



# Tsunami: Impact & Damage

## TSUNAMI IN THE INDIAN OCEAN

On 26 December 2004, an earthquake of magnitude 9.3 on the Richter scale, with its epicentre off the coast of Sumatra, triggered the tsunami in the Indian Ocean at 6.29 a.m. IST. The seismic fault ran north to south beneath the ocean floor, while the tsunami waves shot out west to east. Within minutes of the earthquake, the first tsunami struck the Indonesian island of Simeule, located approximately 40 km from the epicentre. The earthquake was felt widely along the coasts of India.

A typical scene on the islands of Sumatra on a quiet Sunday morning just the day after Christmas: some early birds strolled on the beach while children played cricket and football on the beach sands. Fisherfolk all along the coast went about their daily business of repairing boats and nets, salting and drying fish, and cooking.

Some boats were out in the sea. Suddenly like a bolt out of the blue the earth rumbled and swallowed all it could in a matter of minutes.

The disaster continued in the form of giant waves that swept across eleven nations, including the southern parts of India, washing away thousands of lives and livelihood ruthlessly. While many people are believed to have died in the earthquake itself, most fatalities resulted from drowning caused by the seawater that gushed into the coastal areas. Everywhere, people along the coast were taken by surprise. Among the worst hit was Sri Lanka, where the damage included a train being swept off the rails by the wave.

The earthquake, the tsunami and the events that followed will be long remembered as one among the worst human tragedies in history. Reportedly over 2,85,000 people were killed or missing. Loss and devastation

caused by this disaster brought incalculable suffering to millions of people around the Indian Ocean.

## TSUNAMI IN INDIA

The phenomenon of tsunami that usually occurs near seismically active spots in the Pacific Ocean was unheard of in India till it hit the east and west coast in December 2004. This increased the shock and horror caused by the event. The waves that struck mainland India were 3-10 m in height and penetrated between 300 metres to 3000 metres inland causing severe damage to lives and property in the coastal areas of Andhra Pradesh, Tamil Nadu, Pondicherry, Kerala and Andaman and Nicobar islands, devastating and crippling the coastal economy as never before.

The death toll in India was 12,405; the number of people missing, 5,640. Those displaced totalled 6,47,599. 75 per cent of the fatalities were women and children; while 787 women became widows and 480

children were orphaned. Across the entire Indian coast affected by tsunami, an estimated 1,089 villages were affected, 1,57,393 houses were destroyed and approximately 7,30,000 individuals were forced to leave their homes. 83,788 boats were damaged or destroyed, 31,755 livestock were lost and 39,035 hectares of ripe agricultural land was damaged. (Source for all figures: Government of India, Ministry of Home Affairs Report, 25 May 2005). The total estimated value of damages: US \$2.56 billion (Approx. Rs.11300 crore) and total estimated need for long-term recovery US \$2.1 billion (Approx. Rs.9240 crore).

After the Andaman and Nicobar islands, the state of Tamil Nadu was the worst affected. Tamil Nadu has a coastline of 1,076 km (12% of the total coastal length of the country) of which 60 km is on the west coast (Kanniyakumari district). The devastating waves that lashed several coastal districts of the state (Chennai, Tiruvallur, Kancheepuram, Cuddalore, Nagapattinam, Tiruvarur, Thanjavur, Thoothukudi, Ramanathapuram, Tirunelveli, Kanniyakumari, Pudukottai and Villupuram) left at least 7995 dead and rendered thousands of people homeless. More than 10 lakh people were directly or indirectly affected by the tsunami in Tamil Nadu. The majority of those affected had fisheries and farm-based livelihoods or were employed in associated enterprises. While fisheries were the worst hit, crops and livestock also suffered substantial losses.

## IMPACT AND DAMAGE IN TAMIL NADU

When the tsunami struck, the beautiful beaches, holy shrines, historical and tourism spots spread all along the coast were

DISTRICT-WISE COASTLINE OF TAMIL NADU

District	Coramandel	Palk-Bay	Gulf of Mannar	West Coast	Total km
Chennai	19.00				19.00
Tiruvallur	27.90				27.90
Kancheepuram	87.20				87.20
Villupuram	40.70				40.70
Cuddalore	57.50				57.50
Nagapattinam	124.90	63.00			187.90
Tiruvarur		47.20			47.20
Thanjavur		45.10			45.10
Pudukkottai		42.80			42.80
Ramanathapuram		95.80	141.00		236.80
Thoothukudi			163.50		163.50
Tirunelveli			48.90		48.90
Kanniyakumari			11.50	60.00	71.50
Total	357.20	293.90	364.90	60.00	1076.00

