



Impact Assessment Study of Cyclone Thane on Cuddalore District of Tamil Nadu, India

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Abstract : Tamil Nadu is a very long stretch of coast of about 920 km of which 70 km on the Arabian Sea experiences south-west monsoon waves are very high and affects the shore line considerably. The entire coast line is in the fate of storms every year and cyclone damages are a regular feature in the coastal area, which results damages to houses and valuable properties as well as human life. Cyclones are known by many names the world over like tropical cyclones, typhoons, hurricanes etc. Though TCs differ by name across regions, they are classified according to their wind speed. The classification, however, varies from region to region. The Cuddalore district is categorically classified as Disaster Prone Area because of its geological position and Low Lying Areas. The Cuddalore district is frequently subjected to natural disasters such as Flood, Tsunami, Drought, and Cyclone. Cyclone Thane hit the Cuddalore district on 29th and 30th December 2011 which destroyed houses, boats, standing crops, Livestock's and livelihoods. The present study has been carried out in order to identify the effect of the 'Thane' cyclone especially agriculture damages, settlement damages, transport damages, communication damages and biological damages due to cyclone affected places of the Eastern coast of Tamil Nadu.

IndexTerms Cuddalore District, Cyclone Thane, Devastating Impacts, calamities, Meteorological History

I, Introduction

In recent years abnormal climate events have caused widespread concern among Historians, meteorologists and climatologists. At present time flood, storm and drought have such serious influences in India that it is of prime importance to look for regularities in their variations and to understand the causes and the mechanism of their occurrence. The dictum that the past is the key to the future has frequently been used to justify scientific research. Growing awareness of climatic variability and its impact on human affairs is demonstrated by recent major reports by the various organizations. It is particularly appropriate to the present study.

This paper explores the impact of impacts caused by the Cyclone Thane in Cuddalore District. It also explores the future impact of cyclone and possible options to face the challenge.

Aim and objectives of the study

Despite having cyclone warnings and experiences of cyclones every year, the people are facing such calamities frequently. This was indented to take up this study. The aim and objectives of the study are:

- 1.To Study the Devastating Impacts of Cyclone Thane
- 2.To assess the damages in the settlement ,Transport and communication in the Cuddalore district
- 3.To analyse the damages in the Cuddalore district

II.Methodology

Primary data was collected from the Collector Office. Field surveys were conducted in aftermath of Thane Cyclone to assess damages visually; photographs were taken at the affected areas. The observations include

structural and non-structural damages to buildings, steel structures, and uprooted trees and electric poles. Further, the powerful storm overturned the vehicles parked on the roads, and agriculture was also badly hit as banana plantations, papaya groves, rice paddies, etc., were destroyed. The secondary data was collected from the Libraries, Newspapers and Web sources,

III. Study Area

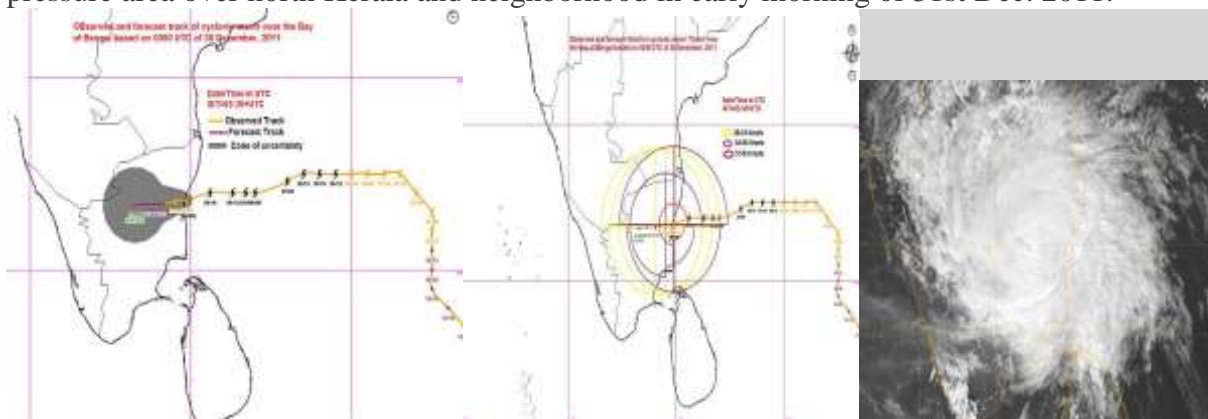
Cuddalore District is situated in the South Indian State of Tamilnadu between 110 45' and 120 27' of Northern latitude and 780 48' and 800 12' of East longitude and covering an area of 3,698.68 Sq.K.M. Cuddalore District was a part of South Arcot District which was bifurcated into Cuddalore and Villupuram districts in September 1993. Cuddalore district consists of 3 Revenue Divisions, 7 Taluks, 13 Community Development Blocks, 5 Municipalities, 16 Town Panchayats, 8 Census Towns and 1 Township. The total number of Revenue Villages in the district is 828, of which 799 villages are inhabited. The Cuddalore district is categorically classified as Disaster Prone Area because of its geological position and Low Lying Areas. The eastern side of the district has a coastline of 52Kms covered by the Bay of Bengal..This district consists of eight taluks of which Cuddalore, Kurinjipadi and Chidambaram are coastal taluks lies in the heavy wind and cyclone zone while other five taluks in the flood prone zone . All the rivers are draining into Bay of Bengal at closer intervals. Since the terrain is flat and just 1.50m above M.S.L, all the flood water got accumulated in this area could not be easily drained in to the Sea. The bed level of rivers is lying minus 1m from the sea. Due to this, the back water in the rivers causes all the flood damages. Therefore the district is vulnerable to the cyclonic depressions and the resultant rains, which cause floods. Cuddalore district in Tamil Nadu was the most affected by Thane cyclone

