

# REVIEW OF THE SWAMINATHAN COMMITTEE REPORT ON THE CRZ NOTIFICATION

---

FINAL REPORT SUBMITTED TO UNDP, NEW DELHI



**Prepared by:**

Aarthi Sridhar and Kartik Shanker  
Ashoka Trust for Research in Ecology and the Environment (ATREE),  
Bangalore

**In consultation with:**

Rohan Arthur, Nature Conservation Foundation, Mysore  
Debi Goenka, Conservation Action Trust, Mumbai  
Bharat Jairaj, Citizen, consumer and civic Action Group, Chennai  
T. Mohan, Advocate, Chennai  
Sudarshan Rodriguez, Marine Conservation Analyst, Chennai

**Citation:**

Sridhar, A., R. Arthur, D. Goenka, B. Jairaj, T. Mohan, S. Rodriguez and K. Shanker. 2006. *Review of the Swaminathan Committee Report on the CRZ Notification*, UNDP, New Delhi.

**CONTACT DETAILS****Aarathi Sridhar and Kartik Shanker**

Ashoka Trust for Research in Ecology and the Environment (ATREE)  
659, 5<sup>th</sup> Main Road, Hebbal,  
Bangalore 560092. India  
Ph: +91-80-23533942  
E-mail: aarthisridhar@yahoo.co.uk  
E-mail: kartikshanker@ces.iisc.ernet.in

**Bharath Jairaj**

Citizen, consumer and civic Action Group  
8, Fourth Street, Venkateswara Nagar, Adyar,  
Chennai 600020. India  
Ph: +91-44-24460387 / 24914358  
E-mail: cag.india@gmail.com

**Debi Goenka**

Conservation Action Trust  
B 502 Glengate, Hiranandani Gardens, Powai  
Mumbai 400076. India.  
Ph: +91-22-25707207  
E-mail: debi.cat@gmail.com

**T. Mohan**

Old no #6, New No 11, Ill Avenue,  
Besant Nagar  
Chennai 600090. India.  
Ph: +91-44-24903415  
E-mail: devika@xlweb.com

**Rohan Arthur**

Nature Conservation Foundation  
3076/5, 4th Cross, Gokulam Park  
Mysore 570002. India.  
Ph: +91-821-2515601  
E-mail: rohan@ncf-india.org

**Sudarshan Rodriguez**

Flat 2B, Adithya Apartments  
38 Balakrishna Road, Valmiki Nagar, Thiruvanmiyur,  
Chennai 600041. India.  
Phone: +91-44-52019470  
E-mail: sudarshanr@yahoo.com

**Disclaimer:** The opinions expressed in this report are solely those of the authors and not necessarily that of the institutions they represent.

## TABLE OF CONTENTS

Contents	Page no
Executive Summary	3
Introduction	5
<b>1. Overview</b>	<b>6</b>
1.1 The Coastal Regulation Zone Notification, 1991 and issues with its implementation	6
1.2 Overview of the Swaminathan Committee Report	8
1.3 What does the Swaminathan Committee recommend?	9
<b>2. Recommendations of the Review of the Swaminathan Report</b>	<b>11</b>
2.1 Major Coastal Management Issues in the Swaminathan Report	11
2.1.1 Implementation and Accountability	11
2.1.2 Public Participation in Coastal Zone Management	12
2.1.3 Refining the Categories of the CRZ	12
2.1.4 Environment Impact Assessments	13
2.1.5 Risk and Hazard Management	13
2.1.6 Adopting International Best Practices	14
2.2 Recommendations for Reform in Coastal Zone Management	15
2.2.1 Implementation	15
2.2.2 Participatory Processes for Developing Coastal Management Legislation	15
2.2.3 Identifying CRZ Categories and Restrictions	16
2.2.4 Social and Environmental Impact Assessments	16
2.2.5 Risk Management	17
2.2.6 Comprehensive Study on Best Practices	17
2.2.7 Research and Future Studies	17
2.2.8 Mapping	17
<b>3. Specific Comments on the Swaminathan Report</b>	<b>18</b>
3.1 Comments on Chapter 2: Coastal and Marine Resources – Threats and Safeguards	18
3.2 Comments on Chapter 3: Coastal Regulation Zone Notification Revisited	23
3.3 Comments on Chapter 4: Suggestions of the Committee for Integrated Coastal Zone Management	25
3.4 Comments on Chapter 6: A National Coastal Zone Management Action Plan	27
References and Endnotes	30

## EXECUTIVE SUMMARY

In July 2004, the Ministry of Environment and Forests (MoEF) set up an Expert Committee headed by Prof. M.S. Swaminathan to carry out a comprehensive review of the CRZ Notification. Its mission was to enable the MoEF base its coastal regulations on strong scientific principles and to devise regulations that would meet the urgent need for coastal conservation and development / livelihood needs. The Swaminathan Committee submitted its report in February 2005, a month after the Indian Ocean tsunami. The UNDP commissioned the Ashoka Trust for Research in Ecology and the Environment, Bangalore to undertake a review of the Swaminathan Committee Report (hereafter referred to as the Swaminathan Report) titled – *Review of the Swaminathan Committee Report on the CRZ Notification*. The recommendations from this review will assist the UNDP in its future collaborations with the MoEF, particularly on the subject of integrated coastal area management.

In constituting the Swaminathan Committee, the MoEF acknowledged the deficiencies with the CRZ and with the overall design and implementation of coastal area management in the country. This review recognises that the Swaminathan Committee was an important beginning in addressing the issues plaguing the Indian coastline. In analysis however, the Report falls short of being a robust document providing a clear future direction. The goals of the Swaminathan Committee were commendable but ambitious, and the process of planning for an enhanced management regime will have to continue far beyond the exercise of the Swaminathan Committee. This review focuses on the next steps that need to be taken in order to continue the above process and begin implementation of some of the useful suggestions contained in the Swaminathan Report. Principally, this review recommends that future coastal planning process be guided by principles of scientific rigour and a participatory process to planning and implementation bearing in mind the related goals of sustainable development and socio-ecological resilience.

Much of the Swaminathan Report is built around advocating for change from mere regulation to Integrated Coastal Zone Management (ICZM). Chapters 3 and 4 provide the ideological basis for the new changes in legislation recommended by the Swaminathan Report. Chapter 3 provides an account of the issues with the CRZ notification and Chapter 4 provides detailed recommendations with respect to the terms of reference outlined for the committee. In these chapters, the Report adopts a stand that there have been several problems with the implementation of the CRZ Notification and that management rather than regulation should be the principle behind an improved structure.

However, serious reservations still remain with the Swaminathan Report. Principally, we find that the final chapter and the annexures outlining the structure and mechanism for implementing the National Coastal Zone Management Action Plan are completely unrelated to the analysis and recommendations of the earlier chapters. It is however possible to overcome this inconsistency and other discrepancies outlined in this review, by launching a complementary set of studies, and planning exercises, which are truly national in scope and participatory in approach. Specific steps are suggested in this review to facilitate the smooth transition from the existing CRZ notification to an enhanced coastal management mechanism. **The main recommendations of this consultative review are:**

1. A **clear timeframe for implementation** is necessary for the implementation of the relevant recommendations of the Swaminathan Report based on strategies and recommendations made in this review document.
2. It is recommended that a **state-wise review of the CRZ notification** be initiated as a follow-up to the Swaminathan review to guide the development of new legislation covering the following subjects:

- Addressing existing violations of the CRZ notification and their status prior to the introduction of the new notification such that the new amendment/notification does not overlook violations of the CRZ.
- Mechanisms for implementing the present CRZ notification despite its grey areas.
- Providing clarity on the interpretation of various clauses and terms in the current notification including the interpretations of CRZ clauses by various MoEF orders and legal judgements.
- Policy recommendations for improved coastal legislation.
- Developing measures for punitive action within the CRZ notification. These punitive measures and guidelines for taking action should be outlined in the text of notification itself rather than in the text of the Environment (Protection) Act.
- Evolving inter-departmental roles, responsibilities and mechanisms for future coastal zone management.
- Guidelines for development / rehabilitation activities in the tsunami affected states in the context of the provisions of coastal laws.

3. There should be major public consultations/workshops inviting various NGOs and resource persons to present the findings of the Swaminathan Report. A participatory process for developing changes to legislation should be adopted through a) consultative group meetings, b) task forces, c) trainings and workshops for stakeholders and d) following specific decision making protocols.

4. Incorporation of hazard and risk management and flood plain management and wetland drainage design in the overall coastal management mechanism and in the designing of a flexible vulnerability line with proper guidelines and procedures for changes. However, the provision for change of the vulnerability line should not be misused for dilution to pave for development activities in this sensitive area. The use, efficacy and impacts of bio-shields before implementing plantations along the coast must be reviewed. These reviews should be supplemented with complete impact assessment studies (on the local ecology and socio-economy of the sites in which these plantations are being located), identification of alternatives and assessments of all the species currently being considered for their ability to function as bio-shields.

5. No significant change in the categorisation of the CRZ is suggested in this review. However the review emphasises the need to decide on categories and restrictions based on specific ecosystems (like the island groups) and using spatio-temporal protection measures wherever suitable for the identification of Ecologically Sensitive Areas.

6. There is a need to develop a specific list of projects for each of the different zones on the coast for which EIAs become mandatory (notwithstanding any list prepared under other legislations). These must employ rigorous BACI (Before-After-Control-Impact) designed studies that are ongoing processes, lasting as long as the development activity is being conducted. A national policy on strategic environmental assessments (SEA) should accompany the demand for SEAs tailored to suit requirements in coastal areas.

7. A rigorous study must be commissioned to identify suitable best practices in other countries based on the leads provided by the Swaminathan Committee. This would also include their policy/ legislative responses to coastal hazards and development challenges.

8. Future research and detailed review based on primary and secondary biological, legal and sociological information is required to guide policy changes. This must be accompanied with mandatory activity-based monitoring along the coast.

9. Detailed geo-referenced maps need to be prepared for the entire coast to facilitate a GIS-based approach to coastal zone management. This should be in the public domain and in user-friendly formats along with all other CRZ related information to encourage informal and widespread regulation of the law.

## INTRODUCTION

In July 2004, the Ministry of Environment and Forests (MoEF) set up an Expert Committee headed by Prof. M.S. Swaminathan to carry out a comprehensive review of the CRZ Notification. The Swaminathan Committee submitted its report in February 2005, a month after the Indian Ocean tsunami. Its mission was to enable the MoEF base its coastal regulations on strong scientific principles and to devise regulations that would meet the urgent need for coastal conservation and development / livelihood needs. The committee was given a fairly broad mandate to review the notification and its implementation, identify current gaps, and suggest mechanisms of addressing them.

The UNDP has been assisting the Government of India in its efforts to establish a strong legal framework for coastal policies and coastal zone management, particularly in the tsunami-affected states. Better coastal protection is fostered by greater participation of civil society groups and communities in the policy strengthening process. The implications of the Swaminathan Committee report are far reaching, especially in terms of post-tsunami recovery and development planning. The UNDP therefore commissioned the Ashoka Trust for Research in Ecology and the Environment, Bangalore to undertake a review of the Swaminathan Committee Report (hereafter referred to as the Swaminathan Report) titled – *Review of the Swaminathan Expert Committee Report on the CRZ Notification*. The recommendations from this review will assist the UNDP in its future collaborations with the MoEF, particularly on the subject of integrated coastal area management.

This review examines the extent to which the recommendations of the Swaminathan Report meet the requirements of integrated coastal zone management – a stated rationale for the creation of the Swaminathan Committee. Further, it is argued here that serious reservations still remain with the recommendations of the Swaminathan Report. Addressing these should precede the implementation of any new initiative of legislative revision. Specific steps are suggested in this review whereby the relevant recommendations of the Swaminathan Report can be implemented.

