

# TSUNAMI AND COASTAL ISSUES OF THE KERALA STATE, INDIA.

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## Abstract

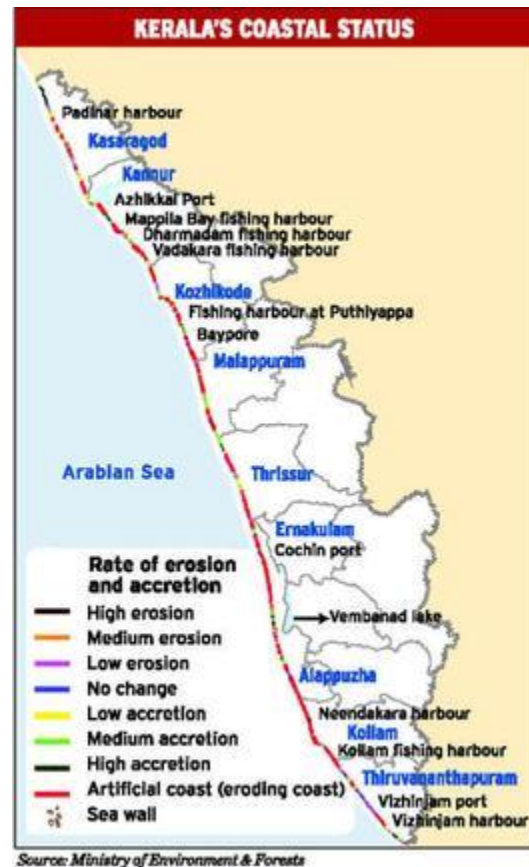
Kerala is a coastal state with an extensive coast line of 590 km long with Arabian sea in the west and stretching from Thiruvananthapuram district in the south to Kasargod district in the north. The state has a population of 3.33 crores as per the census of 2011 and most people live in the coastal area of Thiruvananthapuram, Kollam, Alapuzha, Ernakulam, Thrissur, Malappuram, Kozhikode, Kannur and Kasargod districts of Kerala. Considering the havoc caused by Tsunami which hit Indian coast line on 26<sup>th</sup> December 2004, in many places around the Tsunami disaster ravaged coastlines, the water and sewage system were wrecked by the quake-driven waves, and groundwater supplies were contaminated by sea water. Fisheries are one of the most important sectors of Kerala's economy providing livelihood to the fishermen population living in the 222 marine villages. Tsunami of 2004 affected fisheries sector adversely especially on motorized and non-mechanized segments and prices of different species of fishes slashed down. The rehabilitation related issues will have to be given concerted effort in the light of various localized problems. Many industries are situated in the coastal stretches and about 300 medium and large scale and about 2000 small scale industries are discharging effluent directly into marine or freshwater bodies. Infrastructure development including port and harbours, sand mining for industrial and construction purposes, recreational activities etc have contributed to coastal erosion. Major impact of tsunami and coastal issues are highlighted in this paper on the basis of the situation before and after the tsunami in the affected areas.

## INTRODUCTION

The 2004 Indian Ocean tsunami affected the states of Kerala, Tamil Nadu, Andhra Pradesh, the Union Territory of Pondicherry on the mainland Indian coasts and 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 three kilometres inland. Destruction was serious and incurred loss of life as well as damage to property in the Andaman and Nicobar Islands, the southern Bay of Bengal coast from southern Andhra Pradesh to halfway down Tamil Nadu, 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. Of the aforesaid four areas, the areas that were impacted hardest are clearly the first three (TRINet2, 2005). In Kerala state, 187 villages were affected due to tsunami. The disaster devastated with its high toll of 171 human lives, injuries, homes and livelihoods. Fisher folk were the most affected segment and showed a total loss of about Rs. 117.8 crore (Joint Assessment Mission Report, 2005). The estimated value of loss of equipments in mechanized sector was Rs 64 crore, whereas it was Rs 16 crore in motorized and Rs 20 crore in non-mechanized sector. Infrastructure losses also include damage to 8 fishing harbours and 15 fish landing centres. Over 1924 ha of Mangrove were affected (India Country Report, 2005). Several significant changes followed the tsunami, influencing many facets of coastal planning and governance.

## MATERIALS AND METHODS

The study was carried out in the tsunami affected regions of Kerala during the period 2005- 2007. The Run-up survey carried out as per the guidelines of UNESCO( 1997). The standared procedure followed were APHA (1995) for water and USDA (2004) Roymond et al .(1990) for soil samples. Primary and secondary data were also used for this study. Primary data were collected from the stakeholders by using a schedule prepared for this study whereas secondary data from published Government reports of agencies like UNDP, World Bank and ADB. The data were tabulated and analyzed by using simple statistical tools.