IV. Cyclone Thane

The name of Cyclone Thane was coined by Myanmar, Thane in Burmese means eagle. Which hit the coast of Tamilnadu on the morning of 30th December 2011, According to the Indian Meteorological Department, cyclones originating in the Indian Ocean and the Bay of Bengal are named by eight countries - India, Bangladesh, Pakistan, Sri Lanka, the Maldives, Myanmar, Oman and Thailand.

Meteorological History of Thane

A depression formed over southeast Bay of Bengal in the evening of 25th December, 2011 and lay centered about 1000 km southeast of Chennai. . The cyclone Thane was detected early and IMD issued warning much in advance. The first IMD warning was issued on December 25 2011. There were precautionary alerts from IMD from December 25 onwards (five days in advance) and the cyclone movement was then closely monitored by administration of Cuddalore and Puducherry with the help of IMD. It gradually moved north-northwestwards and intensified into a deep depression in the early morning of 26th December, 2011 and into a cyclonic storm 'THANE' in the same midnight. It then moved west-northwestwards and intensified into a severe cyclonic storm in the afternoon and into a very severe cyclonic storm in the evening of 28th December, 2011. It then moved west-southwestwards and crossed north Tamil Nadu & Puducherry coast between Cuddalore and Puducherry within 0630 and 0730 hrs IST of 30th December, 2011 with a wind speed of 120-140 kmph. After landfall, the system rapidly weakened into a severe cyclonic storm over north coastal Tamil Nadu at 0830 hrs IST of 30th and into a deep depression around noon and into a depression in the same evening over the north Interior Tamil Nadu. It weakened further and lay as a well-marked low pressure area over north Kerala and neighborhood in early morning of 31st Dec. 2011.



Source: Bulletin No. BOB 05/2011/35-NASA's Aqua satellite MODIS instrument captured this visible image of Cyclone Thane on Dec. 30 at 0818 UTC (3:18 a.m.)

Over View of the Vulnerability of Cuddalore

The cyclone made a landfall over Cuddalore and Puducherry on the morning hours of December 30, 2011, with a wind speed of 145-150 km per hour, causing loss of 53 human lives (41 in Tamil Nadu and 12 in Puducherry) and massive property damages. Approx. 7500 people in Cuddalore were provided shelter in community halls. Some of the people after seeing the intensity of the cyclone and high tides (storm surge) evacuated on their own to safe shelters near Chidambaram Taluk (Killai and Parangipettai areas). Transport provisions were arranged by District authorities for such evacuees.

Aftermath of Cyclone Thane and its impact on Cuddalore

The cyclone made a landfall over Cuddalore and Puducherry on the morning hours of December 30, 2011, with a wind speed of 145-150 km per hour, causing loss of 53 human lives (41 in Tamil Nadu and 12 in Puducherry) and massive property damages (details are given in the table below for Tamil Nadu and Puducherry). The Cuddalore district has a population of 26, 00,880 as per 2011 census. Approx. 7500 people in Cuddalore and 1760 people in Puducherry were provided shelter in community halls. Some of the people after seeing the intensity of the cyclone and high tides (storm surge) evacuated on their own to safe shelters near Chidambaram Taluk (Killai and Parangipettai areas). Transport provisions were arranged by District authorities for such evacuees. As a precautionary measure, the administration had cut the power supply on 29th evening both in Cuddalore and Puducherry, anticipating the damage and for preventing electrocution.