# SECTION 1

## OVERVIEW OF THE COASTAL REGULATION ZONE NOTIFICATION AND THE SWAMINATHAN COMMITTEE REPORT

### 1.1. The Coastal Regulation Zone (CRZ) Notification, 1991 and issues with its implementation

In response to growing environmental deterioration in the 1980s and 1990s, and prompted by an earlier letter on coastal protection from the then Prime Minister of India Mrs. Indira Gandhi, in 1981, the Ministry of Environment and Forests (MoEF), of the Government of India (GoI), introduced *Environmental Guidelines for Beaches* in 1983. It followed this with the promulgation of environmental legislations such as the Coastal Regulation Zone (CRZ) Notification, 1991. The CRZ Notification applies to the entire Indian coast, including the Lakshadweep and Andaman & Nicobar Island groups. The notification regulates a range of activities along the coastal stretches on the landward side measuring a width of 500 metres from the High Tide Line. The notification applies to coastal stretches of seas, bays, rivers, estuaries and backwaters, which are influenced by tidal action. The notification also covers the area between the High Tide Line (HTL) and the Low Tide Line (LTL). The area under the jurisdiction of the notification is called the Coastal Regulation Zone (CRZ).

The notification prohibits certain activities within the CRZ, which could have a detrimental effect on the sensitive coastal ecosystem. At the same time, it permits other activities under specific conditions. In essence, the CRZ notification recognised that the coastal area was a sensitive area<sup>1</sup> and only those activities that required the waterfront and foreshore area could be permitted and that too only in select areas with proper safeguards.

The entire CRZ of the country is further classified into different zones: CRZ –I, II, III and IV.

**CRZ – I(i)** areas are those that are ecologically sensitive areas (including marine parks, national parks, sanctuaries, mangrove areas, wildlife habitats, heritage areas, historically important areas, areas likely to be inundated by global warming etc.

**CRZ –I(ii)** areas refers to the inter-tidal zone lying between the LTL and the HTL.

**CRZ –II** areas are those that are already developed close to or upto the shoreline (this is with reference to the geological features as of 1991). These "developed areas" are only those within municipal limits or in other legally designated urban areas which are already substantially built up and which have been provided with drainage, approach roads and other infrastructural facilities, such as water supply and sewerage mains.

**CRZ – III** areas are those which are relatively undisturbed and which do not belong to either Category-I or II. These include the coastal zone in rural areas (developed and undeveloped) and also areas within municipal limits or in other legally designated urban areas, which are not substantially built up. By definition then, all rural areas are classified as CRZ – III and some urban areas could also be included in this category.

**CRZ –IV** are those coastal stretches in the Andaman & Nicobar Islands, the Lakshadweep Islands and small islands, except those designated as CRZ-I, CRZ-II or CRZ-III.

While the general prohibitions apply to all the CRZ categories, the permitted activities can be undertaken only in certain areas of these 4 CRZ categories. For each of the CRZ categories, the regulations differ.

It was only in the year 1998 that the MoEF (under orders from the Supreme Court of India in 1996) constituted the State Coastal Zone Management Authorities (CZMAs) and a National Coastal Zone Management Authority to ensure the implementation of the notification. The structure introduced by the MoEF after the Supreme Court directives had two tiers (National and State CZMA) but in some states it is supplemented with another tier at the district level such as in Tamil Nadu and in Karnataka. Within one

year of the CRZ Notification, each of the coastal states was expected to prepare State Coastal Zone Management Plans (CZMPs). These plans were to be examined by the MoEF in light of the CRZ notification and then approved. However, none of the states have fully approved plans and the MoEF has only granted conditional approval for these plans. The states are expected to revise and resubmit revised plans and maps. Since no state possesses a fully approved CZMP till date, implementation of the CRZ notification has been abysmal. Without a fully approved and operational CZMP, it is not possible to arrive at a clear or even quick estimation of areas where certain activities are permitted. The present status is that all over the Indian coastline, violations of the CRZ notification abound. Relative to the number of violations, in response, there has been insufficient punitive action from implementing agencies.

The CRZ notification was far-reaching in its vision and scope, and was unique in attempting to bring under a single directive, the effective management of the Indian coastline under a sustainable and multiple-use paradigm. Since its introduction, however, the notification has been amended 19 times (upto 24<sup>th</sup> July 2003), each amendment permitting more activities within the area declared as CRZ. The MoEF and the state governments constituted several committees to review matters related to its implementation. Negligible efforts were made to involve civil society groups in these reviews or in the finalisation of the various amendments to the notification. Indeed, of the 19 amendments (as of 24<sup>th</sup> July 2003) to the notification, only three called for objections and suggestions from the public<sup>2</sup>. The content of these committee reports are therefore bereft of critical inputs on issues of ground level implementation and the current problems facing coastal areas. The fact that coastal states responded to the notification with various degrees of prevarication and lack of enthusiasm (demonstrated by their reluctance to prepare CZMPs until directed to do so by the Supreme Court), together with the numerous dilutions of the CRZ have led to considerable undermining of the efficacy of this ambitious legislation.

It has been pointed out earlier, that the CRZ Notification needs to be strengthened and improved in order to effectively manage our coastal areas<sup>3-4-5-6</sup>. Specifically, earlier recommendations to this order include the following:

- A review of the CRZ Notification should take place in order to strengthen the protective provisions of the notification.
- The MoEF should rescind those amendments to the CRZ notification, which had an overall effect of diluting its protective provisions.
- The State Coastal Zone Management Plans must be finalised by the State CZMAs and should be drawn based on principles of participatory planning and adopting a precautionary approach. The MoEF should approve the CZMPs after careful consideration and without causing unnecessary delay. This review contains suggestions on procedures and principles useful for drafting these coastal zone management plans.
- The identification of CRZ – I areas should be a priority and must be attended to immediately.
- The HTL and LTL and the other demarcating lines of the CRZ should be identified and demarcated on the ground<sup>7</sup>.
- There are several clauses that require interpretation and clarification from the MoEF, particularly related to land use in the post-tsunami context<sup>8</sup>. These include questions on the permissibility of reconstructing authorised damaged structures in CRZ–I areas and other No Development Zones of the CRZ-III areas, the identification of areas for rehabilitation in the absence of a functional CZMP, the verification of the legitimacy of damaged or demolished structures.
- The CZMAs should be assisted in their functioning by district CZMAs and the village panchayats must be involved in ensuring the implementation of the approved CZMPs.
- Besides the above, environmentalists, lawyers and other experts have made specific suggestions for implementation, a few of which find mention in the Swaminathan Committee report.



## 1.2. Overview of the Swaminathan Committee Report

In constituting the Swaminathan Committee, the MoEF acknowledged the deficiencies with the CRZ and with the overall design and implementation of coastal area management in the country. The mandate of this committee defined by the Ministry of Environment and Forests in their Terms of Reference included 1) suggesting scientific principles for integrated coastal zone management (based on inputs from earlier reports of expert committees and international best practices) 2) recommending methodologies required for the conservation and protection of various coastal and marine resources and 3) recommending amendments and changes to the CRZ notification and the regulatory framework based on the above information (1 and 2).

The earthquake and the tsunami of December 2004 caused the committee to base its report on the notion of disaster mitigation – “a wake up call” as the report terms it. Indeed these tragic events also led governments and other practitioners to understand its significance in coastal area management. This approach is commendable and timely but must be balanced with other equally important demands on integrated coastal management such as adequate protection to ecologically sensitive areas, monitoring and strengthening the resilience of coastal ecosystems and facilitating community rights and livelihoods that are in consonance with the dynamism of the coastal/marine ecosystem. The committee places great emphasis throughout its report on seeking pragmatic solutions to coastal management, combining state of the art ecosystem science with social and economic analysis to guide management.

Principally, the Swaminathan Report recommends:

1. A rationalization of management boundaries based on coastal vulnerability,
2. Moving away from mere ‘regulation’ to the larger concept of ‘integrated management’ and replacing the categories of ‘Coastal Regulation Zones (CRZ-I to IV)’ with ‘Coastal Management Zones’ (CMZ I to IV), based on ecological importance, coastal vulnerability, and other socio-cultural concerns. However, there has been some reshuffling of activities to be permitted under each of these categories.
3. Creating a new institutional structure specifically geared for coastal management, including the establishment of a National Institute for Sustainable Coastal Zone Management.

A considerable part of what the Swaminathan Report attempts is encapsulated in Chapter 6, where they define the coastal management zones. These mirror the Coastal Regulation Zone in geographical terms, with four zones dealing with the same categories that the CRZ dealt with, except that the word ‘management’ replaces ‘regulation’. One agrees with the basic premise that the approach to the coastal zone should be management rather than merely regulation, which is only one aspect of the former. This change in philosophical stance is a significant one that acknowledges:

- Current uses of the coastal area for direct resource-based livelihoods and infrastructure needs of the country.
- Diversity in uses of the coast and its resources in future.
- Participation of these users in the decisions related to the use and management of the coast and its resources.
- The fragility of coastal and marine ecosystems and the need for conservation in order to continue deriving services and benefits from them.

A coastal management regime could roughly be judged by examining how well it provides for the above. As stated earlier, much of the rest of the Swaminathan Report is built around advocating a call for change from mere regulation to Integrated Coastal Zone Management (ICZM). The Report provides a brief account of the nature of coastal and marine habitats and resources and issues with the current legislation

and management practices. However, a change in governance philosophy must be accompanied by precise mechanisms for eventual practice. Therefore, while the ICZM approach and change in management perspective that the Swaminathan Committee advocates is laudable, it falls short in recommending concrete mechanisms for implementation of ICZM. Many steps are required to convert the recommendations provided in the Report into action, and undoubtedly, the greatest challenge will be in drafting the legislative amendments and regulations that will eventually define India's coastal management practices.

### **1.3. What does the Swaminathan Committee recommend?**

The Swaminathan committee has laid out its recommendations in three sections, beginning with guiding principles, recommendations based on their terms of reference, and a national strategy for implementation. Below, we summarise in brief their recommendations in each of these sections

#### ***Guiding principles for coastal zone management***

The Swaminathan Committee identifies 12 guiding principles that should determine decisions on coastal zone management. Principally, these include:

- Ecological, cultural, national and livelihood security
- Inclusion of a wider coastal zone comprising the offshore waters 12 nautical miles from the coastline in addition to the coastal belt on the landward side.
- Adoption of a participatory approach for coastal management.<sup>9</sup>
- Ensuring conformity with national and international laws while outlining revisions of the law
- Adopting sound scientific and ecological principles for coastal zone management
- Adequate utilisation of the precautionary principle, particularly to overcome the problem of scientific uncertainty while deciding on the negative impacts of human activities on the coast.
- 'Polluter pays' principle and the 'public trust' doctrine to regulate coastal development
- Promoting the regeneration of coastal ecosystems such as mangroves and coral reefs including coastal forestry.