## RESULTS AND DISCUSSION

The soil types can be categorized as loamy sand, sandy clay loam, sand and clay. The pH were almost equivalent to the buffering capacity of carbonates and fall under the categories of saline sodic soil and saline soil. The transmission of many normal regions along the cost into sodic saline and saline categories might be an indication seawater invasion or anthropogenic impacts. The tsunami affected area can be specifically noted for the presence of saline sodic solis.

The details of number of trips per month before and after tsunami are given in Table1. In this study pre-tsunami period indicates a time period of one month from 16th of November to 15th of December 2004 and post-tsunami period is from 16th of January to 15th of February 2005. The number of fishing trips of boats in a month came down by 20 to 60 percent compared to the pre-tsunami situation. Fishing trips of motorized boats were more affected than the non-mechanized category. The number of fishing trips, which ranged from 20-25 days before tsunami, was reduced to the level 10-12 days. Maximum reduction of fishing trips was seen in the case of country crafts with gillnets and canoes with ring seines (60 %). In the non mechanized category , the fishing trips were reduced by 20 per cent to 40 per cent. Utmost slump in fishing trips occurred for catamarans with gillnet.

**Table 1. Number of fishing trips per month for various craft-gear combinations**

Sl.no.	Type of craft-gear combinations	Number of fishing trips	
		Pre tsunami Nov- Dec2004	Post-tsunami Jan-Feb 2005
<b>Motorized</b>			
1	Plank built boats with gillnet	25	12
2	Plywood boats with gillnet	25	10
3	Catamarans with gillnet	22	12
4	Canoes with ring seines (out board).	25	10
		20	10
5	Plank built boats with ring seines (in board)		
6	Canoes with mini trawl nets 25 12	25	12
<b>Non-mechanized</b>			
1	Catamarans with gillnet	25	15
2	Small canoes with castnets	25	15
3	Country crafts with gillnet	25	20

Immediately after the tsunami fishing operations came to a stand still and there was a drastic reduction in the per capita landings of all types of fishing units. In case of motorized boats, decline in fish catches was observed to the order of 25 to 68 %. In motorized category, plank built boats with gillnets experienced utmost decrease of 58% in catches compared to pre-tsunami period whereas in case of non-mechanized category, country crafts with gillnets was affected with maximum reduction of 78% in landings. The decrease in landings is due to destruction of fishing vessels as well as reluctance of fishermen to go to their fishing grounds.

**Table 2: Landings of Marinefishes in Kerala before and after tsunami**

Sl. No	Type of craft-gear combinations	Number of fishing trips	
		Pre-tsunami	Post-tsunami
<b>Motorized</b>			
1	Plank built boats with gillnets	83	35
2	Plywood boats with gillnets	26	15
3	Catamarans with gillnets	75	50
4	Canoes with ring seines (outboard)	650	490
5	Plank built boats with ring seines ( in board)	875	625
6	Canoes with mini trawinets	50	40
<b>Non-mechanized</b>			
1	Catamarans with gillnets	41	27
2	Small canoes with castnets	5	4

The price of marine fish also faced great setback after tsunami . This was due to low demand for fishes in the market and the reduction in the size of fish after tsunami. In the case most of the species, post-tsunami price was reduced to less than half of its pre tsunami price. The income levels of boat owners operating and non-operating as well as the crewmembers showed a steep decline. In the motorized category, the significant reduction in average value of catch per day of operation for different categories of craft-gear combinations was noticed. The average income of boat owners of motorized categories that varied from Rs 233 to Rs 3125 before tsunami came down to the range of Rs 165 to Rs 2250. The maximum reduction in boat owner's income was in the case of plank built boats with gill nets (40 per cent) and minimum was in the case of canoes with

mini trawl nets (21 per cent) in the motorized category. Pre-tsunami income of boat owners in the artisanal sector ranged between Rs. 57 and Rs. 162 while it reduced to the order of Rs 33 and Rs 105 in the post-tsunami period. In the artisanal sector, country crafts with gillnets suffered from 67 per cent reduction in income whereas small canoes with cast nets had only 3 per cent reduction. Fishing labourers, who share one third of the total revenue of the catch, suffered heavily with substantial wage losses due to decrease in catch after tsunami. The average income per trip of fishing labourers in motorized categories that varied from Rs 58 to Rs 292 before tsunami came down to the range of Rs 42 to Rs 183.

