

# PRE- AND POST-TSUNAMI COASTAL PLANNING AND LAND USE POLICIES AND ISSUES IN INDIA<sup>1</sup>

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***Abstract:** The philosophy, information and history of coastal resource use and planning in India largely determine the nature and direction of the present focus on post-tsunami policies and interventions. This paper examines pre-tsunami coastal planning and land use trends, and examines available data and projections, in the post-tsunami scenario. Adequate, standardised and reliable landscape-level data is still not easily accessible and in many instances unavailable in the post-tsunami context for a range of basic variables such as estimates of post-tsunami damage, non-government and governmental rehabilitation and relief efforts, social and environmental impacts etc. However, certain regions (particularly Tamil Nadu) and themes have been more rigorously documented in select NGO reports and by the press. This study uses many of these findings to piece together the post-tsunami coastal planning and land use context.*

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## **Introduction**

The tsunami of December 2004 in the Indian Ocean affected the states of Tamil Nadu, Andhra Pradesh and Kerala and the Union Territory of Pondicherry on the mainland Indian coast and had a major impact on the Andaman and Nicobar Islands. The tsunami caused a water level rise all over the Indian coast with inundation of coastal lands ranging from between 300 metres to 3 kms inland. Destruction was of a serious nature and meant loss of lives and damage to property in the Andaman and Nicobar Islands, the southern Bay of Bengal coast from southern Andhra Pradesh halfway down Tamil Nadu (particularly from Chennai to Kodikkarai), Kanyakumari district on the southern extremity of the Arabian Sea and a small stretch of coastline bordering the Quilon-Alleppey districts in Kerala on the Arabian sea coast (Annexure 1 contains a map showing affected areas). Of the above four areas, the areas with major impacts are clearly the first three (TRINet<sup>2</sup>, 2005). Other than the Nicobar group of islands and several parts of the Andaman Islands, the badly affected districts are on the mainland - Nagapattinam, Cuddalore and Kanyakumari, in the order mentioned.

Several significant changes followed the December 2004 Indian Ocean tsunami, influencing many facets of coastal planning and governance. In retrospect, the most striking of all is the scale and intensity of attention the subject of coastal management and development since received in India. Coastal habitats and coastal communities continue to be recipients of post-tsunami local, national and international consideration. The philosophy, information and history of coastal resource use and planning in India largely determine the nature and direction of the present focus on post-tsunami policies and interventions. The tsunami is now termed as a 'wake-up call' among other descriptions (Anon, 2005a), but for India, as perhaps for other regions in the Indian Ocean, it appeared almost a logical fallout given her history of resource exploitation in the affected states. This paper examines pre-tsunami coastal planning and land use trends, and examines available data and analyses on this subject and projections for the long-term post-tsunami scenario.

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<sup>2</sup> TRINet is a network set up to address the information requirements of the ongoing tsunami rehabilitation and reconstruction activities in different parts of south India. Some of its members include the Nagapattinam NGO Coordination and Resource Centre (NCRC), Kanyakumari Rehab Resource Centre (KRRC) and the Auroville Information Centre.

## **I. BACKGROUND**

The Tamil Nadu coastline, inclusive of the Union Territory of Pondicherry measures 1076 km, Kerala has a 590 km coastline and the Andhra Pradesh coast measures 970 km. The Andaman and Nicobar Islands are the largest archipelago system in the Bay of Bengal, consisting of about 306 islands and 206 rocks and rocky outcrops, and covers a total area of about 8200 km<sup>2</sup>. Of these, about 11 islands in the Andaman group and 13 islands in the Nicobar group are declared 'inhabited'. The entire archipelago is located at a distance of about 1000 km from mainland India. 90 per cent of the total land area of 6408 km<sup>2</sup> of the Andaman group comprises of reserve forests and protected areas of which about 36 percent is designated as tribal reserves. The Nicobar group is spread over an area of 1841 km<sup>2</sup> of which 1542 km<sup>2</sup> is forest (Sekhsaria, 2003).

There are variations of the area defined as the 'coast'. An ecological description of the coast refers to a region impacted by the interaction between the land and the sea in general. The US Commission on Marine Science, Engineering & Resource offers the following definition "*the coastal zone represents that part of the land affected by its proximity to the sea, and that part of the ocean affected by its proximity to the land*". The Coastal Regulation Zone Notification, 1991, which specially governs coastal land use, refers to the region measuring 500 metres from the High Tide Line. This paper resorts to the ecological understanding in describing coastal land use and resource use patterns.

### **1. Overview of state-wise land use trends**

#### **a. Tamil Nadu & Pondicherry**

The Tamil Nadu coast comprises the Coramandel coast from Point Calimere to the Pulicat Lake in the north and the Gulf of Mannar upto the tip of Kanyakumari (the southern-most point on the Indian Peninsula). These regions are socially, ecologically and technologically distinct from each other (Bavinck, 2001) and the entire region is well known for its range of ecosystems comprising of sandy shores, estuaries, mangrove forests (such as Pitchavaram & Muthupet), seagrass beds and coral reefs (in the Gulf of Mannar). The Mangrove Atlas prepared by the M.S. Swaminathan Research Foundation (MSSRF) states that Tamil Nadu has a total area of about 13693 ha mangroves. The Gulf of Mannar was the first Biosphere Reserve declared by the Government of India and houses the sensitive Gulf of Mannar National Park.

There are several anthropogenic influences that have led to the destruction of some of Tamil Nadu's critical coastal resources. Tamil Nadu has a highly industrialised coast. The state has 3 major ports – Tuticorin Port, Ennore Port and the Chennai Port. It also has nearly 13 notified 'minor' ports along the coast. India still does not have a detailed plan of action to implement global ballast water treatment specifications. The government of Tamil Nadu proposes to develop the Sethu Samudram Canal Project, the impacts of which several environmentalists and scientists have cautioned against, primary of which would be the impacts on fishing grounds and the major ecological changes to the sensitive Gulf of Mannar Biosphere Reserve which it traverses (Anon, 2004; Ramesh, 2004; Anon, 2005b; Anon, 2005c). There are also a number of industries located along coastal rivers such as the Uppanar in Cuddalore district. Industrial estates such as SIPCOT have been charged with a high degree of pollution in these rivers (IPT, 2003; SACEM, 2006). Several reports on this subject are found on the SIPCOT Area Community Environmental Monitors website ([www.sipcotcuddalore.com](http://www.sipcotcuddalore.com)). In the district of Nagercoil, sand mining is carried out in Manavalakurichi by the Indian Rare Earths company and much of this is reported to be illegal.

Venkataramajujam et al. have reported that in Tuticorin, coral fragments of *Acropora formosa* (*Challi*) are extensively collected from this region alone, by operating about 30 boats, which remove an annual 80000 m<sup>3</sup> of reef-derived materials (Venkataramajujam et al. 1981). In addition, massive corals are collected to the extent of about 30000 m<sup>3</sup> per year or 15,000 tonnes and are used as building materials. The degradation of coral reefs in the Gulf of Mannar has been well documented and many authors have reported severe degradation due to anthropogenic factors and by natural

agents (Mahadevan and Nagappan Nayar 1972; Pillai 1973 and 1975; Venkataramanujam et al 1981; Silas et al 1985; Venkataramanujam and Santhanam 1985; Wafar 1986; UNEP 1985; UNEP/IUCN 1988). Arjan Rajasuriya et al (2002) states in his paper that coral mining for lime, sand mining, pollution, sedimentation, fisheries, mangrove cutting, population pressure, commercial shell collection and industrial development have led to the increase in coral reef degradation in India. The Gulf of Mannar ecosystem is under tremendous pressure and direct threats such as the rapid removal of coral will ultimately impact the fishery potential of the area.

Mangrove destruction has been widespread in Tamil Nadu as in other parts of the country. The process of degradation however began several years ago and under the aegis of the Forest Department in many instances (MSSRF 2002a). Organisations such as the M.S. Swaminathan Research Foundation (MSSRF) have initiated mangrove restoration work in Pitcharvaram and Muthupet regions. Threats to mangrove forests such as these persist despite restoration initiatives such as that of the MSSRF. The problem of dam construction upstream of rivers continues in the state, which has already resulted in salinity change and mangrove destruction. The Government of Tamil Nadu has been engaged in a few restoration efforts in these regions but the concept of 'joint mangrove management' has not become a part of Tamil Nadu government policy in a uniform manner. This concept is absent in the Gulf of Mannar region for instance.