#### ***Recommendations based on the Terms of Reference***

***TOR 1:*** *To review the reports of various Committees appointed by the Ministry of Environment and Forests on coastal zone management, international practices and suggest scientific principles for an integrated coastal zone management best suited for the country.*

The committee suggests that:

- the recommendations of various earlier review committees must be taken into account. The Swaminathan Committee states that several problems with the CRZ have arisen because of the selective approach of the MoEF in choosing the most convenient recommendations from the earlier committees' reports.<sup>10</sup>
- collective and democratic initiatives are required for preparation and implementation of the CZMPs
- area and region specific plans must be prepared
- there must be a regulatory framework for the implementation of these plans
- local self governance must be encouraged
- the jurisdiction of various government departments need to be clearly defined
- environmental and social impact assessments must be carried out for coastal development activities

**TOR II:** *To define and enlist various coastal and marine resources and recommend the methodology for their identification and the extent of safeguards required for conservation and protection*

The committee highlights the importance of quantifying (identifying, inventorying and monitoring):

- biodiversity, including the development of indices
- coastal habitats and resources, including ground water
- cultural and other heritage sites

The committee also points out the importance of:

- the protective role of geomorphological features
- coastal bio shields

**TOR III:** *To revisit the CRZ notification 1991, in light of the above and recommend necessary amendments to make the regulatory framework consistent with recommendations on (a) and (b) above and the Environment Protection Act, 1986*

- The committee points out that numerous complex issues (property rights, equity, benefit sharing, gender) are not addressed in the CRZ, and need to be taken into account in any new formulation.
- They recommend that an all India coordinated research project is required to identify and fill gaps in ongoing work particularly in the areas of ecological economics and inter-generational equity.
- The committee points out the urgent need to locate sensitive areas and hotspots, and to create GIS based site maps that could help in the development of site-specific plans.
- They suggest that coastal regulations are not based on HTLs, which are typically difficult to demarcate and may vary.
- They reiterate the importance of incorporating livelihood strategies into implementation plans.
- They stress that enforcement must be accompanied by strict penal provisions guided by the public trust doctrine which fixes responsibility on bureaucrats/ public officials to ensure implementation.
- They note that coordination of government departments is critical to coastal zone management.
- They recommend that well-known detrimental activities such as the construction of seawalls and sand mining should be banned from most areas.
- Vacant plots in the coastal zone should be left open, permitting only vital activities on the coast.
- The committee has numerous suggestions on fisheries related development, permitting only those activities relevant to the coastal zone.<sup>11</sup>
- The committee notes that tourism can be promoted in identified zones in a conditional manner.
- The committee explicates the roles of the CZMAs providing an important role for local communities in these CZMAs and in the overall implementation of the notification.

### ***Recommendations for a National Coastal Management Programme***

To implement the above, the committee recommends the constitution of the following:

- A separate division in the MoEF dedicated to coastal management issues.
- A National Board for Sustainable Coastal Zone Management.
- National and State Coastal Zone Management Authorities.
- A National Institute for Sustainable Coastal Zone Management with 2 regional centres for the Andaman & Nicobar Islands and Lakshadweep islands.
- An All India Coordinated Research Project on Integrated and Sustainable Coastal Zone Management.
- A three-tier structure akin to the current CZMAs but with the National Board for Sustainable Coastal Zone Management at the top.

## **SECTION 2**

### **RECOMMENDATIONS OF THE REVIEW OF THE SWAMINATHAN REPORT**

The goals of the Swaminathan Committee were commendable but ambitious, and the process of planning for an enhanced management regime will have to continue far beyond the exercise of the Swaminathan Committee. This review focuses on the next steps that need to be taken in order to continue the above process and begin implementation of some of the useful suggestions contained in the Swaminathan Report. In the first part of this section, we focus on the major issues in the Swaminathan Report that need to be considered and dealt with in the reform of coastal zone management. In the second section, we outline specific steps that need to be taken in order to bring about this reform.

#### **2.1. MAJOR COASTAL MANAGEMENT ISSUES IN THE SWAMINATHAN REPORT**

##### **2.1.1. Implementation and accountability**

While the Swaminathan Report provides an alternative structure for coastal management, it does not really tackle the problems with the existing notification, which is presently in force. One of the important concerns with the present notification is that it has been severely violated and no action has been taken on the said violations. Irrespective of whether a new amendment/notification is introduced or not based on the Swaminathan Report, the earlier violations of the CRZ notification cannot be overlooked. As observed by the Supreme Court in the ICELA case ‘Enactment of a law, but tolerating its infringement, is worse than not enacting law at all’<sup>12</sup>.

The Report also contains a detailed account of the earlier committees and their tasks, but there is no discussion on the various orders of the High Courts in the country and their interpretation of the notification. It has been pointed out by environmental lawyers in particular that the lack of clarity and definitions in the CRZ notification has led to varying interpretations by the courts.<sup>13</sup> At the same time, the MoEF has issued circulars (e.g. the doctrine of ‘infilling’ or building between empty plots) from time to time and these are not examined in the Swaminathan report. The legal status of these circulars is not clear.

While discussing the implementation strategy of the CRZ and the requisite institutional infrastructure there is no mention in the Report of state departments of planning, municipal offices and other local bodies, panchayats and their roles in either the old or new management framework.

The Swaminathan Report as well as most of the critiques of the CRZ highlight dilution of the law, lack of implementation by states, lack of resources and infrastructure for implementation of the law. Among many reasons for the above was the lack of ownership of the legislation by the states and their poor implementation capacities. In fact, on these very two issues there have been no studies or evaluations. The training and capacity building efforts by the Centre were not adequate. The lack of ownership at the state level was a result of very poor outreach and awareness programmes by the Centre. As pointed in the Swaminathan Report, NGOs spent most of the time on challenging violations at court and through formal channels of appeal to the state governments and the MoEF. Very few outreach and awareness programmes at lower levels were carried out (either by state govt. or NGOs) except for a few NGO initiatives<sup>14</sup>. The Swaminathan report has not done a systematic evaluation of the experiences of the states in implementing the CRZ notification. The evaluation of statewide experiences would be essential in guiding the development of any new legislation or improving the efficiency of existing implementation mechanisms. For e.g., the strategy employed in Karnataka of creating the post of a Divisional Forest Office (DFO) exclusively for implementing the CRZ at the district level, along with an assisting officer from the Department of Fisheries stands out as an interesting institutional mechanism. Other aspects that

should be investigated and evaluated are the degree of implementation among states using criteria such as number of public interest litigations filed on the implementation of the CRZ, quality of the CZMPs prepared and action taken against violations. It must be remembered that since implementation lies with the state, the formulation of any revision in the existing legislation needs to incorporate earlier experiences of the respective state governments. Therefore state-level consultations involving the concerned government departments besides civil society groups become a prerequisite to any legislative revision exercise. A national exercise on the above therefore is essential.

One of the reasons for the widespread violation of the CRZ notification is the vagueness surrounding the mechanism for punitive action. The only place where punitive action is outlined in the text of the law is contained in the Environment (Protection) Act, 1986. It is suggested that detailed punitive measures and guidelines for taking action be outlined in the text of the changes to the coastal management legislation itself rather than for changes to be made to the text of the Environment (Protection) Act.

### **2.1.2. Public Participation in Coastal Zone Management**

The Swaminathan Report has suggested two approaches in its section on coastal zone management (page 27 of the Report); a top-down approach with no participation by the people and the bottom-up approach in which there is active public participation in coastal development and planning. Given that the 73<sup>rd</sup> and 74<sup>th</sup> constitutional amendments empower panchayats and local bodies to take decisions on several key aspects of land use, it would have been appropriate for the Committee to have strongly recommended that there are severe limitations with a top-down approach and promote instead, the use of 'bottom-up' principles in planning. The failure of the Committee to emphasise and promote public participation as a primary recommendation is a massive flaw, since local communities are most influential in the conservation and utilisation of these natural resources. It is however recognised that the participatory process is easily open to the interplay of local politics and vested interests. It is suggested that here a top-down approach is necessary with a clear articulation of the goals of planning for coastal management to prevent the degeneration of the participatory approach. As suggested in the philosophical arguments contained in the Swaminathan report, and from trends in recent research and practice these goals are sustainable development and socio-ecological resilience of systems on the Indian coast.

Ironically, the Swaminathan Committee itself did not co-opt any persons from civil society organisations or local communities in consultations, workshops or meetings. Neither did the MoEF, on its part, insist on a participatory process for this committee although the Terms of Reference of the Swaminathan Committee did permit the Committee to associate with other experts and conduct site visits and meetings if necessary. Even after the report was made public, the MoEF did not solicit comments or suggestions from the public although they might publish an amendment in future based on the Swaminathan Report. The Report also does not append any of the suggestions that were made in the only two meetings that the Swaminathan Committee had with select NGOs. There should be major public consultations/workshops inviting various NGOs and resource persons to present the findings of the Swaminathan Report. It will be of tremendous value to involve a representative cross-section of the public at the planning stage before actual changes are made to the legislation.

### **2.1.3. Refining the Categories of the CRZ**

The Swaminathan Report makes changes in the existing categorisation of the CRZ, by changing the term 'regulation' to 'management'. Besides this it also calls for other changes in the nature of activities to be permitted in each of the categories<sup>15</sup>. It is felt that this is the point where there is maximum disconnect in the Report. Virtually nothing contained in the Annexures of the Report find any resonance with much of what is elaborated on in the first few chapters. Therefore, this aspect of categorisation of the CRZ and deciding on the restrictions they entail requires considerable reworking.

On the whole, the CRZ is a significant alternative approach to the conservation of natural resources, habitats and biodiversity. While terrestrial models depend on the exclusion of people, the CRZ is based on the exclusion of activities that are harmful to the environment. It thus sets aside certain areas where only certain activities are permitted. This, by itself, is a remarkably inclusive approach to the protection of the environment and resources. In practice, it needs to be even more inclusive in the planning of which areas permit what activities. However, in being inclusive, it should not fail to incorporate equity issues for local communities and needs to maintain its precautionary approach while deciding development patterns for coastal and marine ecosystems.

#### **2.1.4. Environment Impact Assessments**

The Swaminathan Committee has strongly recommended mandatory and completely transparent Environment Impact Assessments (EIA) and Social Impact Assessments of development activities taking place in coastal areas. It must be understood that the EIA notification (also issued under the Environment Protection Act 1986), under which most EIAs in the country have been mandated, has come under severe criticism from environmentalists and scientists alike. The criticism is principally directed against the poor quality of the EIAs and the numerous dilutions and subsequent ineffectiveness of this legislation in executing an important subject such as impact assessment. It is apparent therefore that for the coastal area, a tremendous amount of data would need to be collected and disseminated to make the EIA process more accurate, honest and transparent. In addition, it is very important to stress that environment impact assessments mandated under the CRZ should not merely be a stamp of approval given as certification before development begins, which has been the case with the EIA notification.

#### **2.1.5. Risk and Hazard management**

Generally speaking the present CRZ legislation does not have a feature of hazard and risk management although the need for the same has been articulated before. Several research papers highlighting the need to incorporate the same already exist<sup>16</sup>. The vulnerability line/mapping exercise broadly mentioned in the Swaminathan Report could perhaps be seen as a step in this direction if it incorporates this.

#### ***Vulnerability Line***

While risk assessment and management based on hazard mapping is an excellent and rigorous framework, it needs to be set in an appropriate social context. Here, the implication of vulnerability to setback can vary from zone to zone, to favour appropriate resource use by local communities and to regulate industrial and developmental activity on the coast. It is of concern that there is no deadline mentioned for the demarcation of the vulnerability line. There is the danger of repeating the same nightmare of the CRZ, which is that violations and unregulated development will continue in the various zones until the vulnerability line is demarcated. The new legislation will also need to be housed in the older law. A mechanism must be created to accommodate change in this vulnerability line from time to time and review the same periodically especially in certain cases such as after earthquakes, cyclones, other extreme natural events and man-made disasters, where new data and findings may suggest management changes. Hence guidelines and procedures for changes in the vulnerability line should be worked out. The conservation spirit of the notification must consistently manifest in the text of the notification. Of significant concern is also the fact that the present criteria outlined in the Swaminathan Report is merely indicative and not exhaustive to include factors such as population density and climate change. The concept of setbacks should be used bearing in mind that for some communities such as fishing communities, their habitats must be located by the shore.

Flood plain management and wetland drainage should be important criteria used in identification of the vulnerability line. Its importance has become quite apparent with the tsunami and the recent flooding in the coastal districts of Tamil Nadu. This could be done on high-resolution contour mapping in these areas. Many of the tsunami and recent flood affected coastal villages in Tamil Nadu were low-lying areas. In fact more than 90 percent of Nagapatinam districts' coastal villages are in low-lying areas<sup>17</sup>.