## LIVES LOST AND IMPAIRED

S.No	District	No. of villages affected	No of kuppams affected	Population of the district as per 2001 census	Population affected by tsunami	Population Evacuated	Human lives Lost	Persons injured	Orphaned children	Women widowed
1	Chennai	4	25	4343645	73000	30000	206	9	-	35
2	Cuddalore	8	43	2285395	99704	61054	610	259	12	78
3	Kancheepuram	30	44	2877458	100000	60000	130	24	9	17
4	Kanniyakumari	16	33	1676034	187650	46280	799	754	3	106
5	Nagapattinam	38	73	1488839	196184	196184	6065	2375	179	294
6	Pudukottai	25	29	1459601	66350	4857	15	-	-	-
7	Ramanathapuram	40	114	1187604	84000	8315	20	2	-	4
8	Thanjavur	22	-	2216138	29278	4600	37	482	2	-
9	Tiruvallur	6	38	2754756	15600	-	29	-	-	6
10	Tiruvarur	-	-	-	-	-	29	3	3	14
11	Tirunelveli	10	-	2723988	27948	11170	4	6	1	1
12	Thoothukudi	23	-	1572273	110610	11625	3	-	-	1
13	Villupuram	8	19	2960373	78240	37500	48	46	-	5
	Total	230	418	28715578	1068564	471585	7995	3960	197	561

devastated and reduced to mere debris. Huts and pucca houses were flattened, fishing boats smashed, and buses, cars and big tankers were strewn around. An extremely high death toll occurred within a span of a few minutes. The fisherfolk living along the coast bore the brunt of the giant waves. Many lost their lives and most their livelihood. The shock of the tragedy left many traumatized. Amidst the tragedy, examples of tremendous resilience and success also emerged.

The complex interaction between water-borne energy, seabed and terrestrial terrain meant that the effects of the tsunami were different from place to place in the east coast and the west coast of Tamil Nadu. The monster waves redefined the coastline. As many as 230 villages and 418 *kuppams* (hamlets), spread across 13 coastal districts were flattened completely. Many productive assets of fishermen, agriculturists and other micro-enterprise owners living along the coasts were all either swept away or made non-functional. About 1.18 lakh huts and houses were affected,

945 people went missing, 3960 people were injured and 4.7 lakh people were evacuated from their homes. People lost their belongings and property. Around 7995 persons, a majority of whom were women and small children—lost their lives. 197 children were rendered orphans and 561 women were widowed.

Nagapattinam, Kanyakumari, Cuddalore, Kanchipuram, Villupuram and Chennai districts were the most severely affected. The other districts were moderately affected. Nagapattinam was the worst hit, accounting for about 76% of the deaths in the State, besides heavy loss of cattle, houses and property. When the monstrous waves lashed against the coastal districts of Tamil Nadu, there was no alert mechanism, which would have provided enough time for emergency evacuation. The worst hit victims were from the defenceless poorer sections living in low-lying areas, many of whom were simply sucked into the sea. Many of the dead were the old, the infirm, women and children who were caught completely

unawares as giant waves quickly engulfed several settlements. Entire families were wiped out in one sweep.

Women were most unprepared to save themselves and their children. Busy with household chores and caring for the children, they lost precious moments initially. They also had to pick up their children and run. In many instances, women died because their hair got caught in thorny trees (*karuvelam* tree) found along the coast. There were cases where women would not free themselves from entangled saris because they did not want to be seen naked and as a result they died. Some people got trapped in the beach sands and in broken structures.

Large numbers of livestock - cows, buffaloes, sheep, goats, and poultry - were also killed, resulting in

huge economic loss. 16,082 cattle were lost in the state, with Nagapattinam recording the highest loss of 12,821.

Fishing and its related activities are of economic importance along the Tamil Nadu coast. Apart from actual fishing, fisheries-related activities such as fish marketing, fish transport, loading, unloading and other labour associated with fish handling, fish processing (drying and curing), boat-making and repair, net making and repair, repair of engines, etc. are important sources of employment and livelihood. In the past two decades, there has also been an increase in aquaculture along the coast, particularly of shrimp.

