

## SUMMARY OF THE FINDINGS

# STUDIES ON THE ECOLOGICAL CHANGES FROM CUDDALORE COASTAL WATERS AFTER THE TSUNAMI

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## Summary of the findings

After the Tsunami many changes occurred in the coastal environment. An attempt has been made in Cuddalore area, Devanampattinam (silver beach), Cuddalore old town and Thazhanguda. During the study period (Jan2009-March2010), unusual tide, waves, sea erosion, were noticed. A detail survey was made to know ecological changes from microbial diversity, phytoplankton, zooplankton, and benthos and fish diversity were studied. 92 species of Phytoplankton and 50 species of Zooplankton were identified. Among the phytoplankton 58 belongs to diatoms, 20 belong to dinoflagellate, 6 belong to Blue green algae, 6 greens, and 2 Silicoflagellates were listed. Among the Zooplankton During the present investigation a total of 50 species of zooplankton were identified in the study area. The zooplanktons were identified 9 Ciliata, 1 Foraminifera, 3 Hydrozoa, 3 Rotifers, and 1 Protochardata, 3 Cladocera, 15 Copepoda, 1 Amphipoda, 1 Decapoda, 1 Chaetognatha and 12 larval forms were recorded.

38 benthos were recorded Among them, the gastropod *Babylonia spirata* and mole crab *Emerita asiatica* population showed rich in diversity.. Regarding fishery 26 items listed, 15 belong to pelagic and 11 belong to demersal fishes. In shellfishes Shrimps are dominated in the catch. Oil sardine bumper catch during July with 8000 tonnes (an average of 4 tonnes per boat) are special to mention.FAD (fish aggregating devices) are used to catch the scads and flying fishes are quite interesting.

Coastal sand dune is a nutrient limited ecosystem. However, certain plants grow on the dunes and they have specialized mechanisms to cope up with the adverse conditions prevailing in the ecosystem. Sand dune plants or psammophytes include creepers like beach morning glory (*Ipomea pes-caprae*) and sand spinifex (*Spinifex littoreus*). These vegetations serve as binding agents to form sand dunes which in turn act as a shelter for some marine animals during the breeding season. The sea turtles lay eggs in such sand dunes. Moreover, the sand dunes also protect the coast from the waves by lessening the force of the oncoming waves. Sand dune species have medicinal properties also. *I. pes-caprae* is being used as pain killer.

These plants are threatened due to the construction of roads, formations of groynes and conversion of the coast into a tourist destination. This is true at Cuddalore, Silver Beach also. A preliminary restoration work was under taken during the post-tsunami period and sand dune vegetation has been successfully restored in a few places on the Silver Beach of Cuddalore. Propagation of *I. pes-caprae* was done by plucking a portion of the creeper and planting it in pits dug at a depth of 30 to 40 cm. Present study has revealed that the ideal season for revegetating the demed sand dune area and restoration of the dune is the northeast monsoon period

Two species of sand dune vegetations named *Ipomea pescariae* (popularly known as “Adapan Kodi” in Tamil) with leaves in the shape of goat’s hoof and violet flowers and *spinifex littoreus* (popularly known as Ravana’s moustache) because of the spiny nature of its leaves, were suffered a setback owing to the construction of roads, formation of groynes and converting the coast in to a tourist destination. A beautiful and colorful booklet were distributed to bring awareness about the plants. (please refer in the Annexure I).

### **Contribution to the Society**

1. From the present study, over exploitation of *Babylonia spirata* from Thazhanguda was noted and awareness on exploitation was made to the fishermen through fisheries department and NGO and publication by popular articles. (Please refer Fishing Chimes articles page.no:43- 44).

2. An attempt has been made during 2009-10 to restore the vegetation of coastal plants like *Ipomoea pescaprae* and *Spinifex littoreus* in 12 places. Successful growths of the flora were observed in 9 places. A public awareness program was also made with help of Pamphlet(booklet) in the regional language and the news came in The Hindu on September 25, 2010. (please refer the News clipping Annexure II)

## Conclusion

Kumaraguru *et al.*, (2005) reported the impact of tsunami on the coral reef environment of Gulf of Mannar and Palk bay. Murugan *et al.*, (2007) found the distribution and abundance of green mussel decreased after the tsunami at Parangipettai area. Ramanamoorthy *et al.*, 2005 explained the inundation of sea water in Andaman and Nicobar islands and part of Tamil Nadu coast.