#### **b. Andhra Pradesh**

The Andhra Pradesh coast also has a number of sensitive features. The larger part of the Pulicat lake forms the southern tip of the coastal plains of Andhra. The lagoons, estuaries and backwaters measure about 640 km. Areas that have significant mangrove growth are Kumaragom, Dharmadom, Chettuva, Nadakavu, Pappinnisseri, Kunjimangalam, Chageri and Veli. The MSSRF Mangrove Atlas of India states that mangrove forests in Andhra Pradesh measure 582 km<sup>2</sup>, representing about 0.9% of the State's total forest area (MSSRF, 2002b).

Strung along the coast are about 1,100 fishing villages. Conversion of mangrove areas into shrimp and prawn culture farms is one of the most significant threats to the coastal areas of Andhra Pradesh and makes up for significant losses to marine ecosystems in turn. In Andhra Pradesh alone, various kinds of wetlands have been converted for shrimp aquaculture, which grew exponentially from around 8,000 hectares in 1991-92 to about 53,000 hectares in 1994-95 (Vivekanandan and John Kurien, 1998). In addition, the loss of major ecological functions such as sediment trapping and shoreline protection serves to underscore the problems associated with mangrove conversion to increase direct food production.

Monocultures of penaeid prawns and non-penaeid prawns is taken up extensively in all the nine maritime districts of the state. Coastal lands are converted into aqua ponds of sizes varying from one to several hectares. Apart from the brackish water/estuarine lands, many paddy fields further inland are converted to aquaculture ponds for intensive carp/crab/prawn culture etc. This has become one of the most severe threats to the Andhra Pradesh coast, particularly in the district of East Godavari. (EPTRI, 2005).

Port development and associated industries such as oil refineries along with port-associated constructions such as breakwaters has created a number of concerns in Andhra Pradesh. Besides the major port of Vishakapatnam there are 11 ports classified as 'minor'. Sridhar and Parthasarathy, provide a detailed overview of the minor port development plans along the Indian coast. They highlight loopholes and gaps in environmental laws and also the poor state of implementation of laws governing maritime trade and the marine environment (Sridhar and Parthasarathy, 2003).

#### **c. Kerala**

The state of Kerala has a narrow width bounded by the Western Ghats to its east, giving rise to about 41 west-flowing rivers. There are also shallow aquifers all along the Kerala coast for which the only

source of recharge is rainfall. These rivers and numerous streams have led to an intricate and extensive backwater system that runs parallel to the coast. The ecosystems along the Kerala coast comprise of mangroves, mud banks, coastal plantations and agriculture against the backdrop of the tropical forests on the Western Ghats hill ranges. Kerala has sparse mangroves that are largely fringing mangroves.

The fishery and other related industries continue to attract many people to the coast, resulting in the dwindling of agricultural practices to a greater extent. Along some parts of Kerala, people grow indigenous salt tolerant varieties of rice in small patches in different parts of Kerala (*Pokkali* lands). *Pokkali* fields along the Kerala coast extend throughout the coast in patches. These fields are found along Ernakulam, Trichur, Aleppy and Kottayam districts. There exists a traditional system of alternative cropping of prawns and *Pokkali* paddy. This practice is slowly being replaced by intensive aquaculture and more recently is being nudged out to accommodate the shelter needs of a growing population (Madyastha & Rekha, 2005).

Kerala has one major port at Cochin and 17 minor ports. As in other states, conflicts are recorded over port development plans between the state government and local fisher communities (Sridhar and Parthasarathy, 2003). River and beach sand mining activities along coastal Kerala has been one of the most persistent of environmental problems. Despite several orders from the High Court of Kerala to prevent beach and river sand mining, this activity continues unabated and completely unregulated (Anon, 2001). For a detailed listing of legal orders made in Kerala and associated case laws concerning sand mining, mangrove destruction, environment impact assessment and violations of the Coastal Regulation Zone Notification, see [http://www.geocities.com/sahasram\\_2000/environment/](http://www.geocities.com/sahasram_2000/environment/). The Kerala Government has introduced a special legislation called the Kerala Protection of River Banks and Regulation of Removal of Sand Act, 2001. The Act mandates the creation of a River Bank Management Plan and a River Management Fund, while prescribing the conditions under which river sand can be mined. Beach sand mining is regulated under the CRZ notification, but the implementation of both laws is heavily criticised with several matters pertaining to violations pending in the High Court of Kerala. Mining of silica sand in Kerala is plagued with several systemic problems and is driven by a complex of economic and institutional factors besides corruption (Paul, 1997).

#### **d. Andaman and Nicobar Islands**

Resource use in the Andaman and Nicobar Islands (ANI) has followed a disturbing trend since its colonisation and occupation by early Europeans. When India inherited the islands from the British it undertook its own colonisation programme (Venkateshwar, 2004). The resource use and the changes in the socio-economic profile of the islands are closely linked with this colonisation. The Andaman groups of islands are inhabited by four tribes of Negrito origin: the Great Andamanese, the Onge, the Jarawas and the Sentinelese. The Nicobar group is home to two tribes of Mongoloid origin: the Nicobarese and the Shompens.

The islands still have approximately 86% of original forest cover left, and probably another 10–20% has been degraded by human activities (ANET 2003). The area of mangroves in the Andaman group of islands is 929 km<sup>2</sup>. The Andaman and Nicobar Islands have some of the last pristine reefs in the Indian Ocean region, and are emerging as one of the most important coral reef sites in the world. Coral reefs stretch over an area of 11,000 km<sup>2</sup> in the Andamans. These reefs are impacted by siltation, sand mining, agricultural runoff and damage due to fishing and tourism activities, besides the threat from a global rise in sea surface temperatures. The collection of corals, shells and sea cucumbers and other marine organisms from this region for commercial purposes has led to their drastic decline. There is also the problem of illegal fishing by Thai trawling fleets in the Andaman Sea. Many of these boats engage in poaching of endangered marine species.

The main categories of natural vegetation of the Andaman and Nicobar Islands are the coastal and mangrove forests and the interior evergreen and deciduous forests. The remaining 13% of land is

largely revenue land and is used for human settlements, agriculture and other anthropogenic activities. Most of the revenue land is along coastal areas where the settlements are concentrated. Rural and revenue areas are under CRZ IV (Coastal Regulation Zone - category IV), except a very small area under CRZ II (developed areas on the coast). No development is permissible within 200 m of the high tide line in CRZ IV areas. Of 13% of revenue land only 21% is under intense cultivation and another 11% is classified as fallow land and cultivable wasteland, and plantation crops cover 45% of the revenue land (ANET 2003). The total urban area is 16.64 km<sup>2</sup>.

Land use in the Andaman Islands has changed drastically since the early periods of colonisation. However, the post-Indian independence history of the islands is marked by large-scale deforestation of its rainforests to feed the growing saw mill industries first introduced by the British. The 1950s witnessed a great influx of settlers from the Indian mainland who were encouraged by the Indian government as part of its official colonisation programme. A significant development has been the Andaman Trunk Road which cuts through the heart of the Jarawa Tribal Reserve. The Jarawas are one of the six aboriginal tribes on the ANI, and had until recently strongly resisted contact with outsiders. This road is one of the major threats to the dwindling populations of the Jarawa which amounts to only about 250. The interaction between deforestation and coral reef degradation has been clearly observed in the Andamans (Kulkarni & Saxena, 2002, Soundarajan et al, 1989; Turner et al, 2001). This emphasises the importance of inland land use planning for the conservation of marine and coastal resources.

There are several accounts which provide deep insights into the links between the colonisation of the islands and their consequent environmental deterioration (Portman, 1899; Mukerjee, 1995; Sekhsaria, 2003; Venkateshwar, 2004).

A number of developmental projects have been proposed in the Andaman Islands. Tourism has always been seen as a succour for the islands and many proposals exist to develop tourism in the islands (Anon, 2006; Saldanha, 1989; Equations, 2005). Encroachments into the forest regions has been tremendous in the Andamans (ANET, 2003). Annexure 2 contains graphs showing the trend of encroachment as projected by the Andaman and Nicobar Forest Department. This is a result of the uncontrolled migration into the islands driven by the subsidies offered in the islands. The net result is the illegal and rampant extraction of forest resources, intrusion into Jarawa territory, destruction of forest resources and eventually an increased pressure on the fragile island ecosystem.

Post-tsunami trends have resulted in massive changes in the Andamans in terms of resource use. On 7<sup>th</sup> May, 2002, the Supreme Court of India, passed an order<sup>3</sup> stopping timber felling activities in the region. Post-tsunami, the government has made requests for relaxing this ban and the Supreme Court issued orders dated 5th January, 2005 to relax the ban on timber felling and sand mining to enable post-tsunami construction related work (Anon, 2005d).