Apart from death and the destruction of houses, fishing implements, thousands of boats and catamarans were damaged or

#### LOST AND DAMAGED PROPERTY

District	Cattle	Houses			Agricultural Land (Ha)	Horticultural Land ( Ha)	Boats					
		Partially Damaged	Fully Damaged	Total			Catamarans		Vallams	Mechanised Boats		Fishing Nets
							Wooden	FRP				
Chennai	2	-	16839	16839	-	-	1493	169	-	568	2992	
Cuddalore	949	544	2328	2872	1925.48	196.51	5530	862	-	505	4935	
Kancheepuram	4	898	3702	4600	248.48	-	1994	784	19	8	2873	
Kanniyakumari	1187	3953	3379	7332	12.57	9.7	6582	-	694	385	7236	
Nagapattinam	12821	2169	17461	19630	4657.47	456.98	6144	-	1761	869	7604	
Pudukottai	-	-	-	-	-	-	191	-	473	30	2342	
Ramanathapuram	-	-	-	-	-	-	0	-	290	-	180	
Thanjavur	-	-	3	3	-	-	47	-	232	-	522	
Tiruvallur	220	-	-	-	-	-	516	570	-	-	2888	
Tiruvavur	-	-	716	716	-	-	-	-	19	-	19	
Tirunelveli	899	-	-	-	-	-	1285	-	82	-	1160	
Thoothukudi	-	-	630	630	-	-	644	-	600	-	2203	
Villupuram	-	106	834	940	1616.34	6.63	1691	1017	-	26	3223	
	16082	7670	45892	53562	8460.34	669.82	26117	3402	4170	2391	38177	

destroyed. 15,522 catamarans, 357 vallams, 513 FRP (fibre reinforced plastic) catamarans and 383 mechanized boats were fully damaged. 10,595 Catamarans, 3813 vallams, 2889 FRP boats and 2008 mechanized boats were partially damaged. This apart, there was extensive damage to the fishing harbours, fish landing centres, auction centres, trading centres and installations all over the coast. Damage to ice plants, marine repair shops and other trades was also reported.

Other sources of livelihood along the coast include agriculture, marketing of agriculture produce, supplying inputs for agriculture, animal husbandry and livestock rearing, production of salt from salt pans, petty trade, money lending, basket making and masonry. 8460.34 hectares of agricultural land and 669.82 hectares of horticultural land was affected. Damage also resulted from salinisation of ground water.

Out of 414 totally damaged public buildings, 91 were school buildings, 71 related to health services, 7 were public office buildings, 114 were cyclone shelters and 131 under the Animal Husbandry Department. Roads accessing affected villages and towns were badly damaged.

The sheer magnitude of the impact initially destroyed much of the communication and transport infrastructure in the affected coastal areas. Lack of electricity, poor drainage and lack of drinking water plagued the already distressed people. Open wells, infiltration wells and bore wells were blocked by silt. Pump rooms either got washed away or were damaged. Pipe connections broke and electrical installations were damaged. Sanitary complexes, libraries, village gymnasiums, bus shelters, metal roads, cement roads, black topped roads, electrical posts, community temples, halls and stages, post offices,

#### VALUE OF DAMAGES

	Rs (in Crore)
Damage caused to mechanized boats, country boats, catamarans, nets, engines fishing harbours, etc	1054.06
Damage caused by sea erosion and inundation of Nagapattinam district	449.00
Damage caused to Panchayat and Panchayat Union roads, water supply and street light arrangements, Panchayat offices, noon meal centres, panchayat school buildings, etc	255.61
Damage caused to highways, roads and bridges	380.64
Damage caused to minor ports at Cuddalore, Nagapattinam and Colachel	74.70
Damage caused to government buildings maintained by P.W.D.	8.50
Damage caused to Tamil Nadu Electricity Board installations	16.93
Damage caused to water supply systems like infiltration wells, open wells, bore wells etc. maintained by TWAD	25.00
Damage caused to beach resorts and hotels maintained by Tamil Nadu Tourism Development Corporation	4.48
Damage to crops	76.80
Damage caused to ferry services run by Poompohar Shipping Corporation at Kanniyakumari	1.04
Damage caused to godowns run by Tamil Nadu Warehousing Corporation	0.27
Damage caused to Salt Corporation	1.50
Damage caused to Anganwadi Centres	1.41
Damage caused to protected monuments of Tamil Nadu Archaeological Department	1.00
Damage caused to food grains stored in the godowns of Tamil Nadu Civil Supplies Corporation at Port godown, Nagapattinam	2.44

ration shops, *balwadis*, water supply lines, school buildings, bridges, highways and stadium light posts were either partially or fully destroyed. Two Government Hospitals and several Primary Health Centres and Health Sub-Centres were badly decimated.

Although the unprecedented scale of human death, homelessness, displaced population and damage was more confined to rural areas rather



than key economic and densely populated urban centres and industrial hubs, the economic impact was felt severely at the local and community levels, dragging hundreds of thousands of already poor people into even deeper levels of penury.