### ***Bio-shields***

The use of exotics in the putative “Bio-shield” is strongly advised against. There should be some concern about the unmitigated zeal with which the “bioshield” concept is being promulgated as a win-win solution in the wake of the tsunami. While it certainly has some benefits for local communities in the short term, one is uncertain about how much protection it affords the coast in actual terms. The last thing required is the further transformation of the coasts into groves of fast-growing exotic species. It is also potentially quixotic to invest large amounts of energy and funds in the regeneration of mangroves in habitats where the primary conditions that led to their decline still exist. It may be instead important to more completely understand what those conditions are before large-scale eco-engineering operations like this are undertaken. Where possible, the regeneration of mangrove, beach and dune vegetation and coastal forests should definitely be considered, but the conditions under which they will be warranted and successful would be limited when compared with the much more important task of understanding and protecting coastal processes against the primary influences affecting it. We need to move away from knee-jerk, short-term and limited remedies that appear to be largely reactions to the tsunami. The committee very wisely recommends against this sort of reaction when rejecting the use of sea walls and other structures that will change current systems and beach dynamics, and we need to inject a little of the same circumspection when employing “bio-shield” principles as well. The problems of the coast go well beyond the scope of simple engineering (whether they are hard or soft engineering solutions).

Access and visibility of the seashore /sea is highly crucial for fishermen as part of their daily decision-making<sup>18</sup> and the bio-shields could impede/hinder the same. Furthermore, there have been cases of conflicts between the forest department (who promoted and implemented afforestation projects) and local communities<sup>19-20</sup>. It is also not desirable to link carbon sequestration (refer pg 92, section 11, pg 98, point xiii) as a goal or major benefit from the creations of bio-shields. Viewing bio-shields from a climate change/carbon sequestration angle may encourage a forestry paradigm on coastal systems, which is not desirable.

### **2.1.6. Adopting International Best Practices**

The coastal zone management practices in other countries listed in the Swaminathan Report could contain some practices that maybe adopted in India. However, the report does not really present a critique of these practices from other countries. It is difficult for instance to discern what could be the nature of “community based programmes” in Canada (page 20 of the Report) or the “relatively efficiency” of “integrated coastal management programmes” of Sri Lanka (page 22 of the Report). However, it is recognised that certain practices appear to be appropriate for India such as the practice in the US of “implementation through state agencies with a resource management mandate...or environmental responsibilities” such that they are eventually linked with a lead state agency receiving federal funds (page 19-20 of the Report). This appears to be a useful management practice that could be relevant in India where state authorities often neglect functioning as a result of funding uncertainties. The Swaminathan Report also suggests that there are best management practices / approaches suggested by international bilateral and multilateral agencies (Chapter 1.3.3, pages 22-25) which may serve as good examples to further develop India's coastal regulation policies.

## **2.2. RECOMMENDATIONS FOR REFORM IN COASTAL ZONE MANAGEMENT**

The recommendations made in this section are designed to facilitate a smooth transition from the existing CRZ notification to a better coastal management mechanism. The Swaminathan Report has set the ball rolling in the direction of integrated coastal zone management. From the discussion in the earlier section, this report makes the following recommendations in order that the relevant suggestions of the Swaminathan Report can be implemented.

### **2.2.1. Implementation**

**Timeframes:** The primary requisite of the Swaminathan Report is a clear timeframe for implementation of its own recommendations based on the recommendations made in this review document.

**Statewise follow-up review of the CRZ Notification:** It is recommended that a state-wise review of the CRZ notification be initiated as a follow-up to the Swaminathan review. The aim of this review would be to identify factors that impede implementation and also identify deficiencies within the existing notification. As a state-wise review, the experiences of the various states in implementing the notification would be evaluated. Implementation will be assessed by analysing activities permitted in the various CRZ. This review should additionally assist in addressing the following subjects:

- Addressing existing violations of the CRZ notification and their status prior to the introduction of the new notification. Clearly, the new amendment/notification cannot annul violations of the CRZ.
- Mechanisms for implementing the present CRZ notification despite its grey areas.
- Providing clarity on the interpretation of various clauses and terms in the current notification. This would include clarifying the interpretations of CRZ clauses by various MoEF orders and legal judgements.
- Policy recommendations for improved coastal legislation.
- Developing measures for punitive action within the CRZ notification. These punitive measures and guidelines for taking action should be outlined in the text of notification itself rather than in the text of the Environment (Protection) Act.
- Evolving inter-departmental roles, responsibilities and mechanisms for future coastal zone management.
- Guidelines for development / rehabilitation activities in the tsunami affected states in the context of the provisions of coastal laws.

As has been recognised earlier as well, this needs to be a participatory process, inviting suggestions from the public, with hearings being held at the regional offices of the MoEF. The final decisions taken on the nature of activities to be permitted in the CRZ should be based on the precautionary principle approach. These decisions to permit or allow certain activities should be ranked with reasons attributed to them and should be made publicly available.

### **2.2.2. Participatory Processes for Developing Coastal Management Legislation**

In addition to the findings of the above Follow-up review of the CRZ, the action plan for developing new coastal legislation should include the following processes:

**1. Consultative group meetings:** Specific groups need to be constituted involving all the appropriate stakeholders in a particular region.

**2. Task Forces:** Expert groups may need to be constituted to gather primary and secondary information on physical, biological, socio-economic and legal aspects of coastal management.



**3. Workshops and training for informed decision making:** While the principle of involving local communities should be followed, communities often do not have the tools or information to arrive at informed decisions. A truly participatory process must make efforts to provide communities and other stakeholders with both information and methods to translate their knowledge into decisions. Therefore, a process of sharing information and skills must accompany the consultations with various stakeholder groups on coastal legislations and management.

**4. Decision making protocols:** There needs to be specified protocols that are fair and transparent to arrive at decisions based on the available information and inputs from stakeholders. This may include decision-making workshops for a truly consultative process. Parallel to the introduction of legislation, a Strategy and Action Plan must be developed which will highlight the methodology to implement the legislation. This would need to include outreach and capacity building /training workshops for the coastal states and must be followed by the states repeating the same exercise at the district level.

### **2.2.3. Identifying CRZ Categories and Restrictions**

No significant change in categorisation is suggested in this review. While CRZ I remains a useful category, and CRZ II a necessary one, the other categories can be further sub-divided. For example, CRZ III encompasses a fairly wide range of uses, not all of which should be subject to the same regulations. For example, fishing villages need to be subject to a very different set of setback zones, and construction regulations than say, industry or tourism. CRZ IV also needs to be sub-divided to meet the different ecological and sociological contexts between the Lakshadweep Islands and the Andaman and Nicobar Islands.

The identification and protection of key ecosystems (Ecologically Sensitive Areas) is a cornerstone of the Swaminathan Report. It is suggested in this review that ecologically important and pristine inter-tidal habitats and soft-bottom communities be considered for protection. In addition, it may be useful to think beyond mere spatial protection, and include spatio-temporal protection measures as another tool for management. Particular attention should be paid to fish spawning aggregations in the identification of such areas in the marine space. To allow for spatio-temporal management measures particularly for the marine areas calls for a flexibility in the management plans and their implementation mechanisms. This needs to be borne in mind in the drafting of the CZMAs and in formulating the management structure for the revised coastal regulation.

### **2.2.4. Social and Environmental Impact Assessments**

There is a need to develop a specific list of projects for each different zone on the coast (particularly for the new proposed changes in legislation) for which EIAs become mandatory (notwithstanding any list prepared under other legislations). Certain zones or regions however, will be demarcated as ‘no development zones’. Procedures under the EIA notification in turn should ensure that coastal systems are accorded a special status attracting rigorous assessment requirements. Best-practice EIAs involve the most rigorous BACI (Before-After-Control-Impact) designed studies that are ongoing processes, lasting as long as the development activity is being conducted. This process, linked to truly independent ecological and sociological monitoring, feeds back to the development process, and helps in course correction before chronic disasters occur to ecosystems or communities as a result of the development. The entire process should be subject to periodic external audits to ensure compliance and that the highest standards are being maintained. The “polluter-pays” principle that the committee recommends later in its report should be applied in any reference to EIAs as well, with the industry bearing the cost of impact assessment.

Social assessments are suggested of all policies, programmes, plans and projects, in addition to environmental assessments. It is recommended in this review that a national policy and guidelines on strategic environmental assessments (SEA) accompany the demand for social impact assessments and that these are tailored to suit the requirements in the coastal areas.

#### **2.2.5. Risk Management**

**Vulnerability line:** Until the vulnerability lines or set backs are decided, the existing CRZ notification will have to be implemented. Clear timelines and deadlines should be developed and communicated for the demarcation of the vulnerability line. The provision for change of the vulnerability line should not be misused for dilution to pave the way for development activities in this sensitive zone. Flood plain management and wetland drainage should be important criteria used in identification of the vulnerability line. Distinctions in the applicability of setbacks for different habitations must be illustrated clearly.

**Bio shields:** Indigenous species should be sourced and utilized whenever possible. Where possible, the regeneration of mangrove, beach and dune vegetation and coastal forests should definitely be considered, depending on the availability of suitable conditions under which they will be warranted and successful. The promotion of bio shields must be preceded by social and environmental impact studies to prevent future conflicts or negative impacts.

#### **2.2.6. Comprehensive Study on Best Practices**

A review must be commissioned to identify best practices in other countries based on the leads provided by the Swaminathan Committee. This would also include their policy/ legislative responses to coastal hazards and development challenges. The specific management practices and approaches suggested by multi-lateral and bi-lateral agencies also need to be fleshed out.

#### **2.2.7. Research and Future Studies**

In several instances (outlined in Section 3 of this document), research and fresh studies would precede the implementation of the Swaminathan Report. Some of the recommendations of the report itself need to be verified with primary research. There needs to be a far more detailed review and analysis of primary and secondary biological, legal and sociological information on the coast, before this can feed adequately into a policy framework for the coast. This also needs to be done in a geographically specific framework as cases and sites differ substantially from each other. Many of the activities recommended in the coastal zone by the Swaminathan Committee need to be supplemented with mandatory activity-based monitoring and impact studies. These would be of an ongoing nature and needs to be incorporated in future changes to the CRZ notification.

#### **2.2.8. Mapping**

Detailed geo-referenced maps need to be prepared for the entire coast to facilitate a GIS-based approach to coastal zone management. This can serve not just in the analysis of land use and development of policy, but also for implementation on the ground. Afsah et al., 1997 state that the role of the regulator is substantially reduced when reliable information is in the public domain<sup>21</sup>. There is increasing evidence that public information can increase the role of informal regulation and that informal regulation does play an important role in enforcement<sup>22</sup>. Reporting of violations increases when the public is more aware of regulations and their importance. Therefore CRZ related information must be made publicly accessible and in user-friendly formats to encourage informal regulation of the law.

## **SECTION 3**

### **SPECIFIC COMMENTS ON THE SWAMINATHAN REPORT**

The Swaminathan Committee had an ambitious task ahead of it and to its credit it has highlighted several useful concepts that are central to the approach of ICZM, which it advocates for the management of the Indian coast. However, the report is not without deficiencies. Some of these are errors and oversights of a benign nature – possibly the result of hastily getting the report out in the public domain following the December 2004 tsunami. Other reservations with the report are more serious and can have far reaching negative implications on the way coastal areas will be managed as the proposed modifications are based on these. This section articulates the concerns with specific statements contained in the report and the proposed modifications for coastal management that it recommends. It is hoped that this will illustrate the need for the strategy indicated in Section 2 of this document.

The most striking problem with the report is that it attempts to be scientific and exhaustive but fails to provide the necessary evidence by means of even a single reference. This makes it difficult to understand the scientific basis for the recommendations of the report. It should have been possible for the committee to put together an exhaustive and scientific document on coastal zone management containing references to numerous prior studies and reports on threats to coasts and strategies for conservation and sustainable utilisation. It has also been of concern to environmentalists that the report does not bear the signature of all members of the Swaminathan committee. This seemingly minor lapse is actually fairly significant considering that this is an official government report.