Kathiresan and Rajendiran (2005) studied the impact of tsunami on mangroves from 18 coastal hamlets along south east of India. Ramachandran *et al.*, (2005) has made an assessment on ecological impact of tsunami at Nicobar island and reported the heavy damage of coral reefs. Gauthamadas *et al.*, (2006) has given a methodology for social transformation frame work for the tsunami affected fishing community.

Department of Ocean Development (2005) has given a detailed analysis of the tsunami impact with help of OceanSatellite OCM data –by NASA, Hyderabad and NIOT and reported the silica and siltation was heavy and the population of benthic community was less. Further, demersal fishery has slightly increased.

Devanathan *et al* (2010) studied the total heterotrophic bacterial population density from Uppanar estuary (harbour) Cuddalore coast and Devanathan and Srinivasan (2010) reported the bumper catch or exploitation of the Gastropod *Babylonia spirata* from Thazhanguda, Cuddalore waters. UNDP (2006) has made a interdisciplinary report “as beyond the tsunami fauna of intertidal ecosystems” in Tamil nadu, and given a detailed data on nine sites from Chennai to Nagapattinam (coramendal coast).

In general very low numbers of benthic fauna (1-9/0.08 m<sup>2</sup>) and species (15) were recorded from Chennai to Nagapattinam coastal as well as the hot spot areas after tsunami survey. However, high number (146/0.08 m<sup>2</sup>) and diversity (35 species) were recorded at

Cooum 0.5.km. Besides, the polychaetes *Polyodontes melanonotes* (2500/0/08 m<sup>2</sup> ) was found to record only in Pondicherry area for first time.

In the present study the benthos diversity showed an increasing trend 2000 individuals /m<sup>2</sup> of oligochaetes, Polychaetes, *Emerita asiatica* and nematodes were reported. In the absence of published base line pre tsunami data at Thazhanguda and Cuddalore old town it is not possible to compare the impact of tsunami or recovery in detail. However, with available works done in India, the present study will be useful for the scientist who needs long-term monitoring strategy or coastal management.

#### **Recommendations:**

Based on the study, it is seen that Ph, temperature, salinity and tide are within the limitation and there is no much change. Phytoplankton and zooplankton density showed normal values and benthos showed very good richness. Fish catch composition also showed an increasing trend. Therefore, it is clear that Nature has its own repairing mechanisms. Some simple environmental guidelines and standards can be done as;

- \* To initiate restoration of coastal ecology through an Integrated Coastal Zone Management Plan.

- \* Fishermen's hamlets should not be permitted within 1 km from the shoreline and they should be encouraged to live behind dense mangrove or sand dune places.

- \* A proper planning and policy is necessary for the location of hamlets along the sea-coasts, where a vast majority of global human population getting concentrated.

- \* It is also suggested to grow plant of *Ipomoea pes-caprae* and *Spinifex littoreus* species suited to the soil substrates as done in this project.

## LIST OF PUBLICATIONS OUT OF THE PROJECT

1. Murugan, M., M. Srinivasan and L. Kannan. 2007. Impact of Tsunami on agriculture lands in Cuddalore area (Tamilnadu, southeast coast of India). International conference “. Coastal zone Environment and sustainable development vulnerability, adaptation and beyond”. Held at school of Environmental studies, Jawaharlal Nehru University, New Delhi. pp82.
- 2 .Devanathan, K., M. Srinivasan and S.Balakrishnan. 2010. Studies on the Total Heterotrophic Bacterial Population Density from Uppanar Estuary (Harbour), Cuddalore Coast. *Advances in Biological Research* 4 (2): 139-145, 2010. ISSN 1992-0067.
3. Devanathan, K. and M. Srinivasan. 2010. Gastropod *Babylonia spirata* from Cuddalore coastal water. *Fishing chimes*, 29(11): 43-44. ISSN : 0971-4529.
4. Srinivasan,M. and K. Devanathan, 2010. ‘Protect coastal vegetation” (An awareness pamphlet for the environment conservation, sand dune vegetation). The Hindu Sep 25, 2010.
5. Brinda. S. M.Srinivasan, and S.Balakrishnan. 2010. Studies on Diversity of Fin Fish Larvae In Vellar estuary, southeast coast of India. *World Journal of Fish and Marine Sciences* 2(1):44-50. ISSN 2078-4589