By noon, all that remained of the coast were human bodies strewn across the roads, torn fishing nets, mangled remains of catamarans, fibreglass boats with outboard motors, cracked country boats and pushcarts, mounds of debris and knee-deep cesspools. Those who managed to survive had become refugees in their own land, searching for their kith and kin and belongings.

The eastern coast of India has often been threatened by calamities like cyclone, storm and flood, but the tsunami was something that defied every bit of preparedness, by the government and by the people.

## NAGAPATTINAM

The entire coastline of 187.9 km (including Palk Bay) was affected. Maximum loss of life was reported in Nagapattinam district alone. 6065 human lives were lost, which is around 76% of the total reported death figure in the State. Also, the highest figures of 179 orphans and 294 widows were reported in this district. Keechankuppam, Akkaraipettai, Seruthur, Velankanni, Pattinacherri, Nagore, Tharangambadi, Poompuhar, Tirumallaivasal and Pazhayar were some of the worst affected areas. The approach roads to the fishing hamlets of Keechankuppam and Akkaraipettai were totally blocked due to fallen trees and electricity posts. Besides, vehicles and fishing boats that had been tossed by the huge waves blocked the roads and bridges. Agriculture had suffered heavy losses in Nagapattinam. Most of the affected land was cultivated with paddy, a very labour intensive crop,





that employs an average of 10-15 persons per hectare during the period of cultivation for land preparation, planting, harvesting, etc.

In South Poigainallur village, the force of tsunami waves broke through the drain provided for agricultural water, and destroyed part of the manmade sand dune. While the death toll in Akkaraipettai and Velankanni was in thousands, the loss of life in South Poigainallur was very limited. This is because the villagers have relied on their ancestral knowledge of maintaining mangroves to protect their agricultural land from seawater infiltration for over 500 years.

The tsunami inundated the fields with seawater and sand. Once the seawater entered the agricultural lands, it stagnated because the unaffected parts of the dunes held the water from receding. The farmers rely on the land for their livelihood. Sale of vegetables was a very lucrative business prior to the tsunami. Post-tsunami, revenue dwindled considerably to about 2 lakh rupees from about 8-10 lakh rupees.

A sizeable number of tourists and devotees who had been to Velankanni

church on account of Christmas (the previous day), and had been on the shore just after the Sunday mass, were swallowed by the killer waves. The water distribution system was damaged and water supply was also affected. The damages due to tsunami had a cascading effect on the coastal economy and religious tourism in places like Velankanni and Nagore.

The salt industry in Vedaranyam was particularly affected. The copious inflow of seawater into an estimated 20,000 hectares of agricultural land in areas adjacent to the coastal region caused heavy losses to agriculturists, who had already suffered a difficult time during the past four years owing to drought followed by heavy floods. Paddy crops that were ripe for harvest perished.

The beaches in and around Nagapattinam town, and the district headquarters, were inundated. In the harbour, boats were flung around pell-mell. Nagapattinam General Hospital was flooded, most of its equipment badly damaged and the receding water left behind sand and slush several feet deep in the ground floor rooms. Tharangambadi sub-district hospital,



in Nagapattinam district, was also flooded and badly damaged. Some of the worst affected PHCs, such as those in Velankanni and Poompuhar, also lie in Nagapattinam district.

The fisheries sector suffered very severe damages never before witnessed in the district. 7604 units of nets, 6144 wooden catamarans, 1761 vallams and 869 mechanised boats were damaged apart from extensive damages to fishing infrastructure such as fishing harbours, fish landing centres and Nagapattinam port.

There have been several tales of horror, sorrow, bravery and grief. In Chinnangudi village, a woman aged 75 years was running away with her 80-year-old husband. The old man fell down but urged his wife to run away. He himself could not get up and died where he fell. Unable to accept this reality, the woman spent 24 hours with the dead body of her husband. Among the stories that bring a lot of hope are those of a six-year-old boy who saved 12 children and of another woman who saved 12 children. There were also cases of bitterness between spouses. Some wives were sore that their husbands did not save their dying children. Besides, they were also gripped with a feeling of helplessness and guilt for not having done enough to save their children themselves.



## KANNIYAKUMARI

Kanniyakumari district is on the tip of the Indian sub-continent and was not fortunate to have the protective cover of Sri Lanka when the tsunami struck on that fateful day. Even earlier, this district had very thickly populated coastal habitations and Kanniyakumari fishermen were known for their skills and die-hard attitude. They fished deeper, farther and longer than the other fishermen from other parts of Tamil Nadu. Kanniyakumari suffered the largest death toll next to Nagapattinam with 799 people dead. Extensive damage was caused to the boats, nets and boat yards. Thousands of big boats were tossed leaving the generally better-off fishermen devastated.

