA- Length Overall

Overcoming the Challenges

With the ever increasing pressure on the marine resources both from within and from the external sources, it is very much necessary to bring in the entire spread of the marine area of the subcontinent under major legal framework to cover them fully over space. It would be appropriate to have the MPAs as the core area where no exploitation is permitted and the next ecologically important spaces which are adjoining and far, which can accommodate regulated exploitation considering the production potential of the area in the category of 'conservation reserves'. The remaining marine space shall be kept open, with the regulations in place for maintaining the biological resources of the area to meet the livelihood as well as the commercial needs of the dependent stakeholders without destroying the ecology of the area. This can be achieved through stakeholder interactions and bringing such areas under a legal network of 'community reserves' (Fig. 2). The inclusion of the territorial waters in the CRZ I provides an opportunity in setting up protected trees.

Considering the vastness of the marine area, it is suggested that at least 10% of the Indian marine area could be declared as MPAs. Further, 20-25% of the area could be brought under 'conservation reserve' network and rest of the 70-60% of the area could have the possibility as 'community reserves'. Proper demarcation of Indian marine space in GIS based maps will be helpful in allocation to the above three categories. The core MPAs shall be demarcated in maps in red. The conservation reserves shall be kept in colour zone of orange and the community reserves shall be kept in yellow. The colour concept may be used in the float buoys which are to be used for physical demarcation of different management areas. As all the other legislations are regulatory and complementary in nature, the committees formed for the constitution of conservation reserves and community reserves shall include various department representatives related to the area as special members/ invitees and the provisions shall be agreed upon for the area concerned and can also be amended based on the resolution evolved by the committees. The coastal revenue villages in each coastal district shall be represented in each district committee and the boundary of each conservation reserve or community reserve shall be restricted to the district marine limits agreed by the adjacent coastal district committees.

Spatial regulations are to be given priority in conservation reserves as they will harbour more viable breeding and feeding habitats. Temporal regulations are to be used in great deal in the community reserves as they are involved on regular exploitation regime. The migratory species conservation requirement in the identified sites and migratory path ways shall be kept as a

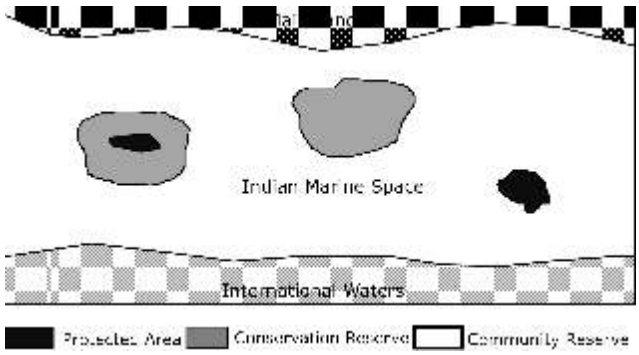

Fig. 2: Representation of seascape with proposed conservation strategy

combination of spatial and temporal restriction especially for whale sharks, turtles, whales etc. The scientific information's available in the field need to be made use of for taking logical decisions in this exercise. The sedentary habitats, sessile animal habitats, and breeding grounds shall be covered in MPA network. The feeding grounds and near surrounds of MPAs which are of ecological importance shall be covered in the conservation reserve network. The other fishing grounds and migratory routes shall be covered in the community reserve network, giving due space for livelihood needs of fishermen population..

Once the objectives are determined and the plan is conceptualised, science can be harnessed to design effective protected areas (Agardy, 1993), but the science of marine protected area itself is in its infancy and very

little in real technical sense has been attempted towards holistic management of the marine resources as a continuum with in national limits. Fisheries, nation and indeed the entire biosphere can benefit from the establishment of marine protected areas at all scales (Agardy, 2000). The new opportunity provided in Wildlife Protection (Amendment) Act 2006 through conservation reserves and the community reserves have to be put to great use as discussed above, which is not available for other countries. Despite incomplete knowledge and incomprehensive science, steps are to be immediately taken, as the rate of devastation happening is much beyond the reported and not brought under any functional monitoring mechanism. By clearly defining the objectives and using science to design the best possible plans for achieving the objectives, we can surely improve our management of marine resources and activities before the health of the seas succumb to the status of no recovery.