## **2. Fisheries resource use trends**

It is necessary to look at over five decades of fisheries history to understand the changes in the last ten years. Prior to independence, marine fishing was carried out at a subsistence level, almost exclusively by the traditional fishers. The current state of fisheries finds its genesis in the modernisation programme introduced by the Government of India across the country. The Government of Kerala welcomed the Indo-Norwegian Project for Fisheries Community Development whose objectives were to increase returns from 'fishermen's activities', efficient distribution of fresh fish and a higher standard of living in project areas. The basic idea was to remove the 'drudgery' of fishing and improving the economic condition of fishing communities. Several programmes for motorisation of fishing crafts were also taken up across the country such as that of the Bay of Bengal Programme on the east coast of India. The South Indian Federation of Fishermen's Societies (SIFFS) in Kerala and the government of Kerala's cooperative initiative - the Matsyafed, actively promoted motorisation

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<sup>3</sup> In the matter of I.A. No. 502 in W.P.(C) No 202/1995.

programmes. Through these programmes, loans were provided to acquire motors and fishing nets with better access to improved fishing technologies and equipment (Salagrama, 2002).

There has been a phenomenal growth in marine fisheries in India during the last five decades both quantitatively and qualitatively. The estimated total marine fish production in the country during 1947-48 was 3.73 lakh tonnes. The total marine fish production during the year 2004-05 was 27.78 lakh tonnes<sup>4</sup>. This is completely the result of technological improvements made to fishing craft, introduction of new fishing technologies, increase in the fishing effort and the extension of fishing into relatively deeper regions. This has also resulted in several imbalances in the fishery resource itself. Much has already been said about the growth of fisheries in India and its subsequent declining trend (Kurien, 1985; Anon, 1990; Kurien, 1991; D’Cruz, 1998 ; Salagrama, 2002; Gillet, 2002; D’Cruz, 2004; Kurien, 2005). From these studies it is clear that there has been a tremendous expansion of mechanised fishing crafts and fishing gear all along the Indian coast. Several of these crafts are unlicensed. In addition, in regions like Kerala, the traditional sector has itself undergone a fair amount of transformation. There is a profusion of crafts such as the ‘*thangu vallams*’, which operates large ring seines (akin to the purse seine). These boats were introduced in the 80s. It was at this time that the Fisheries Department in Kerala stopped the registration of vessels. This implies that most *thangu vallam* vessels operating on the Kerala coast today are unregistered. Conflicts are no longer the usual ones that exist between the mechanised and the traditional sector since the latter has undergone a fair amount of technical metamorphosis. Fisher unions have not been able to address effectively the problem of fisheries management. On the other hand, their demands appear limited to acquiring better technologies for their own constituencies. In Kerala, the *thangu vallams* consider themselves to be a part of the traditional sector, despite the huge investments and advanced technologies this fishing now involves (Kurien, 2005).

Accurate and reliable data forms the backbone of fisheries management. Fisheries data in India is collected by the Central Marine Fisheries Research Institute as well as by each state government through their fisheries departments. The data collected by these two agencies for a region are often dissimilar and there are several critiques of the reliability of such data. In particular the data collected by the state departments has always been in question. The CMFRI data however follows a stratified multistage random sampling design (Srinath et al, 2005), and the trends from this data are presented in this paper.

The CMFRI conducted frame surveys including census of fishermen, craft and gear during 1961-62, 1973-77 and 1980. During 1998, a rapid census of fishing craft and gear was conducted. The results are summarised as<sup>5</sup>:

Year	1961-62	1973-77	1980	1993*	1998
Active fishermen (in Lakhs)	2.3	3.2	4.7	8	10**
Artisanal craft	0	0	0	26171	50922
Motorised	90424	106480	140833	155925	76596
Non-Motorised	0	8086	19013	34571	49070
Mechanised	0	NA	11316	NA	30979
Trawlers					

Total (Mot&non-mot)	90424	106480	140833	182096	127518
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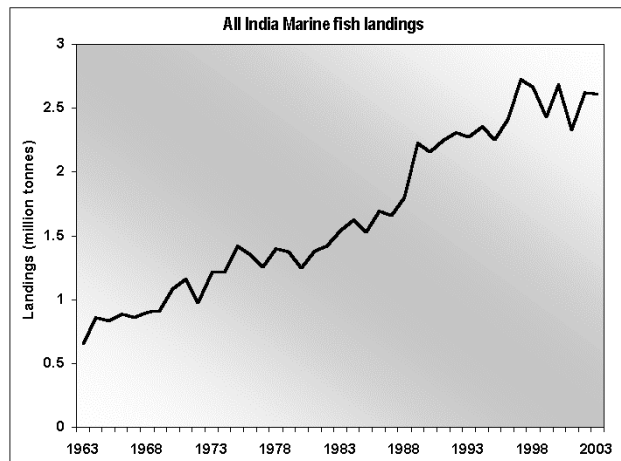
\* Source: Ministry of Agriculture, Government of India,

\*\* Projected NA: Not available

Fisheries data from CMFRI records for the years 1963 to 2003 shows that there has been an overall increase in the fish catch as seen in the graph below:

<sup>4</sup> Statistics from the Department of Animal Husbandry of the Ministry of Agriculture (<http://dahd.nic.in/>)

<sup>5</sup> This table showing craft data table was extracted from Status of exploited marine fishery resources of India (Modayil & Jayaprakash, 2003)



Source: Central Marine Fisheries Research Institute

*a. Kerala, Andhra Pradesh and Tamil Nadu*

Annexure 3 shows CMFRI data on the total annual fish catch in Kerala for the years 1985 to 2004. The data shows an increase in the amount of fish caught in these years. There has been a marked change in the fishing gear in Kerala over the years.

The change in fishing gear has determined the nature of the catch. In turn, the rise in demand for certain fish products have driven the demand for certain fishing gear. For example, when a market for oil sardines emerged, there was a marked increase in the use of gill nets in Andhra Pradesh and Tamil Nadu. This is mainly targeted at the pelagic resources (Modayil & Jayprakash, 2003). However, analyses of fish catch data and the consequent status of fishing craft and gear are not computed very carefully in the country. The CMFRI only collects catch data while the state fisheries departments are supposed to monitor the craft and gear data. The latter is highly unreliable and only in a few instances has there been any careful census of craft and gear. In Kerala SIFFS produced the Census of Artisanal Marine Fishing Fleet of Kerala in 1991 and one later in 1998 (SIFFS, 1999). They propose to undertake another such exercise in the year 2006. The Government of Tamil Nadu undertook a census in the early 50's and one more in the year 2000. Only recently on behalf of the Government of India, the CMFRI undertook a mammoth exercise of conducting a fisheries census to include the number of fishing families and the number of craft and gear and rough income estimates. Besides these, there are no reliable estimates of fishing craft and gear. It is against this backdrop that one must view the post-tsunami scenario, particularly the fisheries rehabilitation impacts. In Tamil Nadu, the government conducted a census of fisherfolk and this data was last published in the year 2000. No census exists for Kerala or Andhra Pradesh and poor socio-economic data is available on fishing communities.

There are also many studies that highlight the impacts of growth in fisheries on women. Venkatesh Salagrama terms this trend as the 'masculinisation' of fisheries, where women who once were at the fore of all fishery marketing were finally relegated to a marginal role. With the growth of several harbours and the mechanised sector, the catch landed is large, and is already pledged to merchants from export and processing companies. Large landings immediately crash prices of fish even in neighbouring villages with small landing sites. This in effect squeezed women traders out of the profession altogether in many places. At many harbours, women are now engaged in marginal tasks such as cleaning, sorting, drying and a few post-harvest tasks. Fish company agents and exporters now control the entire marketing of fish at landing sites. In the wake of the tsunami, rehabilitation efforts on Chennai's coastline were impacted by the traditional marginalisation and vulnerability of the fisherwomen. Women in fishing villages here played a significant economic role yet were politically powerless and excluded from economic decision-making. Before the tidal wave hit,

fishermen only engaged in fishing, while women handled all other responsibilities: processing fish; mending nets; caring for households, children, and the elderly; and even arranging finance and loans from middlemen and moneylenders for domestic needs and business. While most men were still fearful to return to sea immediately after the tsunami, women were providing almost 100 percent of the household income for Chennai's 40,000 fishing families, working as domestic servants, boat painters, net menders, shop keepers, and tailors<sup>6</sup>.

There are new trends in the fishery sector. Fisheries institutes and state governments are actively promoting mariculture as a supplement to capture fisheries. There is talk about sea ranching as a means to increase fish stocks in the ecosystem and other technological fixes such as Fish Aggregating Devices – the latest fad being promoted even by local conservation organisations.

