

# Post-tsunami Assessment in the Coastal Region Between Kanyakumari and Ovari, Tamil Nadu—A Case Study

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**Abstract:** Coastal zones are dynamic areas that are constantly undergoing change in response to a multitude of factors including sea level rise, wave and current patterns, hurricanes and human influences. On 26<sup>th</sup> December 2004, huge waves smashed across the shore between Kanyakumari and Ovari. As they crossed the beach, the waves up to 30 feet tall. Many people are dead due to crush and pull to sea and drowned as the mighty waves withdraw. Many villages have been obliterated, the death toll could exceed 300 but the damage to the property is very high. The size of the tsunami is related to the area that moves on the ocean bottom and how far it moves. This region is manifested with marine terrace, sand dunes, beach ridges, estuaries, floodplains, beaches, mangroves, peneplains, uplands, sea cliff, etc. We have attempted the shoreline dynamics using beach profile survey, and coastal environment changes through online survey, governmental, records and coastal geomorphological studies using remote sensing technique. The major destructions are identified in this paper.

**Key Words:** tsunami; waves; ecological impact

## 1 Introduction

26<sup>th</sup> of December 2004, dawned silently like all the other mornings. It was so with the coastal areas of Tamil Nadu. But, on that Sunday's morning, all on a sudden, from Marina Beach, Chennai and down to the coastal areas of Cuddalore, Nagapattinam and then down south to Colachel, the coastal area on the West side of Kanyakumari tip of India, things changed for worst. In no time, the sea, in a sudden ferocious way rose high and got into the land covering two to three kilometres of areas with its watery net. In this process thousands of people were taken off unaware, into the fold of the sea and killed<sup>[1]</sup>.

Whenever an earthquake occurs on land, the seismic energy released by it normally travels in waves resulting in damage to buildings and other structures<sup>[2]</sup>. But the seismic energy released by the earthquake in ocean causes tsunamis which

travel thousand of kilometers. The tsunamis hit the obstacles that come along their path with great ferocity and the east coast was the first obstacle which the huge tidal waves encountered, causing destruction all along.

When we visited the affected coastal areas from Kanyakumari to Ovari, the whole area gave a painful feeling on how the already deprived and the marginalized communities like the fisher folk, gets more and more victimized during such calamities, may be natural or human made. All the areas remained like deserted battlefields with broken buildings, dead bodies, carcasses of animals, uprooted trees and deserted and lone houses and huts. The fishing boats could be seen damaged and lying in different faraway areas up to one to two kilometers away from the sea. The fishing nets were also seen lying in a stranded way. There were cries and wailings everywhere due to the destruction made by the tsunami along the study area. The detailed studies of post tsunami

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assessment are made in this paper.

## 2 Tsunami and study area

The study area is located between Latitude of N8°04' to N8°17' and Longitude of E77°32' to E77°54' at southern part of the Tamil Nadu. It encompasses district of Kanyakumari and Tirunelveli (Table 1). It is bounded by Bay of Bengal in the east, Western Ghats in the west and Indian Ocean in the south being the southern most tip of India (Fig. 1). Mostly Kanyakumari district made of Charnockite, Garnetiferous gneiss and Leptynite and Tirunelveli district made of mostly Garnite gneiss.

**Table 1** Details of the study area

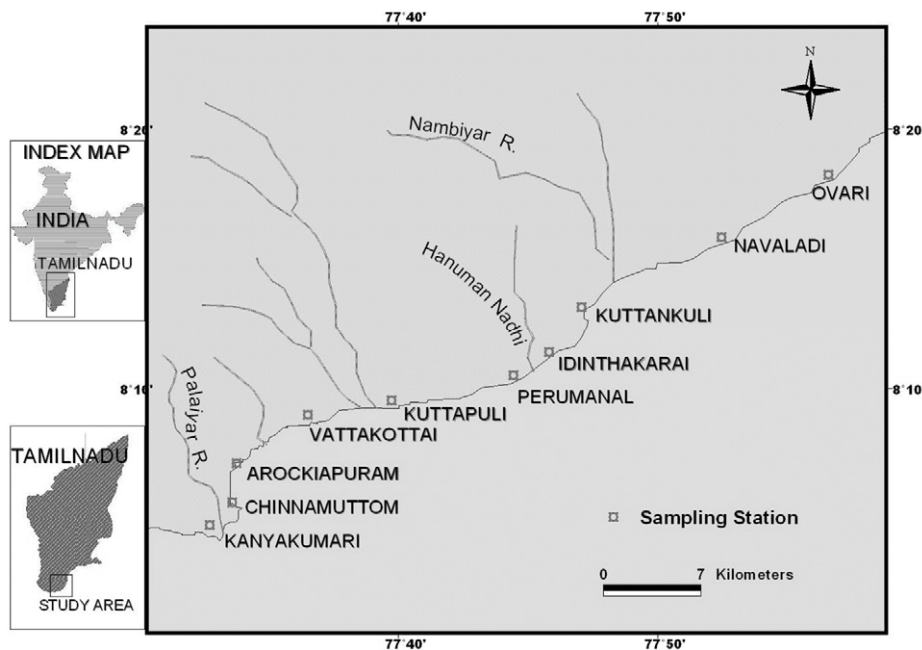
Location	Latitude (°)	Longitude (°)	Elevation (m)
Ovari	8.17	77.49	19
Idinthakarai	8.14	77.45	20
Perumanal	8.09	77.39	17
Chettikulam	8.08	77.37	16
Kuttapuli	8.08	77.36	16
Vattakottai	8.07	77.34	15
Lakshmpuram	8.07	77.34	16
Muttam	8.06	77.34	17
Capecomarian	8.04	77.33	20

The killer earthquake, which had its epicenter near Indonesia, claimed five lives in the district when tidal waves triggered by seismic activity entered nine coastal villages and caused extensive damage to fisherman’s property particularly catamarans and fishing nets. Of the nine coastal villages in the district—Koottapuli, Perumanal, Panjal, Idinthakarai, Thomaiyarpuram, Kooththankuzhi, Uvari, Koottappanai and

Kooduthaazhai all under Radhapuram taluk and Kooththankuzhi, Idinthakarai and Koottapuli were the worst affected. However, no men and materials at the site of Koodankulam Nuclear Power Project were affected or damaged. The seawater, which started entering Kooththankuzhi around 9:30 am, invaded about 750 meters into the villages. The intense tides, which entered more than six times between 9:30 am and one pm. Capsized fiberglass boats with huge holes could be seen floating at a distance from the shore. Around 30 catamarans were pushed up to the bridge, nearly a km away from the sea. Seawater swelled around 9:30 am and moved nearly 250–400 meters into the land. When it receded, it retreated one km beyond the normal point, leaving a huge stretch of damp land. However, the retreat and invasion of heavy tides continued infrequent intervals. Vivekananda Memorial Rock and near the Tiruvalluvar statue at Kanayakumari, the waves are boost up above a height of 33 m. Compared to Western coast of Tamil Nadu not a lot of Casualties occur in Southern Coast of Tamil Nadu.

## 3 Tsunami wave approaches along the study area

In Tamil Nadu, the “shadow” coastal regions of Tuticorin, Rameswaram, Kanyakumari, and Tiruchendur were relatively less affected. In these areas, the effects were generated by diffracted waves, which are less intense than the direct impact of tsunamis. When a wave encounters a large barrier, its motion penetrates the region of the geometric shadow by a process of scattering known as diffraction. When the waves are diffracted by a large leading body, their height gets progressively diminished, resulting in continued reduction in wave energy flux until it meets with another boundary of the



**Fig. 1** Location map of the study area

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