#### **3.1. Comments on Chapter 2: Coastal and Marine Resources – Threats and Safeguards**

2.1.1 and 2.1.2: Surprisingly the Swaminathan Committee (ostensibly geared to safeguarding coastal environments and resources) begins this chapter by placing much emphasis on the exploitation of hydrocarbons, placers and other minerals. These are the first to be discussed and alarmingly emphatic statements are made about the need to encourage their exploitation to meet national priorities. The statement articulated here is a political position and not one that is necessarily environmentally sound. The significant environmental issues that arise from their extraction are given very short shrift, at least in timbre, if not in intention. Little attention is given later in the report to the significant, if under-explored potential of alternative, and potentially cleaner sources of energy that coastal areas may possess, such as tidal and wind energy sources. While these alternatives are not complete replacements for more conventional sources of power, they can be used to subsidize the environmental impacts of these sources wherever possible. Most alternative energy options are currently costlier than conventional sources, with the possible exception of wind energy. However, they need strong encouragement since their environmental impacts are far lesser than conventional sources and hence they serve as environmental subsidies.

2.1.4: The section on fresh water has no reference to the existing laws on groundwater extraction. There is also no reference to the Supreme Court's order to exercise the precautionary principle even in the use of groundwater<sup>23</sup>. While the report does make a remark in Section 4.1.2 about declaring ground water a social resource and advocates the sustainable management of aquifers, there is no mention of a comprehensive ground water policy and its implementing mechanism specialised for the coastal region.

2.1.5: The section on renewable energy sources only deals with Ocean Thermal Energy Conversion (OTEC) and tidal energy. The suggestion of OTEC in the islands should be treated with caution. The impact of the OTEC as acknowledged in the Swaminathan Report is a sudden change in temperature, which can be detrimental to the health of the coral reefs. The report would have benefited from a detailed

listing of options before prescribing OTEC and other forms of energy generation in sensitive areas such as the islands.

2.2.1 Areas of aesthetic value and heritage sites: The CRZ notification ensured protection for areas of outstanding beauty, heritage sites and sites of aesthetic value. However, the lacuna in the notification was that there were no mechanisms for identifying such areas and sites. The Swaminathan Report mentions that the Development Plans of the civic authorities alone can ensure the protection of these sites, but this is not unique only of heritage sites. The local authorities will have to be involved in the implementation of all aspects of the notification just as the new coastal management regime will have to provide a protection mechanism for a range of features. The report fails to mention that there is still no adequate mechanism or plan in the country dedicated to the conservation of cultural heritage in particular. This is illustrated by an absence of a national heritage policy. Many states have not even legislated on this matter despite significant appeals from civil society to do so. The report does state that heritage, archaeological and aesthetic sites need identification and protection, but does not really provide the methodology for doing so other than leaving this to the MoEF, the Archaeological Survey of India and the State Departments of Archaeology. Since this responsibility was never executed in the past, it is wholly possible that this important clause will remain ignored despite the Swaminathan report's observation. However, there can be a significant difference if steps and methodologies for implementation are also indicated.

2.3.0: Introductory paragraph: limited endemism and extinction risk in the sea. The discussion is highly simplistic and does not take into account the increasing body of literature that casts considerable doubt over this contention. Despite the fact that there are fewer barriers to species transfer than on land, the combination of life history, dispersal patterns, and other factors nevertheless creates considerably high regional endemism in the oceans, leading to definite hotspots of endemism in the ocean<sup>24</sup>. For instance, much recent research has shown that the threats to the ocean from regional extinction risk are higher than previously thought<sup>25</sup>. In particular, species can be driven to population extinction fairly rapidly under over-harvesting pressure. The threat posed by invasive and exotic species in the marine environment as well has received much recent attention, and has the ability to drive native flora and fauna very quickly to extinction<sup>26</sup>.

2.3.2: The need to safeguard and encourage the livelihood requirements of fishing communities needs a word of caution on the scale of operations being undertaken. While coastal livelihoods of sustenance communities should definitely not be compromised, there should be a transparent and unambiguous distinction between these and more large-scale commercial operations whose functioning near the shore could potentially have a very significant negative impact on the coastline and nearshore habitats. The threats from certain kinds of fisheries needs to be highlighted such as from trawlers especially deep-sea trawlers (foreign and domestic) and from bottom-trawling operations within the territorial waters of the nation. Considering that the recommendations of the report include management measures for the offshore region, it is surprising that the report makes no mention of the earlier fisheries related reports such as the Murari committee report. There is also no definition of the public facilities that the report recommends should be provided for fishing communities. This needs attention since these are terms used in legislation and that requires clarity.

2.4.1 Mangrove regeneration: This step can be most effectively and efficiently meted out only if the local community is actively involved, the fishing community in particular. They should be a part of all such efforts and need to be informed on the ecological role of mangroves and their possible role in mitigating disasters. The statement in the Swaminathan Report that the conversion of mangroves into aquaculture ponds reduced after the Supreme Court's orders is not true. On the contrary it has been reported that local communities and panchayats had to fight against aquaculture agencies in places like Muthupet in Tamil Nadu and found little support from the State authorities, MoEF and Aquaculture Authority (Pers. Comm. T.Mohan, Advocate, Chennai High Court).

2.4.2: “This nutritional advantage, the exotic marine life of different hues and shapes...” - it is necessary to shy away from terms that carry heavy ecological meaning. The term ‘exotic’ can be easily done away with, because it is considerably loaded. Section on Coral Reefs: There is no living barrier reef in the Lakshadweep. Additionally, in the next paragraph, the report talks of seagrasses in Kavaratti and Andaman and Nicobar Islands. In fact, seagrasses grow in many of the Lakshadweep atolls, not merely in Kavaratti. In Agatti for instance, seagrass fishery is an important source of protein, particularly during the monsoons. In the functions of coral reefs, only the non-human related functions are mentioned. Coral reefs provide a range of essential goods and services for human communities which make them all the more valuable and necessary to maintain in good health. In the next section on Threats to Coral Reefs, it is important to note that, apart from destructive fishing, non-destructive fishing is debatably the single most important local anthropogenic disturbance on coral reefs, significantly lowering ecosystem functioning, and being a big player in the precipitation of ecological phase shifts. Along with sedimentation, changes in land use (as seen in the Andaman Islands) are perhaps one of the most dramatic threats to coral reefs. This includes land use changes, which in some parts of the islands are further inland, than the 500-metre line<sup>27-28-29</sup>. Thus, in areas such as the Andamans, even when strictly implemented, the CRZ has not been able to adequately protect coral reefs since it has had little control over the land use changes further inland. Hence, in some areas in the Andaman Islands, either the area to be regulated under the coastal management regime would have to be much further inland than other mainland coastal areas, or there should be some interface between the coastal management plan and other management regimes further inland. In fact, in ecosystems such as small islands, detailed guidelines for various sectors such as agriculture, construction, housing and harbour works would need to be developed. Another major cause of disturbance on coral reefs is ship groundings, which gets no mention in the document. In the Management Approach section, perhaps the most important need for management is a proper understanding of resource extraction practices and requirements of local communities, matching that against the carrying capacity of reef resources – few good studies of this nature exist in the country today. There are a few examples such as that of the Pacific Fishery Management Council, which banned bottom trawling specifically for the conservation of reef areas. There are also examples where large marine areas were closed to specific fishing gear. These include areas where bottom trawling was closed in regions deeper than 700 fathoms and ecologically important areas within 700 fathoms where specified gear types were banned<sup>30</sup>.

2.4.3 Seagrass Beds: There is an inherent contradiction in the document that needs to be addressed. While on the one hand, the Swaminathan Committee admits that ‘large scale exploitation of marine algae is depleting [seagrasses]’, it suggests, “a few economically important species of algae such as *Gracilaria edulia* could be cultivated in the sea grass beds on a large scale”. Given the fact that our seagrass beds are very important, highly threatened and largely ignored ecological communities, they should be left as inviolate as is possible, without promoting their use for large-scale projects. India is not rich in seagrass beds, and the few meadows we have house the last remnant populations of the highly endangered dugong. If one is serious about dugong conservation, seagrass habitat conservation cannot be neglected. In this context, it is recommended that the position against coastal engineering constructions be strengthened.

***Other observations:***

No mention is made throughout Chapter 2 on inter-tidal habitats and rocky pools. The initial CRZ notification considered inter-tidal areas as important, but there appears to be little appreciation of these systems being important ecosystems in their own right that need more attention. Apart from being areas where some of the most important concepts of ecological theory about competition, disturbance and diversity have been tested and developed, they are vitally important resource areas for humans. A large number of marginal communities make their living from inter-tidal habitats, and a larger proportion of women are directly involved in inter-tidal and rocky shore gleaning than in other types of fishery. These

ecosystems are also the first to be affected by sewage disposal, beach erosion, oil spills and other pollution events. While many inventories exist in India of species that thrive in inter-tidal areas, there is still need for a proper understanding of the status of these habitats across the Indian coastline, and of the ecosystem goods and services they provide.

No mention is made of soft-bottom communities, which are often the communities worst affected by trawling operations<sup>31</sup>. Soft-bottom communities sustain benthic food chains and help in maintaining populations of fish; sustained trawling can often cause them to completely switch state, by losing species and becoming practically mono-dominated by trawling-resistant species. This can result in eventual collapses in coastal fisheries as well, apart from the significant biodiversity consequences. These need special attention, from a research and conservation perspective.

Apart from the mentioned ecosystems, the importance of temporal changes in the distribution of ecosystem resources is nowhere made evident in the review of coastal and marine resources. Particularly glaring by its absence is the importance of spawning aggregations of fish and the need to protect them. Without internal mechanisms (traditional practices) or external directives (fisheries management), fishing communities often target these vital aggregations of breeding fish, since they are spatially and temporally explicit. Spawning aggregations are particularly vulnerable since they result in the removal of large reproducing adults from the population, which could have very significant impacts on the population structure and eventual sustainability of the fishery. Spawning aggregations need to be identified in Indian waters: where traditional practices exist to protect these aggregations, they should be strengthened and supported, where they do not, new management options should be considered.

2.4.6 The section on sea turtle nesting reflects a complete inadequacy of analysis and understanding of the available information. Apart from Orissa, Satish Bhaskar's surveys and other records reveal that sea turtle nesting occurs along the entire Indian coast. This has been known for more than twenty-five years<sup>32</sup>. More recently, the Government of India – UNDP project conducted surveys of the entire coast, and substantial information is available to base coastal management with reference to sea turtles from these surveys. These reports illustrate that there is substantial literature already existing that has identified management recommendations for the conservation of marine species.<sup>33</sup> Similarly, for other ecosystems such as mangroves and coral reefs, there are rich resources, which have already identified management and conservation recommendations. These need to be the sources from which recommendations should be incorporated into any future management plans for the Indian coast.

2.4.7: There is no mention about problems associated with afforestation as well as planting exotics such as casuarinas (please see section 2.15, on bio-shields on pg no 14 of this report).

2.4.8 Marine parks and sanctuaries: The report does not provide an analysis of existing provisions namely the provisions of the Wild Life (Protection) Act especially some of the deficiencies and shortcomings of the same. Nor does it deal with the status and success of current marine protected areas in the country.

2.5 Management Approach: The report lacks the framework and analysis to achieve coastal conservation and management. Ideally the section on coastal geomorphic systems on pg 46, Section 2.5.0 onwards describing the features and formations in coastal systems should have followed a log frame approach. In other words, the management approach should have been drawn from the list of threats as against each feature. It is a widely used and accepted tool of object-oriented planning employed in resource management, conservation and policy work<sup>34</sup>. In many of the cases the management approach only addresses a few threats to the specified feature. It could have followed a sequence where the listing of threats and their root causes precedes the identification of a management approach addressing each of the root causes. The absence of such a logical approach becomes a major lacuna of the overall strategy of the entire report and that contained in the section on coastal geomorphic systems. The threats and consequent

management approach advocated in the report are not often related. There are some ambiguities such as restricted sand mining in one section, but discussion on banning the same activity in another section. There are also other points that merit more explanation:

P50: A few industrial plants are permitted on cliff tops. There is no explanation why industries should be located on cliff tops of coastal areas, which were earlier considered ecologically sensitive areas.