#### *b. Andaman and Nicobar Islands*

The National Biodiversity and Action Plan for the Andaman and Nicobar Islands (ANI) provides information on the fishery trends in the islands. The ANI coastline is 1,962 km and around 35,000 km<sup>2</sup> of continental shelf that provides potential fishing grounds. The 200 miles of Exclusive Economic Zone (EEZ), around the ANI, is vast and covers a sea area of 0.6 million km<sup>2</sup>, which is about 30% of the EEZ of India. The Census of India (1991) estimated the fisheries potential as 160,000 tonnes of which 100,000 tonnes is tuna and tuna-like fishes. Reports by the Central Agricultural Research Institute (CARI) show that out of the total 130,000 tonnes of pelagic stock, only 13,200 tonnes are currently exploited.

Other than the indigenous tribes, the ANI did not have purely fishing communities and the fisheries sector began by bringing fishermen families from the mainland and settling them on the islands, the Department of Fisheries was set up by the A&N Administration in the islands in 1955. Since then fishermen from Kerala, and Andhra were settled in the islands. The A&N Administration provided these people with land, housing, loans and fishing equipment. CARI and the Fisheries Department are also developing inland aquaculture sector. Efforts have been made by the ANI Administration to promote the growth of commercial fishing, storage, marketing and exports. They have set up the ANI Integrated Development Corporation (ANIIDCO). ANIIDCO has floated a company - the Andaman Fisheries Limited (AFL), which has set up cold storage and processing plants. The Marine Products Export Development Authority funded by the Department of Ocean Development is also in the process of implementing a demonstration project for prawn farming. However, community development is poor as indicated by the dearth of co-operatives of self-help groups among fishing communities and the settlers (ANET, 2003)

## **II. ISSUES**

### **Post-tsunami land tenure and use issues**

#### *Tsunami damage estimates*

Early in January 2005, the Government of India estimated reconstruction costs in the four Indian states devastated by the tsunami to be around 70 billion rupees (1.6 billion dollars). The report was based on an assessment by federal government teams in the southeastern coastal regions of the states of Tamil Nadu, Andhra Pradesh, Kerala and Pondicherry, not including costs of reconstruction in the Andaman and Nicobar Islands. The nationwide death toll at this stage stood at 9,995, with 5,689 people registered as missing. Of these, 5,592 were untraced in the Andamans archipelago alone, according to a Home Ministry statement (Relief Web, 2005a)<sup>7</sup>.

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<sup>6</sup><http://www.prb.org/Template.cfm?Section=PRB&template=/ContentManagement/ContentDisplay.cfm&ContentID=12514>

<sup>7</sup> ReliefWeb is the world's leading on-line gateway to information (documents and maps) on humanitarian emergencies and disasters. ReliefWeb was launched in October 1996 and is administered by the UN Office for the Coordination of Humanitarian Affairs (OCHA).

A Joint Assessment Mission undertaken by the World Bank, the United Nations and the Asian Development Bank on the behest of the Government of India, made a preliminary estimation of damage and losses from its survey between the 1<sup>st</sup> and 15<sup>th</sup> February 2005.

In \$ million	Damage	Losses	Total	Effect on Livelihoods
Andhra Pradesh	29.7	15.0	44.7	21.2
Kerala	61.7	39.1	100.8	36.3
Tamil Nadu	437.8	377.2	815.0	358.3
Pondicherry	45.3	6.5	51.8	5.9
<b>TOTAL (by sectors)</b>	<b>574.5</b>	<b>448.3</b>	<b>1,022.8</b>	<b>421.7</b>
Relief a/		200.7	200.7	

a/ Relief provided by the local, state and national governments (not included in Total (by sectors)).

Source: JAM estimates on the basis of information made available by the governments and direct observation.

The Kerala government assessed the damage to be about Rs. 1358 crores. In its request for aid to the Government of India, the Kerala Government stated that 172 persons were declared dead. The report also states that the panchayats of Alappad and Arattupuzha were completely devastated. 219 villages and a population of 25.78 lakhs were declared as affected. The government offered monetary compensation of Rs 1 lakh for dependents of dead adults, Rs 50,000 to the family of dead children, and Rs 25,000 to the injured. The document states that a total number of 13044 houses have been affected by the tsunami, of which 2919 houses have been fully damaged and 10125 houses have been partially damaged. Houses requiring minor repairs were stated to be 3059 and those requiring major repairs were 7066 (Anon, 2005e).

According to the Government of India's 'Report to the Nation' in June 2005, as many as 12,405 lives were lost: 8,009 in Tamil Nadu, 3,513 in Andaman & Nicobar Islands, 599 in Pondicherry, 177 in Kerala and 107 in Andhra Pradesh. Non-governmental organisations say the death toll was much higher, and there is no clear proof of the exact number of deaths. Official estimates say the tragedy affected 27,92,000 people in 1,089 villages: 43,000 people in Pondicherry; 196,000 in Andhra Pradesh; 13,00,000 in Kerala; 356,000 in the Andaman and Nicobar Islands and 897,000 in Tamil Nadu. The tsunami destroyed over 235,000 homes, damaged 83,788 boats and rendered 39,035 hectares of cropped area unusable. The social infrastructure -- schools, primary health centres, drinking water supply, *anganwadis* (child care centre) and other community assets in these areas were totally destroyed. The Prime Minister's National Relief Fund – the agency that requests for citizens' donations in the wake of any national tragedy collected Rs 8.29 billion. According to the Prime Minister's Office, over 91,000 contributions from organisations and individuals came in for tsunami relief (Iype, 2005).

In the Andaman and Nicobar Islands, from the 38 affected islands, 3513 persons were reported dead or missing. 50,000 persons were reported as affected by the tsunami, 10,000 households were fully damaged, about 10,000 ha of agricultural lands were affected and 354 km of roads were destroyed (Anon 2006).

With respect only to fisheries, in 2005, the ANI administration released information on the immediate impact of the tsunami on fisherfolk (Equations, 2006). Besides several being rendered homeless, many fisherfolk lost their fishing inputs such as their crafts, gear, engines, iceboxes, etc. The ice plants and cold storages of the Department of Fisheries were also severely affected. The Department assessed losses to government property, departmental staff and losses to fisherfolk as detailed below:

1. Loss to government property was estimated at Rs. 820.00 lakhs.

2. Two technical officials from Katchal Islands were reported missing.
3. 69 fishermen were reported missing/dead.
4. A total of 2323 fishermen were directly affected.
5. 622 local made *dongies* (boats without engines) were fully damaged.
6. 471 local made *dongies* were partially damaged.
7. 316 engine-fitted boats were fully damaged/ lost.
8. 294 engine-fitted boats were partially damaged.
9. Several fishers lost their nets, fishing implements, marketing assets, etc.

In addition to this, the department also received about 1600 additional claims for loss to craft and gear which were being processed and at the time of writing this report these claims were to be approved by a committee consisting of the Assistant Director of Fisheries of the Zone (convener), a representative of the Revenue Department of the area and Panchayat Raj Institution representative viz. concerned *pradhan* in rural areas/Ward Council in Municipal area/Tribal captain in tribal areas.

### Displaced persons

In a report titled 'Tsunami: One Year On – India', Relief Web reported that the death toll for the entire country was 10,881, about 5,792 people were reported missing, and 6,913 were injured. More than 3 million livelihoods were described as being affected by the tsunami (Relief Web, Dec 2005b). There is no aggregated and reliable statistic till date about the nation wide number of displaced persons. Various regional centres have been collecting data on deaths, houses damaged and so on, and this is currently being compiled into databases by various initiatives such as the United Nations Development Programme (UNDP) supported Post-Tsunami Environment Initiative ([www.ptei-india.org](http://www.ptei-india.org)) and the United Nations Tsunami Response System (UNTRS) supported a beneficiary tracking system developed by Price Waterhouse Coopers. This data is not yet available to present in this paper. The amount of money allocated or spent on tsunami rehabilitation so far, is not really an indication of the number of displaced persons or the damage that occurred. The state governments have provided rehabilitation cost estimates to the Government of India to include estimated cost of disaster mitigation work as well, so the costs don't reflect actual damage.

### Temporary shelters

Despite the immediate surge of concern and aid for the victims of the tsunami, the relief phase saw a number of shortfalls in coordination and planning as a result of which temporary shelters were inadequate and could not fully meet the needs of the affected persons. Shelters are categorised as temporary, intermediate or permanent, depending on the material utilised. Several hundred persons are still housed in temporary shelters nearly 2 years after the tsunami. In the ANI, many families still live in temporary shelters with tin sheets or tar-coated sheets and corrugated metal with tarpaulin vs. mud, bamboo houses. There are reports of human rights violations in the temporary and intermediate shelters in the ANI (Chaudhry et al., 2006).