Heavy damage was caused to the West Coast Road from Kanniyakumari to Kodimunai and the bridge connecting Mela Manakudi and Keela Manakudi villages was completely washed away, leaving only the pillars. Having a higher percentage of fishermen among the working population, the mood in the district was gloomy and desperate. The life giving sea had become life threatening within a moment.

## CUDDALORE

Cuddalore is a large industrial town. It has a large number of industries that employ much of the city's population. The district of Cuddalore was heavily damaged by the tsunami waves. 610 people died and many were still missing. Several fishing hamlets simply disappeared. Many villages were cut off from the rest since the roads were either washed away or covered with debris. The famous Silver Beach and the historic Cuddalore Port were devastated.

At several places in Cuddalore district, huge waves burst water pipelines disrupting water supply, and in other places the seawater incursion





made both surface and groundwater saline and unpotable. Fishermen, prawn/crab and fish seedling farm owners, fish transport owners, ice-manufacturing units, all suffered loss of income. Horticulture activities in Cuddalore were also affected. The entire village of MGR Thittu was reduced to a rubble. More than 80 persons died in this village alone.

Nearly 128 boats were lost in this village. "We usually keep all the nets and fishing accessories on the beach. Boats cost anything between Rs70,00-80,000, the engine about Rs35, 000-40,000 and the different kinds of nets about Rs 1-1.25 lakh. "We have lost everything. In spite of having a diploma in Mechanical Engineering I was fishing for a living, as I was unemployed. Now even that is gone. It is hopeless," rued young Kumeresan, a totally dejected youth.

#### TOOTHUKUDI

As many as 23 coastal villages were affected in Thoothukudi. The magnitude of havoc caused by the tsunami was similar in all respects to the other districts except in loss of

human life which was comparatively less. About 6 taluks were located along the 120 km stretch of South East Coast of Tamil Nadu. Fishermen are the dominant community in these villages and a majority of the population depended upon fishing for their livelihood. 600 vallams, 644 catamarans and 409 fibreglass boats, engaged in fishing activities and the shelters in the fishing communities were extensively damaged.

#### CHENNAI

The residential areas situated along the coastline in Tondiarpet, Mylapore, Triplicane, Foreshore estate, Nochikuppam and Royapuram Fishing Harbour were badly affected. Kids playing on the world's second largest beach, the Marina, along with early morning walkers, were carried away by the killer waves. Boats, cars and other vehicles parked along the coastline were rudely tossed by the waves. Soon Marina beach was a vast street of water with floating cars, boats and debris. 206 persons including a few tourists were killed at Chennai.

## KANCHEEPURAM

In Kancheepuram district, nearly 44 *kuppams* in 30 revenue villages were affected leaving a population of nearly one lakh stranded. The destruction was so severe that several pucca houses were flattened and fishing boats smashed. The East Coast Road saved many habitations lying to the west but the smaller coastal hamlets became deathbeds and 130 persons died in the district.

The nuclear atomic power plant at Kalpakkam has always been a sensitive area. Though seawater entered the power plant, the authorities promptly dispelled fears of danger.

## RAMANATHAPURAM

In Ramanathapuram district, six huts of fishermen at Thondi



village were fully damaged and two people lost their lives. Though not many lives were lost when compared to other districts, quite a number of fishing implements were lost depriving people of their livelihood resources.

## TIRUNELVELI, THANJAVUR, TIRUVALLUR, TIRUVARUR, VILLUPURAM AND PUDUKOTTAI

In Tirunelveli district, 13 hamlets were affected and 5626 families were exposed to the high tide risk zone, forcing them to consider relocation to safer places.

In Thanjavur district, the tsunami caused extensive damage to 22 seashore villages in Pattukkottai and Peravurani taluks. A 9-year-old boy who was playing by the seashore near his house died. About 37 people who had travelled to Nagapattinam and Kanniyakumari districts lost their lives there. Besides, 47 catamarans, 232 vallams and 40,692 kg of fishing nets were damaged.

About 29 people lost their lives in Tiruvallur district. Large amounts of fishing implements suffered damage. More severe was the loss of livelihood of many families sustaining on fishing in places like Pulicat.

29 people lost their lives and 3 people were injured in Tiruvarur district. 48 people lost their lives and 46 people were injured in Villupuram district. More than 18 habitations were severely affected by tsunami, which has put the fear of death and destruction in the heart of these families.

15 people lost their lives in Pudukottai district. Though not directly affected, many boats lying in fishing harbours could not go out to sea for many months leading to loss of livelihood.