Maximum decline in fishing labourer's income was experienced for plank built boats with gillnets (40%) and minimum was in the case of canoes with mini-trawl nets (21%) in the motorized category. Pre-tsunami income of fishing labourers in the artisanal sector varied between Rs 41 and Rs 100, while it reduced to the order of Rs26 and Rs55 in the post-tsunami period. The fishing operations are gradually becoming non profitable due to diminishing returns and are not sufficient to meet even the operating costs. Hence there was a tremendous drop in the average number of fishing days. Moreover, the fishing labourers who are already in the clutches of the moneylenders and traders from whom they had borrowed money are finding it difficult to cope up with the situation. The government is providing grants to the affected population in order to sustain the lives of fisher folk in the absence of their livelihoods.

The tsunami caused widespread damage to housing and almost 1,54,000 houses were either destroyed or damaged (JAM Report, 2005). Almost all the affected houses in Kerala belonged to pucca category. Many huts and temporary shelters used for marketing and fishing related activities along the coastline were not included in the initial assessment of losses.

Major issues along Kerala coast include sand mining, destruction of mangroves forests, Coastal erosion. Tourism, CRZ violation, climate change, deep sea fishing not tapped cold storage facilities in adequate, lack of facilities in landing centres, deep sea fishing policy, absence of strategies for the effective utilization of the by catch, unauthorized introduction of new fishing vessels ,usage of banned fishing practices and banned gears, illegal fishing practices in the inland waters, depletion of fishery stocks of commercial species, aquaquatic pollution, decreasing share of the state in the marine products, unhygienic condition prevalent in fish markets, high fishing costs, general backwardness of coastal communities, threat to biodiversity, destruction of mangroves, lack of insurance schemes n shrimp/fish culture.

Following are some of the issues to be resolved.

- > A large number of affected households were living on the government land without title (encroachers). This has posed many problems associated with rehabilitation.
- > As part of the protection from the disasters, a number of families were asked to relocate by strictly adhering to Coastal Zone Regulations (CRZ). But this issue invited opposition on the grounds that most of the fisher families live within the CRZ even before adoption of this measure and resettlement of all these families by strictly adhering to regulations would deprive of their traditional rights and privileges.
- > Fishermen communities are reluctant to have their resettlement at more than 800 meters to 1 kilometre from the existing location or from the sea. Further the land availability is a problem as most villages are narrow strips of land between sea and backwaters, most of them having width of not more than 2 kilometres.
- > Displaced households with legal title demanded that the government should provide them new land with title while allowing them to retain the rights to original property.
- > The biggest problem in the affected area was the non-availability of drinking water. Following the disaster, wells were buried in sand and water in the wells that survived had turned saline. Also water pipe connection in temporary shelters did not serve the purpose forcing people to depend upon other sources of fresh water.

>A scientific linkage between the environment and developmental needs to be clearly established to forecast and mitigate disasters and to improve our environment of the state. >Minimum standards should specify the levels of availability of services in the disaster prone area such as coastal belt

>There is an urgent need to set up a separate wing under the Department of Environment in the State to look into the various environmental issues generated by natural hazards by involving experts from related



disciplines. The formation of a Natural Hazard Management Commission (NHMC) with full autonomy in line with the Central Election Commission must empower the efforts in this front.

> Coastal afforestation schemes such as bio shield development to protect the coastal area must be implemented with out delay.

>Contour mapping of coastal areas from 10 to 20 km at half meter interval should be taken up for the purpose of evacuation and the association of micro level preparedness planning in case of emergency.

>Education/extension programmes related to the coastal calamities, warning systems and preparedness activities connected to disaster mitigation measures should be charted out for government officials, NGOs, primary curriculum as well as the general public

## CONCLUSION

One of the issues that have to be taken up after the tsunami is the need for adequate disaster management system and disaster preparedness plan under the auspicious of the state and district level authorities. Experiences with the natural disasters indicate that some of the most effective risk management actions both anticipatory (reducing future risks) and compensatory (preparedness to respond) need to be taken at the local level. As a right step in this direction, the State has set up a disaster management department headed by a secretary level officer. In addition, a comprehensive environmental, multi-hazard, coastal zone management need to be developed. Above all, focusing on the early warning systems based on vulnerability assessment and hazard analysis, preparedness and relief, recovery and rehabilitation should be given emphasis. In order to reinstate the standard of living of the fisher population, necessary back up designed towards capacity building, by empowering the fisher folk, providing facilities like alternative income generating avocations and adequate support to restore fishing activities should be undertaken by the Government and other agencies. Livelihoods are not restored at least to the pre-tsunami level if alternative avocations are not adopted successfully. However, Government is supplying a contingency grant of fixed amount, which has imbibed a culture among the victims to wait for the government or other agencies to act .

## ACKNOWLEDGEMENTS

I express my sincere gratitude to the Principal and faculty members of Zoology Department, S.N.College, Kollam for the constant encouragement and valuable help.

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