In many instances, NGOs began permanent shelter construction. Reliable estimates of the exact number of temporary shelters and intermediate shelters are not available, except where NGO coordination centres were established, such as in Nagapattinam in Tamil Nadu. However, information is not available on the type of material used in all these instances. Among the material used were<sup>8</sup>:

- Bitumen-coated sheets for walls and roofs
- Roofing of either asbestos or metal sheets
- Cement-impregnated particle boards (for walls)
- Corrugated FRP (fibre-reinforced plastic)

The available information on the temporary shelters built with these materials, and their disposal has caused some concern. In many places the bitumen sheets have completely disintegrated. Toilets were

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<sup>8</sup> Information on temporary shelters was gathered from Sudarshan Rodriguez of the PTEI project.

constructed (at a 1: 20 toilet - people ratio) in the temporary shelters and many of the septic tanks were not properly constructed leading to ground water contamination. In terms of the environmental implications of these temporary shelter measures, information is needed:

- the volumes of different types of material being utilised for temporary shelters
- the total number of shelters, material used, septic tanks per shelter
- total number of shelters currently in use
- information on reuse/recycling of these material
- evaluation of the health and environmental concerns of these material
- guidelines for dismantling of the shelters
- guidelines for possible reuse/recycling and disposal of these material

It is still not clear whose responsibility is it to dismantle the temporary structures, which have been abandoned after the occupants moved to intermediate or permanent housing. In Nagapattinam, it is reported that the government has undertaken the responsibility of clearing this additional debris (Pers. comm., Sudarshan Rodriguez).

In Tamil Nadu, the government has initiated a massive Tsunami Housing Reconstruction Programme which envisages the construction of about 1,30,000 concrete houses. The State Relief Commissioner communicated a model MOU to be entered into with NGOs and other rehabilitation agencies where designs and specifications of permanent houses developed by experts were to be approved by the District Collectors.

The Government of Tamil Nadu estimated state that 54,000 houses were damaged in Tamil Nadu (Government of Tamil Nadu, 2006). However, the construction of new homes had already begun by the NGOs. The World Bank has revised its assistance programme and is now extending another loan for the construction of approximately 65,000 houses for non-tsunami affected coastal areas.

#### Shelter related issues

The Government of Tamil Nadu introduced G.O 172 on 30<sup>th</sup> March 2005 declaring that all government sponsored new houses would be constructed only 200 metres from the HTL. With the stated objective of providing built houses in safe locations to the tsunami-affected families, the Government pledged assistance only to those who agreed to be relocated beyond 200 metres of the HTL. Those who intended to construct within 200 metres would not be eligible for government assistance. The government also extended assistance to those whose homes were not damaged but who wanted to relocate nonetheless. The ambiguity of the Coastal Regulation Zone Notification led to the above interpretation, and it was deemed that no new constructions would be permitted within 200 m. for all categories of the CRZ. It had been earlier stated by this author elsewhere (Sridhar, 2005) that several ambiguities lay within the CRZ notification and in the post-tsunami context, these required urgent clarification from the Ministry of Environment and Forests. There was strong resentment towards G.O 172 from various quarters. Several fishworker groups and NGOs termed this a discriminatory order. They put forth various arguments against the G.O stating that fisher communities have a right to stay close to the shoreline and visibility of the coastal waters is important for their fishing activities. The lack of consultation with and participation of fishing communities in these shelter guidelines has also been severely criticized. There are other arguments stating that this G.O effectively tries to remove fishing communities from the coast, and this makes it easy for the tourism industry and other real estate interests to make their entries into the coast.

In the early stages of relief and temporary construction, NGOs were fairly ignorant of CRZ laws and were mining sand dunes on the coast for building activities, which is strictly prohibited by law. Fishing communities do not have *pattas* or land rights and title deeds in the majority of cases. However, the CRZ only allows authorised constructions on the coast. The dichotomy has not been addressed yet.

Tamil Nadu has developed guidelines for construction on the coast. In the Andaman Islands, the Ministry of Urban development and the Disaster Authority of the Home Ministry have set guidelines

for housing. There are several matters that still remain unaddressed in the Andaman and Nicobar Islands. As noted earlier, there were several encroachments in the islands by settlers who constructed illegal houses. Many of these settlers have incurred losses from the tsunami. A debate rages on whether these families are entitled to compensation and housing on humanitarian grounds or not. Whether permanent housing would mean security of tenure is not clear particularly for those who may have been classified as 'encroachers'. It has also been noted that only one house is being issued per patta holder, although houses and people have multiplied since last housing estimates were collated by the government. There have also been several debates on the matter of building design for the ANI. The Ministry of Urban Development and Housing has finalised a pre-fabricated house design for the Nicobars. However, the appropriateness of these designs is under debate since Nicobaris live in locally designed *machans* (made principally of bamboo and *dhani* leaves).

### Agriculture<sup>9</sup>

The tsunami damaged large tracts of agricultural areas. It created salinised soils, washed away topsoil, standing crops were damaged, silt and sand casting and siltation of ponds, irrigation and drainage occurred. In Tamil Nadu the Nagapattinam Tsunami Resource Centre estimated damages to 8460 ha of agricultural land in Tamil Nadu and about 5000 ha in Nagapattinam district itself. Many initiatives are underway in Tamil Nadu to restore agriculture related livelihoods. These include removal of mud, clearing of drainage and irrigation channels, deep ploughing of fields, creating trenches around fields etc. 23 NGOs are involved in Nagapattinam district alone. Short-term measures include green manuring fields, growing salt resistant crops, while long term measures are aimed at overall improvements in agriculture.

Limitations to the rehabilitation efforts on agriculture appear to be process related. Coordination, unrealistic community demands and expectations etc were listed at a recent workshop in Tamil Nadu on the tsunami and Agriculture. Timely interventions appear to have been lacking in this sector.

### **Post-tsunami coastline stabilisation**

#### Bioshields

The immediate reactions of the state governments to the tsunami were to 'fortify' the coast by constructing sea walls across the coast. A Tamil Nadu government press release dated 4<sup>th</sup> January 2005 quoted the Chief Minister as having clarified "*To ensure the Tamil Nadu coast is not ravaged by the tsunami in future, protection works such as construction of sea walls, groynes, beach protection measures will have to be taken up. It is also proposed to take up shelter belts, mangrove plantations along the coastline to protect the coastal areas from the tsunami attack in future*" (Anon, 2005f). The first month after the tsunami witness many news reports quoting the Tamil Nadu Government's demands for a 1000 km sea wall as tsunami protection (Das, 2005)! Recently, it has been reported that a 3.2 km sea wall will be built at the Kalpakkam Township near the Kalpakkam nuclear power plant. While the penchant for constructing sea walls has not completely waned, it has gradually given way to another slogan - that of 'bioshields' or coastal plantations defences. There are various arguments about the appropriateness of these plantations, their impacts on coastal ecosystems and also conflicts arising out of land use in coastal commons (Kerr et al. 2006).

The MSSRF has been spearheading the promotion of mangrove plantations and non-mangrove bioshields which they describe as shelter-beds. These shelterbelts are strips of vegetation composed of trees and shrubs grown along the coasts to protect coastal areas from high velocity winds and also presumably from devastations like the ones caused by the recent tsunami. They are stated as being able to act as sand binders and inhibit the process of sand erosion. Shelterbelts are promoted as a means of reducing wind speed and ameliorating the local microclimate. The Toolkit for Establishing Coastal Bioshields states that well-placed and well-managed shelterbelts or bioshields can be used to increase agricultural productivity (Selvam, et al. 2005). The document states that in order to make

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<sup>9</sup> Compiled from NGO presentations at the Workshop on Disaster Preparedness in Agriculture, NCRC.

bioshields effective at proposed sites, the choice and mix of species should be decided based on the height and depth of the bioshield required. These plantations are seen to provide an augmentation of incomes in the medium to long term.

Prior to the tsunami, the Tamil Nadu Forest Department were involved with the plantation of *Casuarina* along the coast, although largely on revenue lands. Post-tsunami, the World Bank funded Emergency Tsunami Response Project (ETRP) is supporting the plantation of mangroves and shelter belts along the Tamil Nadu coast. The data from various coastal forest divisions along Tamil Nadu shows that only *Casuarina* is being planted all along the coast and the entire exercise appears to be devoid of any science. The plantation exercise on the ground does not currently follow any guidelines on how these 'bioshields' should be raised.

The Swaminathan Committee Report on revised coastal management legislation strongly recommended the use of bioshields. The authors of the 'Review of the Swaminathan Report' have been critical of this recommendation (Sridhar et al, 2006). They state *'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.'*

The reviewers also state that access and visibility of the seashore /sea is crucial for fishermen as part of their daily decision-making 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. They advise against the suggestion of carbon sequestration as a goal or major benefit from the creations of bio-shields. They state *'Viewing bio-shields from a climate change/carbon sequestration angle may encourage a forestry paradigm on coastal systems, which is not desirable'*.