P51: Threats to sand bars and specifically the problem associated with damage to sand bars from flushing of sewage in the seas is not mentioned.

P53: There is no rationale of why further reclamation should be permitted as a management approach, particularly since this has proven to be a big threat to coastal ecosystems. It is recommended that the word 'ban' be used instead of the word 'restriction' for reclamation. A ban on disposal of treated waste is probably also a good measure. Since monitoring is difficult, coastal settlements should be encouraged to recycle and reuse treated wastewater.

P53 and 54: Terms such as 'Reclamation for essential activities' are ambiguous and need proper definition.

P54: In point 6 on Zonation, reference to recreation should only mean tourist *access* only and not full-fledged tourism. Aquaculture should not be allowed in or near lagoons. Discharge of even treated effluents and the dumping of dredge spoil will also be detrimental to the coastal ecosystem.

P57: Salt Marshes: The management approach should be to designate these as CRZ –I. In such areas, if salt panning was the continuing (authorised) practice, then the same could be permitted without change in scale or land use. Natural salt marshes should be declared as ecologically sensitive and no change in land use should be permitted nor should its conversion to aquaculture or salt panning.

2.7.2: The Committee appears to have tried treading carefully around the issue of aquaculture, but has in fact made recommendations that are detrimental to coastal ecosystems. While seeking immediate action against those who have destroyed mangroves, the Committee has sought enhanced aquaculture activities within the CRZ area. The Committee should have quite clearly stressed that the Supreme Court order only permits traditional aquaculture to continue within the CRZ and ought to have emphasised the implementation of the other aspects of the Supreme Court's order. There is currently very poor enforcement of the above order. In most cases, these farms do not have effluent treatment facilities or settling ponds. Unproductive agricultural land is also not to be allowed for conversion to aquaculture use as stated in the Swaminathan Report in Page 62. There is no mention /discussion of traditional aquaculture at all. While mariculture, which is advocated in the Swaminathan Report, could provide livelihood opportunities to fishing communities, it cannot be allowed without proper guidelines. Furthermore, different interventions should have environmental assessments and certainly clear guidelines and process. It is in this light that regulation of the region beyond the inter-tidal zone becomes important in the new management regime.

2.7.3 Ports and Harbours: This section does not highlight the problems caused by ports at all; there is no list of threats or any management approaches. This is alarming considering that several poor port designs have had tremendous negative impacts on the marine ecosystem. The report fails to note that there was a significant change in the legislation in 1997, when environmental clearance powers were transferred from the MoEF to the Ministry of Surface Transport. This amendment was contested in the Delhi High Court and still has not been disposed. The report does not acknowledge the environmental impact of this transfer in power from the MoEF to the MoST.

2.7.5 An explanation of water extraction by coastal settlements (both urban and rural) was warranted in the discussion on growing coastal settlements.

2.7.6 No mention is made in the Swaminathan report of the conflicts arising with local communities as a result of the development of tourism.

2.8.2 Cyclones: The report makes no mention of the frequency of tropical cyclones in the Bay of Bengal, which amount to about 4-5 per year – a figure that is steadily increasing<sup>35</sup>. Even the basic relevant scientific detail and information related to cyclones is absent in the report. Therefore it appears that the Swaminathan report lacks a sound research approach particularly on this section and in its final analysis.

2.8.4 Sea level rise: The report does not provide the implications of sea level rise on coastal land areas. There are many studies and models showing scenarios of sea level rise. It is important to take this into account since the United Nations Environment Programme (UNEP) identifies India among the 27 countries that are most vulnerable to sea level rise<sup>36</sup>. The Energy Research Institute (TERI) in New Delhi has conducted a district level ranking of vulnerability to a one-meter sea level rise by constructing a weighted index<sup>37</sup>. Some studies state that in the absence of protection, a one-meter sea level rise on the Indian coastline is likely to affect a total area of 5763 square km, and put 7.1 million people at risk<sup>38</sup>. Another case study of Orissa and West Bengal estimates that in the absence of protection, a one-meter sea level rise would inundate 1700 square km of predominantly prime agricultural land<sup>39</sup>. Recent studies and models predict an increased occurrence of cyclones in the Bay of Bengal, particularly in the post-monsoon period, along with increased maximum wind speeds associated with cyclones<sup>40</sup>.

It is important that set back zones and the vulnerability line take into account the above findings and other research recommendations related to sea level rise. Annexure I on page 110 of the Swaminathan Report on vulnerability mapping does not consider the above as criteria. Sea level trends referred to in the report are probably past temporal data and not based on climate change modelling. It is difficult to ascertain the sources of data mentioned in the Swaminathan Report since it contains no references.

2.8.5 Salt water intrusion: The report could be strengthened considerably if reference was made to the various Central Ground Water Board reports or even to the arguments contained in the public interest litigation filed by lawyer M.C Mehta at the Supreme Court on depleting groundwater reserves.

2.9.0 Coastal pollution: The necessary control measures, particularly that of enhanced monitoring systems for checking coastal pollution mandate greater discussion. The Swaminathan Report fails to make linkages with important initiatives such as Coastal Ocean Monitoring and Prediction System (COMAPS)<sup>41</sup>, which could supplement greatly coastal pollution control measures. Future steps for coastal pollution control should recognise that there is no national policy on industrial zoning which renders sensitive areas of the coast susceptible to pollution related impacts. This is also an important observation made by the MGK Menon Committee on Hazardous Wastes<sup>42</sup>.

### **3.2. Comments on Chapter 3: Coastal Regulation Zone Notification -Revisited**

3.2.3: The report states that the CRZ “established the traditional rights of the fishing community”. This statement is misleading and conveys the impression of actual implementation that guaranteed these rights, while in actuality implementation of the notification didn’t see the light of day. The CRZ did recognise fishing settlements and permitted certain rights for the same and is the only legislation that does so. However, no state government has implemented this spirit of the legislation by means of granting legal *pattas* to fishing communities. While it has protected the fishing community and their rights in many ways this basic fundamental right recognised by the CRZ legislation was never actually implemented.

3.4.4: This section either refers to cement, fertilizer, pharmaceutical, chemical and gas handling industries or their packing units as ‘non-polluting’. This is a completely erroneous statement. It is well known that each of these industries is polluting in its production process and their packaging or bagging plants are certainly not devoid of pollution. There are several complaints of cement plants located in/near ports that have caused significant pollution in terms of suspended particulate matter as well as spillage into port



waters. It is advisable that the bagging/packing plants be located at the plant itself and not at the port/SEZ areas. These issues should be addressed objectively rather than denying their polluting character. It is also not clear why 'Information Technology' projects need to be located in the CRZ/CMZ area. The CRZ notification took a clear position on the nature of activities to be permitted on the coast – primarily those requiring the foreshore and waterfront area for their operation. It appears that the Swaminathan Committee might unwittingly be endorsing several dilutions to the CRZ notification against which enough scientific arguments exist.

3.4.5 Mining: The report allows for mining of placer minerals. In addition to EIA requirements a clear guideline/framework for ecological restoration of mined areas needs to be developed, the implementation of which should be statutory /mandatory by law. The same is also mandated by the UNEP GPA Key Principles for Coastal Mining Development which underlines that "*incorporation of effective rehabilitation and restoration planning into coastal mining projects can ameliorate many of the short and long term environmental impacts*"<sup>43-44</sup>. However, serious note should be taken of the fact that coastal mining does have long-term negative implications. The recent tsunami has revealed this in areas of Tamil Nadu where inundation by the tsunami was more serious in areas of severe sand mining (Pers comm., Sudarshan Rodriguez and Syed Liyakhat 2005). It is known to aggravate sea erosion and increase the vulnerability of the coast to sea level rise. This review therefore recommends that absolutely no mining be permitted in the coastal areas of any minerals found elsewhere. In addition, every possible effort should be made to phase out entirely, all mining along coastal stretches.

3.4.7 Fishery and allied activities: While the report mentions a need to develop integrated fishing units, the exact location of the same from the shore or the Vulnerability Line in different areas will need to be specified. Guidelines for the same should also be developed. Without proper definitions there is bound to be much confusion and little implementation. For instance a large industrial fish processing plant can be classified as an integrated fishing unit. Units managed and owned by the community /cooperatives should be encouraged. Local labour from the community for the same should also be mandatory.

3.4.10 Groundwater: The report suggests that groundwater resources of depleted areas be mapped. There are several other suggestions for groundwater management. Firstly, the entire coastal region's groundwater resources should be mapped. Groundwater rules should be based on mapping and assessment of the aquifers instead of just using the CZM zonation. Perhaps each coastal area could have a separate parallel classification systems based on the above assessment with specific guidelines /regulations for each type of zone of groundwater quality/aquifer characteristics. Groundwater management is important as the quality of groundwater plays a major role (especially with reference to salinity) on the type of ecology/vegetation. Groundwater extraction could be taxed and groundwater recharge management should be made legally mandatory and binding (with fines for non-compliance). The taxes from this can go towards a groundwater fund. The use of groundwater for saltpans should be banned. Documentation of traditional methods of groundwater recharge and management as well as a study of the appropriateness of the same should be undertaken. Desalination plants as a solution for fresh water supply should be carefully assessed before it is aggressively or wantonly promoted. All aspects of pollution from various technology options for fresh water supply should be carefully evaluated. Desalination for instance is not a non-polluting activity. It is important to recognise its environmental impacts particularly in ecologically sensitive areas like the islands of Lakshadweep and the Andaman and Nicobars.

3.4.12: This point implies that environment assessments and regulations should be shifted from the jurisdiction of the Environment (Protection) Act, 1986 to that of the Indian Ports Act, 1908. This is not acceptable, considering that the Indian Ports Act does not have relevant provisions, and especially since this would absolve the MoEF of its duties in environment protection. Besides, it would amount to the implementing agency (port promotion agencies) being its own police.

3.4.16: The permissions for defence projects in the coastal area should only apply to those essential projects needing foreshore and waterfront facilities. This cannot be interpreted to include residential construction or facilities that do not depend on the coast for their functioning.

3.4.20 Recreation and tourism: It is suggested in this review that only access within the CZM areas be permitted for tourism. Full-fledged tourism is not encouraged in the sensitive CZM region. It should also be mandatory to involve and get permission by way of a No Objection Certificate from the local panchayats when these tourism areas are decided. Furthermore, no permanent structures should be allowed and definitions and guidelines for temporary structures should be developed. The tourism management plans should be specific and should have codes of conduct as well as details such as the number of tourists that can be allowed at a time on the beaches.

### **3.3. Comments on Chapter 4: Suggestions of the Committee for Integrated Coastal Zone Management**

4.1.1 (i): The MoEF did not accept all the recommendations of various committees. In fact what the report does not mention in this section is that the various committees' recommendations were regressive. So it is inaccurate to say that all the recommendations should have been adopted and that this would contribute to the strengthening of the notification. The points under 4.1 state the need for a shift from just regulation to "regulation and management" in India's coastal management. While legislation and policy making is fine the same needs to be followed by a Strategy and Action Plan (like the National Forestry Action Plan). The strategy is actually a roadmap as to how a policy/legislation will be implemented. It is based on a SWOT analysis, an assessment of capacity needs, and human and financial resource needs. In this regard, the committee has not taken any cognizance of the coastal plans (east and west coast, including plans for the Andaman & Nicobar islands and the Lakshadweep islands) prepared as a part of the National Biodiversity Strategy Action Plan project. This will also include the strategy for awareness and outreach tools at various levels with different target groups.