भारत में समुद्र के नजदीकी भागों में वन्यजीव संरक्षण की चुनौतियां : संयुक्त रणनीतिक संरचनाओं की संभावनायें

वी. नागनाथन

सारांश

भारतीय उपमहाद्वीप में 8129 वर्ग कि0मी0 लम्बा समुद्री तट है। उपमहाद्वीप में 3.5 मिलियन मछुवारों की आबादी है, जो समुद्र पर आर्थिक रूप से निर्भर है। यह आबादी देश के नौ राज्यों और दो उपमहाद्वीपीय संघ राज्य क्षेत्रों में फैली हुई है। समुद्री रक्षित क्षेत्र, पार्थिव रक्षित क्षेत्रों से एकदम भिन्न है, क्योंकि समुद्री रिहाय"ाी पद्धति में जीवितता के लिए कोई परिभाषित क्षेत्र नहीं है। इसके लिए समस्त समुद्री क्षेत्र का समग्र और व्यापक प्रबंधन आवश्यक होता है। समुद्री क्षेत्रों में रक्षित क्षेत्रों की पद्धति का सही अर्थों में प्रयोग नहीं किया जा सकता है। हाल ही में बने वन्यजीव रक्षण ½संशोधन½ अधिनियम 2006 में प्रबंधन विकल्पों को प्रस्तुत किया गया है, यथा: संरक्षित रिजर्व और सामुदायिक रिजर्व, जो समुद्री क्षेत्रों में सहभागिता प्रबंधन के पक्ष में है। सहभागिता प्रक्रिया द्वारा परितंत्रीय, आर्थिक और सामाजिक तीनों उद्देश्यों की पूर्ति के लिए समुद्री क्षेत्र को विश्लेषित तथा प्रबंधित करने के मापदण्डों हेतु समुद्री स्थानिक योजना एक नव विकसित रणनीति है। प्रस्तुत लेख में भारत के वर्तमान समुद्री सरंक्षण का सूक्ष्म अध्ययन करने का प्रयास किया गया है और साथ ही वर्तमान समस्याओं से पार पाने के लिए रणनीतियां सुझाई गई हैं।

References

Agardy, T. (2000). Information needs for marine protected areas, *Scientific and Societal Bulletin of Marine Science*, 66 (3); 875-888

Agardy, T. (1993). The science of conservation in the coastal zone: new insights on how to design implement and monitor marine protected areas. International Union for the Conservation of Nature, Gland, Switzerland. 72pp.

Beddington, J. (1995). Fisheries, the primary requirements. *Nature*, 374:213-214.

Borison.V. (1979). The selective effect of fishing on the population structure of a species with a long life cycle. *J. Ichthyol*, 18:896-904.

Caddy, J. and Sharp, G. (1986). An ecological framework for marine harvest investigations FAO Fish/Tech. Pap.3 82 FAO, Rome.

CMFRI (2010). Present and future scenarios of India Marine Fisheries, http:// www.cmfri.org.in/uploads_en/divisions/files/present%20and%20future%20scenario%20of%20Indfian%20marine%20fisheries.pdf.

Costanza, R., Kemp, R.W.M and Boynon, W.R. (1993). Predictability, scale and biodiversity in coastal and marine ecosystems, implications for management, *Ambio* 22: 88-96.

Dayton, P.K, Thrush, S.F., Agardy, M.T. and Hofman, R.J. (1995). Environmental effects of marine fishing. Aquat, Conserve, Mar. Freshw, *Ecosyst,* 5: 1-28

Frank Maes (2008). The international legal framework for marine spatial planning Marine Policy, 32:797-810

Fogarty M.J., Sissenwine, M.P. and Cohen, E.B. (1991). Recruitment variability and the dynamics of exploited populations. *Trends Ecol. Evol*, 6: 241-246.

Goeden,G.B. (1982). Intensive fishing and a "keystone" predator species; ingredients for community instability. *Biol. Conserve*, 22: 273-281.

Holt, S.J. (1990). Recruitment in marine populations *Trends Ecol. Evol*, 5: 231

Lamieson, G.S. (1993). Marine invertebrate conservation: evaluation of fisheries over-exploitation concerns. *Am. Zool*, 33: 551-567.

Moony, H.A. (1998) Ecosystem management for sustainable marine fisheries, *Ecot, Appl*, 8: S1

Pauly, D. (1995). Anecdotes and the shifting baseline syndrome of fisheries. *Trends Ecol. Evol*.10 : 430

Roberts, C.M. (1993). Effects of fishing on the ecosystem structure of coral reefs. *Consery Biol*, 9: 988-994.

Saila, S.B., Kocie, V.L. and Memanus, J.W. (1993). Modeling the effects of destructive fishing practices on tropical coral reefs, *Mar. Ecol. Prog. Ser*, 94: 51-60

Singh, H.S. (2003). Marine Protected Areas in India Indian, *J. Marine Sciences*, 32(3):226-233

Tegner, M.J., Baseh, L.V. and Dayton, P.K. (1996). Near extinction of an exploited marine invertebrate. *Trends Ecol. Evol* 11: 278-280

TERI (2010). Review of marine and coastal policies in India:http://www.teriin.org/teri-wr/projects/tbtpresentations/sreviewmarine.pdf.

Zacharoula, Kyriazi, K., Frank Maes, Marijn Rabaut, Magda Vircx, Steven Degraer (2013). The integration of nature conservation in to the marine spatial planning process Marine Policy. 38: 131-139.