#### **IV. POLICIES AND INSTITUTIONS**

##### **Governance and institutional structures for coastal land management**

India has inherited a unique categorisation of lands, where the State is the custodian of all lands – a concept that technically allows for State regulation over the use of even private lands. In the coastal areas, the majority of government lands are vested with the Revenue Department, followed by other departments such as the Forest Department, the Public Works Department and so on. These revenue lands have various categories which vary in each state. Tenure arrangements also vary across landscapes and these are also governed by various state and central laws. Different government ministries and state departments in charge of implementing these laws exercise their jurisdiction over resource use in coastal areas. The Fisheries Department controls fisheries resource use. The forest department is in charge of the use of coastal forests that are on forest lands. The Wildlife Wing of the Forest Department is in charge of protected areas that are located on the coast and for the protection of marine species that are listed in the Schedules of the Indian Wildlife Protection Act, 1972.

##### ***Traditional community resource management***

There are a few well-researched accounts on traditional and community-based fisheries and marine management practices in the country (Mathew, 1991; Baavink, 2003; Salagrama, 2003; Lobe & Berkes, 2004;). These studies illustrate the different community arrangements for fisheries management whose designs are based on varying community institutions and structures, fishery practices, governance mechanisms and habitats. Each study informs us of the possibilities and the limits of community involvement in managing the ecosystems they derive livelihoods from. A vast majority of the community arrangements for resource management are not well researched or compiled. In particular, the community arrangements for management of fisheries in the open waters is poorly understood, as are community responses to its current deterioration.

After the tsunami, much interest has been generated over the traditional governance systems along the coast. A few analyses exist that examine the role of traditional governance institutions in the disaster relief stage (Gomathy, 2006; Salagrama, 2006) but further studies are required on the role of these governance institutions in resource use and resource management, after the tsunami disaster.

### **Policies and regulations governing coastal land/resource management and use**

The numerous laws governing coastal areas can be defined as either development laws or conservation laws. This paper discusses the most significant conservation laws in the post-tsunami context: the Marine Fisheries Regulation Acts and the Coastal Regulation Zone Notification.

#### *Coastal Regulation Zone Notification<sup>10</sup>*

Among the laws guiding anthropogenic activities along the coast, the most significant and specialised legislation is the Coastal Regulation Zone (CRZ) Notification, 1991. The CRZ Notification was issued under Section 3(1) and Section 3(2)(v) of the Environment (Protection) Act, 1986. These clauses outline the powers of the Central Government to protect and improve the quality of the environment and take preventive measures to control and abate environmental pollution. This includes the power to delineate areas where anthropogenic activities can be regulated and restricted. The CRZ Notification is therefore a specialised legislation, which was introduced with the intention of protecting the coastal environment of India. A majority of the post-tsunami rehabilitation activities undertaken by governmental and non-governmental agencies in India take place in areas falling under the jurisdiction of the CRZ Notification.

The Coastal Regulation Zone or the zone under the purview of the CRZ Notification was declared comprising the coastal stretches of seas, bays, estuaries, creeks, rivers and backwaters which are influenced by tidal action (in the landward side) up to 500 metres from the High Tide Line (HTL) and the land between the Low Tide Line (LTL) and the HTL. In the case of rivers, creeks and backwaters, the notification states that the CRZ would apply to both banks of the water body, but the distance of the CRZ from the HTL may be reduced from 500 metres on a case-by-case basis, with the reasons for the reduction to be recorded in the Coastal Zone Management Plan (CZMP) of that State. However, this distance was not to be less than 100 metres or the width of the river, whichever was less. Therefore, lands in the backwater areas are also subject to the regulations of the notification.

#### *Mechanism for the implementation of the CRZ Notification*

The notification states that the respective State Governments should have identified, classified and recorded all the CRZ areas in the State Coastal Zone Management Plans, which was to be approved by the Ministry of Environment and Forests (MoEF). In these CRZ areas, from the date of the CRZ Notification i.e 19<sup>th</sup> February 1991, certain restrictions would be imposed on various anthropogenic activities including the setting up and expansion of industries, operations or processes etc. The responsibility of implementing the CRZ Notification rests with the state governments and the MoEF.

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<sup>10</sup> This section draws from a detailed analysis of the CRZ notification in the post-tsunami context, by this author (Sridhar, 2005)

The notification outlines the activities that are to be permitted by the MoEF and under which conditions. All other activities are to be regulated by the state governments and Union Territory Administrations within the framework of these approved CZMPs.

An organogram showing the institutions and structure developed for the implementation of the CRZ is annexed (Annexure 4). On November 26, 1998, the MoEF constituted 13 State Coastal Zone Management Authorities (SCZMAs), one for each of the coastal States and Union Territories, and a National Coastal Zone Management Authority (NCZMA) to monitor and implement the CRZ Notification's provisions. The constitution of the SCZMAs varies across the states but their duties and responsibilities are identical. Compared to other authorities constituted by the MoEF under Section 3(3) of the Environment (Protection) Act [EP Act], the SCZMAs have a fairly extensive and important mandate. They are also empowered to "take action and issue directions" — substantial powers in legalese. Among some of its activities, the SCZMAs are mandated to identify ecologically-sensitive and economically-important areas, create integrated management plans and to act as the immediate authority empowered to implement all provisions of the CRZ Notification, including recommending projects for clearance to the government. The National Coastal Zone Management Authority (NCZMA) is also vested with important responsibilities for coastal protection requiring official tenure to function.

#### *Concerns with the implementation of the CRZ Notification*

While the CRZ Notification is one of the earliest specialised environmental legislations, 15 years since its introduction several anomalies have crept in, resulting in serious problems for implementation. Some of these concerns have been pointed out below and needed to be recognised before inferring the position of the law on rehabilitation efforts.

- Since 1991, there have been 19 amendments and around 3 corrigenda (up to 24<sup>th</sup> July 2003) to the provisions of the notification. Each of these amendments have sought to dilute the protective measures of the notification and in the process have introduced newer clauses further complicating and rendering meaningless several of the protective clauses of the original notification.
- Despite the numerous amendments, the MoEF has not yet issued a consolidated notification in the official gazette, incorporating all the changes to the original notification. This makes the interpretation of the various clauses of the notification a real challenge. At the time of writing, the MoEF's official website presently has only a few select amendments. All amendments and a consolidated notification need to be made publicly available.
- The series of amendments to the notification have made way for several industrial and large-scale commercial activities. However, none of the amendments have sought to clarify some of the other ambiguities and uncertainties such as the definition of key terms such as 'local inhabitants', 'traditional rights and customary uses'.
- Although the states were supposed to prepare their CZMPs before February 1992, they only submitted the CZMPs after being directed to do so by the Supreme Court in 1996. The MoEF has only conditionally approved these State Coastal Zone Management Plans<sup>11</sup>. However, none of the States have incorporated the conditions laid out by the MoEF and are yet to prepare a revised CZMP that has been fully approved by the MoEF incorporating all its conditions. In the case of the tsunami affected states, the Coastal Zone Management Plan is not yet fully approved.
- In none of the states has the High Tide Line demarcation exercise been done at the ground level, for identification of zones and field implementation of the notification.

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<sup>11</sup> On September 27, 1996, the MoEF issued a letter to the Chief Secretaries of all coastal states and to the Administrators of the Union Territories, approving the CZMPs subject to the incorporation of various conditions and subsequent receipt of the revised maps from the states.

### ***State Marine Fisheries Regulations Acts***

In India, the official focus on fisheries has traditionally been on its development and only recently on its management. Management efforts in the various state marine fisheries regulation laws are mostly regulatory in nature where the powers and responsibility for the same has been vested with the State. The tsunami affected states each have state Marine Fisheries Regulation Acts (MFRAs). The MFRAs were drafted along the lines of the existing pre-independence legislation - the Indian Fisheries Act 1927. The MFRAs act as conservation laws since they regulate fisheries through a system of spatio-temporal closures (such as the monsoon bans), restrictions on mechanised fishing in near shore waters, gear and craft regulations. For Kerala, the ban on mechanised fishing in near shore waters is now based on depth (upto 30 metres north of Kollam and upto 20 metres in the southern region), for Tamil Nadu it is 3 nautical miles and for Andhra Pradesh it is 8 km. The various MFRAs also empower the state governments to restrict the number of boats that can be licensed or registered in the state, which allows for regulating the fishing effort.