4.1.1. (xi): All steps should be taken to ensure that environmental and human concerns are given top priority in these circumstances. In this light, the committee's stipulation that defence-related projects should go through the same environmental and social assessment processes sends positive signals. In addition, instituting a well-designed and context-specific education of defence personnel on the potential social and environmental impacts of their activities will go a long way in mitigating impacts. In areas where ecologically important areas are identified, the burden of proof should rest with the defence officials to show why their activities cannot be conducted in other areas, and this should be as transparent as possible. A case in point is the periodic navy exercises at Netrani Island (Pigeon Island) off the Karnataka coast – it is an important nesting and roosting site for sea eagles, has a sizeable population of edible-nest swiftlets, and a diverse marine fauna. The impact of routine navy bombings in this region on bird and marine populations is unknown, but likely to be significant.

4.1.1. (xii): While it is necessary to sensitize coastal area managers to ecological, economic and sociological issues that characterize the coast, it is perhaps unrealistic to expect managers to wear all these hats while getting on the job of management as well. What would perhaps be much more effective is the instituting of partnerships between coastal area managers with researchers and analysts whose training is specifically geared to answer these questions. Co-opting ecosystem scientists, social scientists and ecological economists in the business of management would help break down barriers of mistrust between managers and academics working on coastal subjects. Fostering a synergistic relationship between scientists and managers would go much further than laying the entire burden of investigation and implementation on the already overworked shoulders of the ecosystem manager. A related issue is the importance of establishing the role of scientists (government and non-government) as legitimate

stakeholders, whose contribution could go a very long way in improving our understanding and management of coastal ecosystems and resources. In turn, scientists should be encouraged to be more responsible and transparent about communicating their research results to managers and their research should be open to public access in the same way that management should be open to public scrutiny. The discussion on the manager's role and capacities should have easily benefited from a discussion on the role of the local communities in the management of the area and in the implementation of the notification.

4.1.2. (iv): The committee's precautionary approach to restoration work is fully endorsed, particularly with regard to the introduction of exotics into coastal environments. In this context, it is important that species like casuarina and eucalyptus be avoided where inappropriate. While promoting these measures, a lot of care should be taken that natural coastal and oceanographic processes are not impeded.

4.1.2 (v): The committee's recommendation that sites of immeasurable value need to be left inviolate is welcome. It is not clear however, why the inviolability of these sites is mentioned in the same paragraph as a discussion on ecological cess and lease rights for mining and chemical industries. This provides room for much confusion, and it should be made clear that sites of immeasurable ecological or socio-cultural value will be deemed as such, and retained as inviolate to any destructive and extractive activity.

4.1.2 (xi): The complex issue of coastal fisheries and sustainability of resource extraction from the marine environment is given short shrift in the document, and needs considerable thought. The present management of fisheries in the country is woefully inadequate, and traditional practices of fisheries management are rapidly eroding as boundaries between artisanal and commercial extraction become increasingly blurred. The consequence of overcapacity on ecological systems and eventually on human community resilience is largely unexplored in the Indian context, and needs to be given much more thought. The Swaminathan Report should also have made special mention about the considerable environmental costs of ship groundings on benthic communities along with other sources of vehicular disturbance. Another issue within this context that goes largely unmentioned through the document is the accidental introduction of exotics and invasives into marine environments through vehicular traffic. This is an inter-regional, cross-ecosystem, and international problem of great importance. Marine invasive species can have serious devastating impacts on benthic habitats and eventually on the rest of the ecosystem as well. Without adequate baselines, it may be difficult within the Indian context to even identify the presence of invasive in Indian waters, far less understand its population dynamics and rate of spread. At present, there appears to be no adequate regulatory mechanism to monitor against the introduction of exotics. The usual vectors of transport for exotics are ballast waters and boat hulls of large ships, and while these can be regulated, it is much more difficult to control exotic spread through smaller vessels which are not subject to international anti-fouling norms. These smaller vessels may actually pose a greater risk of regional transport of exotics, particularly because of their longer residence times between harbours and lack of hull maintenance. There needs to be a much better system to control this and it would have been very useful if the Report explicitly mentioned this when discussing the potential impacts of marine vehicular traffic.

4.1.3. (v): Restoration is not a panacea to habitat loss, and it needs to be endorsed with plenty of riders and safeguards. While mangrove regeneration efforts may have mixed benefits, the validity of restoration efforts for coral reefs is much more suspect. In India, it appears to be the flavour of the day, but the rewards are very often ephemeral, cosmetic, or even detrimental to promoting ecosystem resilience – the ecological bottom line of good ecosystem management. Artificial reef structures and other restoration efforts may be useful under a very limited set of conditions, and given how expensive any operation of ecologically meaningful size could be, it is important to question whether those funds are not better spent in understanding the underlying dynamics of the system or the causal factors that led to the decline in the first place. For instance, there exist no studies of Indian coral reefs on spawning periods of coral species for the region, of source and sink dynamics of coral regions, and very few studies on post-recruitment

survival in reefs. All these are essential to understand *before* any restoration effort takes place. Artificial reef structures almost certainly have an immediately discernable result of acting as fish attracting devices and this can often be taken as the success of an artificial reef programme. It has been shown however, that such devices, popularly known as Fish Aggregating Devices (FADs), tend to merely concentrate fish from surrounding areas, not actually increase fish abundance or biomass. This could be dangerous if these FADs are used popularly for fishing, because it allows for an extremely efficient over-harvesting of reproductive-age individuals, which would otherwise require considerably more investment of fishing effort. FADs may be useful management tools for benefiting local fisheries if very carefully managed, but if the purpose is ecosystem restoration they are not very useful. Many studies including some in Indian reefs<sup>45</sup>, show that when the underlying stresses are removed, Indo-Pacific coral reefs show surprising natural resilience to even the worst disturbances. It *is* possible to cause more damage with enthusiastic good will than with benign neglect. While benign neglect is not being suggested as a management principle, a policy of bolstering natural resilience, constantly monitoring ecosystem health, and leaving ecosystems alone to repair themselves as far as possible is certainly advocated. Only in the worst cases should direct intervention be considered as an option. More generally, we need to escape the notion that the problems our ecosystems face are problems that can be fixed with clever engineering – biological, physical or otherwise.

4.1.3. (viii): The recommendations of the committee on the need for more prioritized research and much more coordinated and multi-disciplinary work on the coasts is commendable. Additionally, a greater role should be granted to private and non-governmental organizations involved in coastal research, as well as the various grass-root organizations that are attempting several experiments of community mobilization along the coast. Together these can form a potent force to increase our knowledge of the coastal environment, and the socio-economic and political conditions that best support effective management of this environment.

4.1.3. (xii): There is indeed a dire need for inter-departmental coordination and interaction. In addition, it would be useful to allow data sharing to filter down to all stakeholders with an interest in accessing the data.

4.1.3 (xvii): This point advocates landscaping for parks, gardens and playgrounds in open vacant areas within municipal limits. This is not necessary in coastal areas and can interfere significantly with the coastal ecosystem especially coastal vegetation. The same should not be allowed or specific detailed guidelines should be developed to ensure adequate environmental safeguards.

### **3.4. Comments on Chapter 6: A National Coastal Zone Management Action Plan**

This last chapter attempts to operationalise the contents of chapters 3 and 4 by providing an outline of the regulations and the permitted activities in the CRZ. Read with Annexure II, III, IV and V, the latter in particular, make this chapter extremely problematic. On the whole it appears that this section does not actually flow from earlier chapters, and appears to be disjointed and not reflective of the recommendations of the earlier chapters.

6.1.3: Classification While there is some justification in largely maintaining a rationalized version of the 1991 notification structure, the Swaminathan Report does not indicate why the new schema in this chapter will work effectively, when the earlier did not. This is particularly important, since the onus of preparing detailed management plans and implementing them still falls squarely on the shoulders of the State or Union Territory. As pointed earlier, one of the principal reasons why the CRZ notification was ineffective was that the states did not take the notification seriously, a point made repeatedly even by the Swaminathan Report. However, no guaranteeing mechanism is provided in the new formulation to ensure

that the current recommendations, if ratified, will be taken any more seriously by state governments than the earlier.

An integrated and adaptive coastal management system, while certainly an ideal worth aspiring to, may be much more difficult to implement given the heterogeneity of environmental and socio-economic conditions along the Indian coastline. The essential interfaces between habitats in the fluid boundaries of the coastal-land and seascape are important and activities in one habitat may have far-reaching implications on another. However, with particular reference to many of the ecosystems highlighted for special attention (CMZ I areas), it is possible to conceive of them as discrete entities whose management challenges are unique to them. If we think beyond spatial areas and focus instead on ecosystem function, and the drivers of ecosystem change, it is still possible to devise useful management systems that regulate harmful activities within the boundaries of the ecosystem, as well as in the larger penumbra of human influence on these systems. While in CMZ II and CMZ III areas, an integrated, multi-sectoral approach may be very useful, it may be much more useful to advocate a context-specific, ecosystem (or human community)-driven, function and resilience-based management paradigm for coastal habitats. This might be more practicable given the complexity of our management landscape. It also allows for problem-driven management solutions that can be stated, implemented and evaluated, rather than Leviticus-style prescriptive approaches that tabulate activities allowed and disallowed within an ecosystem. While the legislation can provide the broad framework, there should be scope for more detailed management and regulatory measures in certain areas (spatially) and if needed seasonally or temporarily. This approach could be introduced in certain areas as a pilot programme as part of a flexible Coastal Zone Management Plan. It should be emphasized once again that conservation of the ecosystems and the fragile coastal habitats will follow a precautionary approach and the above mentioned flexibility cannot be misinterpreted to allow for further development activities on the coast.

Annexure I, II and III provide definitions for CZM –I, II and III areas respectively. Annexure IV provides the guidelines for permitted activities in the CZM III areas. It is not at all clear what the basis for permitting some of these activities in these zones really is. The permission to these activities appears to be arbitrarily decided. In fact it is at this crucial stage of providing guidelines for development along the coast, that a sharp divorce in the tone of the Swaminathan Report emerges. There is little association between the annexures following chapter 6 and the ideological discourse attempted in the earlier chapters that expounded on future integrated coastal zone management principles.

6.2 Funding: It is necessary for the committee to describe how the MoEF proposes to raise funds for the coastal management plan and to explain the purpose behind each of the programs for which funds are to be raised. It is suggested that researchers quantify, with techniques such as cost-benefit analyses, the results of adopting recommended techniques of conservation, development, and other coastal management issues. This would develop a clear idea in terms of direction and future benefits.

Central and State policymakers should fund research that will quantify pollution prevention benefits and costs of methods that are to be used in order to help future decision making processes. These steps can then assist the country in making appropriate plans to maximize their benefits at the same time reduce pollution and environmental destruction . More importantly additional studies are needed to prove that these suggested preventive methods can provide long-term environmental benefits that exceed the benefits of using clean-up technologies at a later time. This will also stress upon the fact that **short-term private interests can jeopardize long-term ecological security.**

6.3 Legislative mechanism: For all the discussion in the previous chapters on a participatory approach to Integrated Coastal Zone Management, it is disappointing to note that the Committee followed the severely criticised approach of several of the earlier amendments introduced by the MoEF in the past of merely issuing new notifications without any consultations.

6.5 Organogram: The committee makes it a point to propose that the National Board for Sustainable Coastal Zone Management will oversee and review the implementation of the Management Action Plan. However, the objectives, role, mission and inter-linkages of the various bodies suggested in the institutional structure/mechanism in the annexure of the report are not clear and will need to be developed in detail. Currently, the Swaminathan report does not provide information on how this institution will function and how it proposes to fill key gaps in research, conservation and development planning in a unique manner as is alluded. It is also suggested that in order for a more inclusive and objective approach, the periodic reviews of the management action plans should be left to independent evaluators as far as possible.