The regulatory paradigm of the marine fisheries laws have been hailed since there is an attempt to balance development needs with conservation, where human actions are regulated and where human presence is not prohibited as the wildlife laws mandate (Shanker & Sridhar, 2006). However, the insights into implementation of this law are not as encouraging. In response to the rapid mechanisation of fisheries from the 50's onward, the attendant implementation has been languid at best. Ironically, of the main objectives of the MFRAs was to reduce the conflicts that arose between the traditional and mechanised sectors by officially demarcating fishing zones. In the absence of any implementation however, conflicts find newer grounds. Diminishing fish stocks and conflicts over resource extraction between the mechanised and traditional fisheries have aggravated. These conflicts are either between different categories of fisherfolk over resource use patterns and control, or conflicts between the fisherfolk and the State over regulations on fishing practices. The attitude towards fisheries laws ultimately describe in what manner responsibility for the fishery resource is viewed by the community which currently appears to have only intensified unsustainable resource use and heightened social tensions. An organogram showing the functioning of the MFRAs appears in Annexure 5.

### ***Concerns with the implementation of the Marine Fisheries Regulation Act***

- The provisions of the MFRAs is not well understood by fisherfolk in many parts of the coast (pers comm. T.Peter, KSMTF<sup>12</sup>).
- The provisions of the law are also not fully utilised to maximise its potential to contribute to meaningful conservation.
- Implementation of the MFRAs has been poor on several counts. Most significantly, the MFRAs appears to have made no dent on the problem of over-capacity, a fact evident from the numerous unlicensed and unregistered vessels plying in all the tsunami-affected states.
- Fisheries statistics on craft and gear is suspect and such data collection has been under criticism from different quarters. Read with the point above on the uninhibited fishery by unregistered vessels, the future of fishery regulation through the MFRAs appears somewhat grounded.
- As part of the relief and rehabilitation efforts, post-tsunami, there has been an unaccounted number of boats and fishing equipment that was distributed along the affected villages, particularly the Tamil Nadu coast. There is also a vast amount of conflicting information on what this has meant in terms of increased fishing effort and the actual impact on the resource (ICSF, 2006).

### ***Changes in legislation post-tsunami***

There really have been no changes in legislation, either the CRZ notification or to the Marine Fisheries Regulations Acts, although the tsunami did pose several challenges and did make bare the

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<sup>12</sup> Kerala Swathantra Matsya Tozhilali Federation – Kerala Independent Fisherfolk Union

inherent contradictions in law and the failure in its implementation. Questions began to be raised on the implementation of the CRZ notification the absence of which intensified the destruction by the tsunami. Several settlements and establishments had sprouted in near shore areas where should the law have been employed, there would be none. These buildings suffered grave damage during the tsunami.

Prior to the tsunami, the MoEF constituted a committee referred to as the Swaminathan Committee to review the Coastal Regulation Zone Notification. This committee had highlighted the importance of Integrated Coastal Zone Management but failed in several areas to deliver a convincing plan of how this would actually take shape. For a detailed review of the Swaminathan Committee Report see Sridhar et al., 2006. Following the publication of the Swaminathan Report, a document has been circulating around containing the text of what is purported to be the MoEF's proposed new coastal legislation - the Coastal Management Zone notification. The plan for coastal management outlined in it has generated much resentment from many quarters. The media carries regular reports highlighting condemnation of the CMZ plan by fishworker unions, NGOs and academicians. This CZM plan was recommended by the Swaminathan Committee. Among the various concerns with the proposed CMZ notification, serious one include:

- Earlier violations of the CRZ notification are sought to be nullified
- The new law ushers in developmental activities that were hitherto not permitted in the coastal zone.
- It brings under its jurisdiction a much larger marine area (12 nautical miles as opposed to the earlier inter-tidal area), without really specifying the implications on fishing rights.
- It also does not deal with areas of overlap with other legislations that govern development in the marine and coastal areas.
- It does away with the earlier conservation design of the CRZ notification which comprised of No-Development Zones. Instead, these areas are all open to development subject to decisions made by a planning authority. In the absence of any checks and balances, this only signifies a simple way to permit anthropogenic activities endlessly and indefinitely on the coast.

### **Planning and decision-making processes**

Both in the CRZ notification as well as in the MFRA, the text of the law is not clear about participation of local communities in decision making. The responsibility for planning and decision making is squarely affixed on the shoulders of Coastal Zone Management Authorities who may or may not consult with local communities. The MFRA makes no mention of consultation with fishing communities on regulations or management. However, it is well known that the implementation of these laws and actual decisions that are made towards this, are influenced by lobby groups.

Under the MFRA, a number of orders are issued on fishing regulations such as the dates of monsoon bans, which fisher category this applies to etc. These are actively influenced by fisher lobby groups, particularly the powerful mechanised sector. To this extent, 'participation' of some definition makes an appearance, but not by fair and transparent or officially recognised means.

## **IV. LESSONS LEARNED AND SOLUTIONS IDENTIFIED**

As with many recent natural disasters in the country, the destruction caused by the Indian Ocean tsunami was closely linked to the manner in which governments and people treated the coasts. Data is still pouring in from several governmental and non-government agencies through a range of programmes and projects. Projects such as the Post-Tsunami Environment Initiative ([www.ptei-india.org](http://www.ptei-india.org)) aim to understand the impact of the tsunami on environmental, social and policy aspects of coastal management and resource use. However, even in the absence of complete data from research projects, papers on earlier resource use patterns, media reports and discussions with communities members and NGOs working on post-tsunami related issues has revealed much. Despite the initial

enthusiasm following the tsunami, to implement the CRZ Notification, the current booming land prices in coastal areas are indicative of what lessons the tsunami has taught the country.

Many NGOs are engaged in dialogue with governments, either through coordination centres such as the one in Nagapattinam, Tamil Nadu or through workshops and meetings on specific issues such as shelters, ecological concerns and so on. There is a treasure of recommendations that emerge from these exercises and heed should be paid to these.

Without sounding too prescriptive or conversely, trivialising the challenges ahead, only a few measures are suggested here that can form a basis for future coastal resource management:

1. Coastal management legislation, particularly the Coastal Regulation Zone Notification and the MFRAs need to be critically reviewed to identify problem areas for implementation and management of the resources.
2. Currently, coastal resource laws are not really grounded in science (both natural and social science). The above mentioned reviews of legislation should specify areas where management measures can benefit from scientific rigour and instruction.
3. Coastal management measures and ecological restoration need to be grounded in good science. A range of restoration activities currently being undertaken such as that of creating bioshields and coral reef restoration, should be injected with a good amount of scientific rigour. Literature is emerging about the importance of coastal forests and the conditions under which they can best benefit coastal communities. Wolanski sums it well by stating '*the science of bioshields is well established; the technology of bioshields is however still developing. It is a mixture of many socio-economic and ecological considerations*' (Wolanski, 2006). While some may argue that in the Indian context the science is nascent, the pre-conditions Wolanski refers to seem to be forgotten by both donors and practitioners in their enthusiasm to produce results that are impressive.
4. Attention should be paid to various reviews and critiques in the country that detail the problems with proposed changes to legislation. With a large number of NGOs working on various aspects of coastal management, both pre- and post-tsunami, there is easily one consolidated report per issue, with fairly well-developed suggestions for research and intervention. With respect to coastal planning and management, two reports recommended are the Statement of CRZ and rehabilitation in Tamil Nadu. This report was developed as an exercise to specifically address concerns with coastal planning and development in the rehabilitation context (Sridhar, 2005, available on [http://www.atree.org/Statement\\_CRZ.pdf](http://www.atree.org/Statement_CRZ.pdf)).
5. With regard to future legislation such as the proposed CMZ, a detailed critique of the Swaminathan Review was prepared by a group of persons who have closely followed the implementation of the legislation and matters related to coastal conservation over the years. This is available on [http://www.atree.org/Swaminathan\\_Review.doc](http://www.atree.org/Swaminathan_Review.doc). The report contains detailed steps that should be followed for an improved understanding of coastal management needs and policy development.

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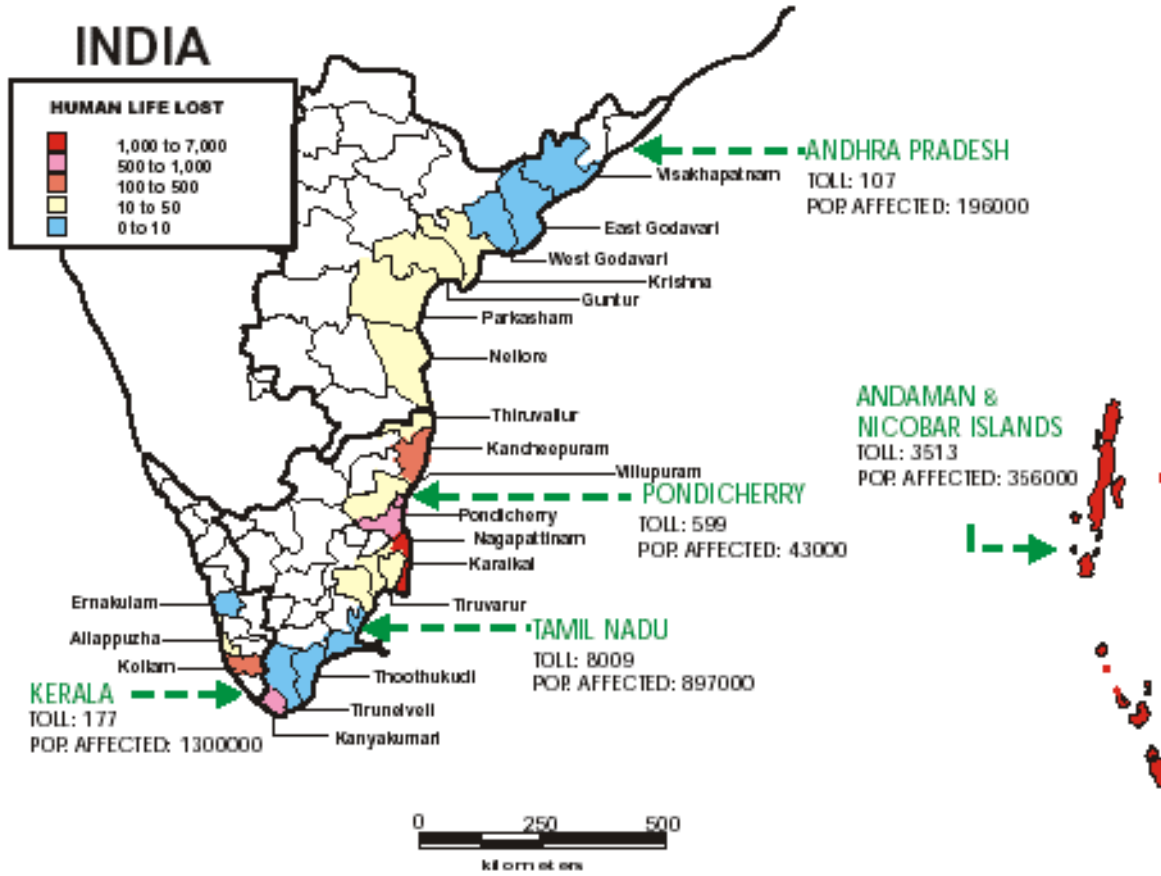
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## Annexure 1

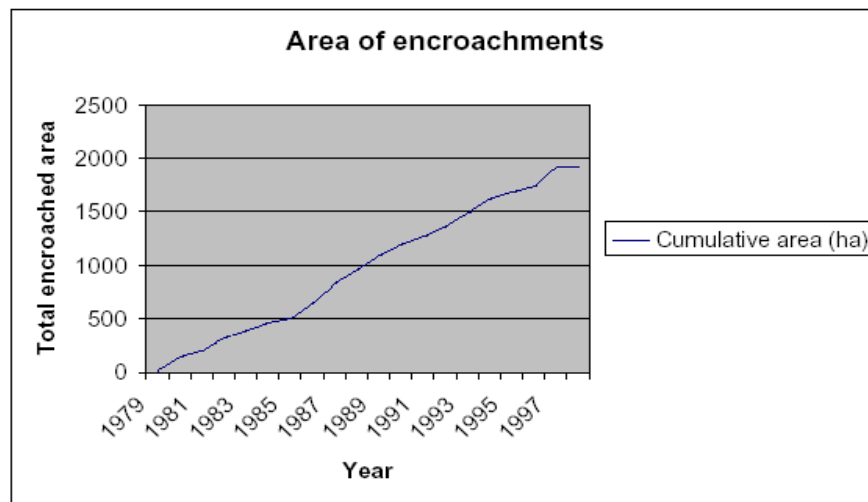
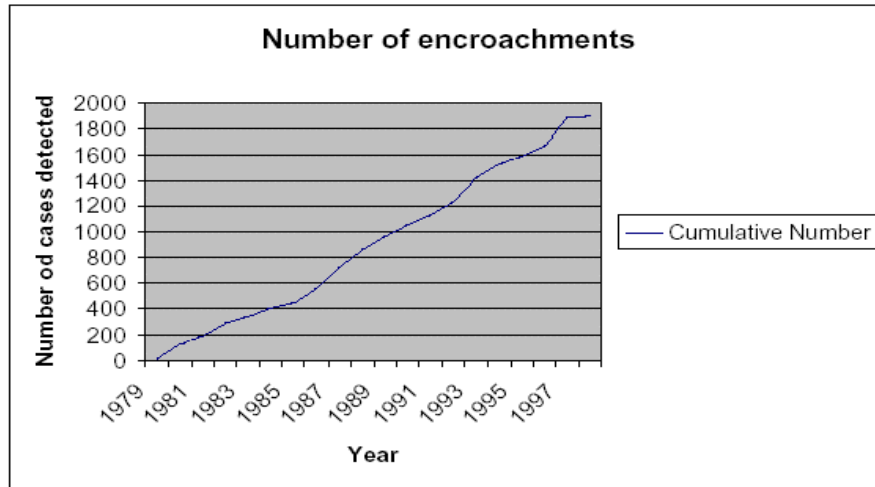
### Indian Ocean Tsunami affected areas in India



Source: United Nations Team for Recovery Support

## Annexure 2

### Trends in encroachments in the Andaman Islands as per Andaman & Nicobar Forest Department



Source: ANET, 2003. *Andaman and Nicobar Islands Union Territory- Biodiversity Strategy and Action Plan*. Prepared Under the National Biodiversity Strategy and Action Plan-India. GOI- UNDP. New Delhi.

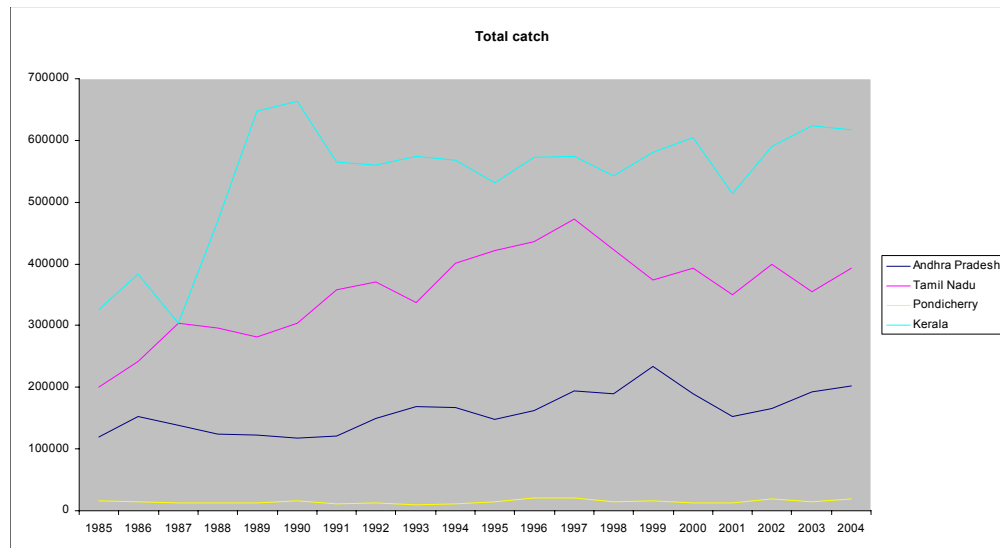
### Annexure 3

#### Total annual catch for the states of Andhra Pradesh, Kerala, Tamil Nadu and Pondicherry between 1985 and 2004

State-wise Marine Fish Landings (tonnes) in India during 1985-2004

#### Total Catch

Year	Andhra Pradesh	Tamil Nadu	Pondicherry	Kerala
1985	118541	200551	16480	325536
1986	152153	242041	14261	382791
1987	139160	303633	13456	303286
1988	123560	295664	13004	468808
1989	123128	281300	12360	647526
1990	118232	303275	15520	662890
1991	121150	357497	10477	564161
1992	149882	371108	13295	560742
1993	167939	337552	10196	574739
1994	167098	401497	10432	568034
1995	148467	421924	13562	531646
1996	162862	435673	20006	572055
1997	193351	472513	21274	574774
1998	190108	422622	13747	542696
1999	233276	374148	16155	580773
2000	189529	3933332	12718	604113
2001	152757	350709	12013	514139
2002	164911	398666	19459	589519
2003	192007	355163	14968	623293
2004	201348	392753	18416	616839



Source: Marine Fish Landings in India. 1895-2004. Estimates and Trends, CMFRI Spl. Pubi.

#### Annexure 4

#### Organogram showing implementation structure of the CRZ notification