## REFERENCES AND ENDNOTES:

- <sup>1</sup> In fact the CRZ Notification has been issued under Section 3(2) (v) of the Environment Protection Act, 1986, which is the clause used to declare Ecologically Sensitive Areas in the country.
- <sup>2</sup> Rule 5(3)(d) of the Environment (Protection) Rules, 1986 requires that the Central Government issue a notification calling for objections and suggestions whenever it intends to introduce an amendment pertaining to the restrictions of activities. However, most of the amendments of the CRZ have been introduced using clause 5(4) of the Environment (Protection) Rules.
- <sup>3</sup> Sharma, C. 1997. Coastal Area Management in South Asia – A Comparative Perspective, ICSF, Chennai
- <sup>4</sup> Goenka, D. 2000. 'The fragile coastline', <http://www.india-seminar.com/2000/492/492%20d.%20goenka.htm>
- <sup>5</sup> Anon. 2001. 'Coastal Regulation Zone –The experience of a decade', Equations and Nagarika Seva Trust, Bangalore
- <sup>6</sup> Anon. 2002. 'West Coast Ecoregional Biodiversity and Strategy Action Plan', National Biodiversity Strategy Action Plan, Kalpavriksh, New Delhi/Pune, 67p
- <sup>7</sup> In letter No J17011/8/92-IA-III dated 10.5.99, the Government of India designated seven authorized agencies to whom the demarcating of the HTL and LTL could be entrusted. However the Government of India is still in the process of arriving at a common methodology for demarcating the HTL and LTL and is still evolving the necessary guidelines.
- <sup>8</sup> Sridhar, A. 2005. Statement on the CRZ Notification and Post-Tsunami Rehabilitation in Tamil Nadu, UNDP, New Delhi 40p.
- <sup>9</sup> The report however restricts this to educational and mobilization programmes by Panchayati Raj institutions
- <sup>10</sup> While this is true, it is also a fact that not all recommendations of these committees were designed to augment coastal protection.
- <sup>11</sup> It however, does permit some new activities not mentioned in the earlier notification.
- <sup>12</sup> Anon. 1996. JT 1996 (4) SC 263 = 1996 (5) SCC 281, *Indian council for Environ Legal Action vs Union of India & Ors, WP (Civil) 664 of 1993*
- <sup>13</sup> Pers. Comm. Advocates T.Mohan and P.B Sahasranaman, 2005
- <sup>14</sup> Such initiatives are noted from Karnataka (by members of the Federation of Voluntary Organisations for Rural Development in North Kanara District (FEVORD-NK) and the Environment Support Group of the Nagarika Seva Trust, Bangalore), in Tamil Nadu (by programmes of the Coastal Action Network) and in Kerala (Kerala Shastriya Sahitya Parishad).
- <sup>15</sup> See Annexures II –V of the Swaminathan Report
- <sup>16</sup> Mascarenhas, A. 2004. Oceanographic validity of buffer zones for the east coast of India: A hydrometeorological Perspective. *Current Science*, 86: 399-406.
- <sup>17</sup> George, A. 2005. 'Shelter Status in Nagapattinam', Workshop on Post Tsunami Rehabilitation in Fishing Communities organized by TRINet, Chennai.
- <sup>18</sup> Praxis. 2005. The Land of Opportunity, Experiences of resettling a fishing community inland, [http://www.tsunami2004-india.org/downloads/Praxis\\_brief.pdf](http://www.tsunami2004-india.org/downloads/Praxis_brief.pdf)
- <sup>19</sup> Vivekanandan, V., C.M.Muralidharan and M. Subbha Rao. 1997. A Study of the Marine Fisheries of Andhra Pradesh, Draft report. AFPRO/SIFFS/Donor Consortium
- <sup>20</sup> Ramasubramanian, R., T. Ravishankar and D. Sridhar. 2003. Mangroves of Andhra Pradesh: Identification and conservation Manual, MSSRF.
- <sup>21</sup> Afsah, S., B. Laplante and D. Wheeler. 1997. *Regulation in the Information Age*, Indonesian Public Information Program for Environmental Management; See <http://www.p2pays.org/ref/22/21749.pdf>
- <sup>22</sup> See Pargal, S., H. Hettige, M. Singh and D. Wheeler. 1997. 'Formal and informal regulation of Industrial pollution: Comparative Evidence from Indonesia and the US', Policy Research Working Paper No 1797. World Bank
- <sup>23</sup> M.C Mehta vs Union of India, 2001; See <http://www.elaw.org/resources/printable.asp?id=1268>
- <sup>24</sup> See among many others: Findley, J.S. and M.T. Findley. 2001. Global, regional and local patterns in species richness and abundance of butterfly fishes, *Ecological Monographs* 71: 69-91
- <sup>25</sup> See, for instance: Dulvy, N.K. et al. 2003 'Extinction vulnerability in marine populations', *Fish and Fisheries* 4: 25-64
- <sup>26</sup> For a discussion, see: Gurevitch, J. and D.K. Padilla. 2004. 'Are invasive species a major cause of extinction?' *Trends in Ecology and Evolution* 19(9): 470-474
- <sup>27</sup> Kulkarni S. and A. Saxena. 2002. Conservation Status of Coral Reefs of Andaman and Nicobar Islands. *CORDIO Annual Report*. Sweden.

- <sup>28</sup> Kulkarni S. and A. Saxena. 2001. Impact of Sedimentation on coral reefs of Mahatma Gandhi Marine National Park, Andaman Islands, India and its Conservation implications. *Second Symposium on Marine Conservation Biology*, San Francisco (USA) on 21<sup>st</sup> – 26<sup>th</sup> June 2001
- <sup>29</sup> Kulkarni S., A. Saxena and B. C. Choudhury. 2000. *Ecological Assessment of Coral Reefs of Mahatma Marine National Park, Wandoor, Andaman Islands: Its Conservation Implications*, Technical report submitted to Wildlife Institute of India, Dehradun. 181 pp.
- <sup>30</sup> See <http://www.pcouncil.org/decisions/0605decisions.html>
- <sup>31</sup> See, among others: (i) Watling, L. and E.A. Norse. 1998. Disturbance of the Seabed by Mobile Fishing Gear: A Comparison to Forest Clearcutting. *Conservation Biology*. 12(6): 1180 -1197; (ii) Kaiser, M.J. et al. 2000. Chronic fishing disturbance has changed shelf sea benthic community structure, *Journal of Animal Ecology* 69(3): 494 -503; (iii) Thrush, S. and P.K. Dayton. 2002. Disturbance to marine benthic habitats by trawling and dredging: Implications for marine biodiversity, *Annual Review of Ecology and Systematics* 33:449-473
- <sup>32</sup> Kar, C.S. and S. Bhaskar. 1982. The status of sea turtles in the Eastern Indian Ocean. In: *The Biology and Conservation of Sea Turtles* (ed. K.A. Bjorndal), pp- 365-372. Smithsonian Institution Press, USA.
- <sup>33</sup> One of the objectives of the GoI-UNDP programme was to extensively survey the entire coast for sea turtle nesting and mortality with intensive sampling of key areas. Another objective of the survey was to build a coastal network of organisations and individuals involved or interested in marine conservation who would serve to disseminate and collect information on sea turtles and related coastal issues. Surveys were carried out in all the maritime states of India including the two island groups by the various organisations, resulting in the following reports. Andrews, H.V., S. Krishnan & P. Biswas. 2001 *The status and distribution of marine turtles around the Andaman and Nicobar archipelago*. GOI UNDP sea turtle project Report. Madras Crocodile Bank Trust, Tamil Nadu, India; Bhupathy, S. & S. Saravanan. 2002. *Status survey of Sea turtles along the Tamilnadu coast. A GOI-UNDP Sea Turtle Project Report*. Salim Ali Centre for Ornithology and Natural History, Coimbatore. India; Dileepkumar, N. and C. Jayakumar. 2002. *Field Study and Networking for Turtle conservation in Kerala. A GOI-UNDP Sea Turtle Project Report*. THANAL Conservation Action and Information Network, Trivandrum. India; Giri, V. 2001. *Survey of marine turtles along the coast of Maharashtra and Goa. A GOI-UNDP Sea Turtle Project Report*. Bombay Natural History Society, Bombay. India; Roy Choudhury, B. 2001. *A Short Survey On Sea Turtles In West Bengal. A GOI-UNDP Sea Turtle Project Report*. Nature, Environment And Wildlife Society, Calcutta. India; Sharath, B.K. 2003. *Status Survey of Sea Turtles Along The Karnataka Coast, India. A GOI UNDP Project Report*. Department of Biosciences, University of Mysore, Karnataka; Sunderraj, W.S.F., et al. 2002. *Status of the breeding population of sea turtles along the Gujarat coast. A GOI-UNDP Sea Turtle Project Report*. Gujarat Institute of Desert Ecology, Bhuj. India; Tripathy, B. and B.C. Choudhury. 2001. *Sea turtles and their nesting beaches along the Andhra Pradesh coast, India: a status survey. A GOI-UNDP Sea Turtle Project Report*. Wildlife Institute of India, Dehradun. India; Tripathy, B., B.C. Choudhury, and K. Shanker. 2002. *A status survey of sea turtles and their nesting habitats in Lakshadweep Islands, India. A GOI-UNDP Sea Turtle Project Report*. Wildlife Institute of India, Dehradun. India
- <sup>34</sup> Woodhill, J. 2000. *Planning, Monitoring and Evaluating Programs and Projects: Introduction to Key Concepts, Approaches and Terms*. Unpublished Report. The World Conservation Union (IUCN), Gland, Switzerland
- <sup>35</sup> Singh, O.P. et al. 2001. Has the frequency of intense tropical cyclones increased in the north Indian Ocean? *Current Science*, 80:575-580. <http://www.ias.ac.in/currsci/feb252001/575.pdf>
- <sup>36</sup> UNEP. 1989. *Criteria for Assessing Vulnerability to Sea Level Rise: A Global inventory to High Risk Area*, Delft Hydraulics, Delft, The Netherlands, 51p.
- <sup>37</sup> TERI. 1996. *The Economic Impact of a One Metre Sea Level Rise on the Indian Coastline: method and case studies*. Report submitted to the Ford Foundation.
- <sup>38</sup> JNU. 1993. *Impacts of greenhouse induced sea-level rise on the Islands and coasts of India* New Delhi: School of Environmental Sciences, Jawaharlal Nehru University.
- <sup>39</sup> IPCC. 1992. *Global Climate Change and the Rising Challenge of the Sea*, Supporting document for the Intergovernmental Panel on Climate Change, World Meteorological Organization, and United Nations Environment Programme, Geneva
- <sup>40</sup> DEFRA. 2004. *Action to tackle climate change: India-UK collaboration on impacts of climate change in India, Keysheet 4: Climate Change Impacts on Sea Level in India*.
- <sup>41</sup> Coastal Ocean Monitoring and Prediction System (COMAPS), <http://www.cpcb.nic.in/pamsweb/coastalpollu.htm>
- <sup>42</sup> Anon. 1997. *Report of the High Powered Committee on Management of Hazardous Wastes, WP No. 657/95*, Research Foundation for Science, Technology and Natural Resource Policy vs Union of India and ors.



---

<sup>43</sup> International Council for the Exploration of the Sea (ICES): ICES Guidelines for the Management of Marine Sediment Extraction Annex 10 of the 2003 report of the Working Group on the Effects of Extraction of Marine Sediments on the Marine Ecosystem.

<sup>44</sup> See <http://padh.gpa.unep.org/page.cfm?region=1&theme=2&topic=12> 'UNEP GPA Key Principles for Coastal Mining Development'.

<sup>45</sup> Arthur, R. 2005. *Patterns and processes of reef recovery and human resource use in the Lakshadweep Islands, Indian Ocean*. PhD thesis. James Cook University, Queensland, Australia.