Devastating Impacts of Cyclone Thane

The districts affected by the recent floods and the extent of damages district-wise were as depicted in the table below:

Table 1
Impacts of Cyclone Thane

State	affected Districts	affected Villages	affected reported Deaths	Houses fully damaged	Houses Partially damaged.
Tamil Nadu	Cuddalore	901	41	73292	275925
Puducherry	Puducherry	17	7	9789	8645

(Source: Government District Administration / IAG /NGO Reports)

With wind speeds in excess of 140 kmph, the consequence of cyclone Thane was a second Tsunami (Tsunami occurred on 26th December) for people living in this coastal district of Tamil Nadu State, India. A day after the tropical storm 'Thane' left a trail of devastation along Tamilnadu's northern districts and Puducherry, a coastal city about 150 km south of Chennai.. The number of deaths in Tamil Nadu's Cuddalore district alone touched 29.

Table 2
Loss of Human Lives

S. No.	Name of Taluk	Total
1	Cuddalore	12
2	Panruti	11
3	Kurinjipadi	4
4	Chidambaram	9
5	Kattumannarkoil	1
6	Vridhachalam	4
	Total	41

Source: National Institute of Disaster Management June, 2012

Deaths in Cuddalore occurred mainly due to electrocution, falling of trees and collapse of house or walls. A large number of cows, goats and buffaloes were killed in many villages.

Table 3
Loss of Cattle & Loss of Poultry

Cows	Bullock	Buffalos	Goat	Total	Hen	Duck	Quail	Total
76	7	14	246	343	52938	285	6200	59423

Source: National Institute of Disaster Management June, 2012

Damage to agriculture sector

The cyclonic storm had totally ruined Cuddalore district. Hundreds of acres of standing crops also been lost due to the thrashing rains as the cyclone moved away. Massive damages to crops, mainly to cash crops such as cashew nuts, banana, coconuts, sugarcane were reported from both Tamil Nadu and

Puducherry. Severe damage to paddy and other crops was also reported. Cuddalore district ranked first in terms of cashew production with 24,302 tonnes (47.0 per cent) and had the highest cashew productivity of 810 kg / ha among cashew growing districts in the state. Almost the entire tree cover of Cuddalore district was ravaged including the entire cashew nut trees and jack fruit trees that were the backbone of the majority of the people's livelihood options. The cyclone has resulted in extensive damage with the loss being estimated at over Rs 2,000 crores. The major Cashew trees (23,500 ha) in the blocks of Panruti, Annagramam, Vridhachalam, Cuddalore and Kurinjipadi were either completely uprooted or partially uprooted. In addition, the branches were also damaged with complete leaf shedding. It has been observed that 77.43 percent of total farm land cultivated under the cashew has been damaged by the cyclone in December 2011. Out of 30349 hectares, 23500 area of cultivation has been damaged.

Table 4
Details of Damage to agriculture sector

Sl. No.	Crops	Total Area damaged (Ha)
1	Paddy	70271
2	Groundnut	2274
3	Black Gram	7000
4	Sugarcane	6833
5	Coconut	939
6	Cotton	110
7	Oil Palm	46
	Total	87473

Source: National Institute of Disaster Management June, 2012

Damages to Horticulture and Plantation Crops

Cyclone 'Thane' caused extensive damage to Horticultural crops in the 11 districts. Perennial horticulture crops like Cashew, Jack etc were damaged to an extent of 36,517.08 Ha. and affected the livelihood of 70366 farmers. In Cuddalore 38155.58(Ha) of Area **Affected** and 51327 **farmers were affected**. The crop damage assessment was taken up on war footing manner and a compensation of Rs.41.48 crores for horticulture crops was disbursed to the affected farmers. Towards rehabilitating the livelihood of affected farmers, Hon'ble Chief Minister has announced a special package for horticulture crops for Rs.724.96 crores.

Damage to houses

Hundreds of houses were smashed to varying degrees, electric posts deformed out of shape and transformers traumatized by the very strong winds. Thatched houses were completely damaged mainly in the most affected region of Cuddalore, Panruti, Kurunjipadi and Chidambaram Talukas in Tamil Nadu. Semi concrete buildings and fully concrete were also damaged .The Cyclone had destroyed more than 75,000 thatched huts in Cuddalore alone. The cyclone was accompanied by rains and gale that uprooted thousands of trees, knocking down electric poles, transformers, transmission towers, snapping power supply in several areas.National and State Highways were completely blocked. Power supply was severely affected. Water supply was affected mainly due to power failure. Fuels (petrol, diesel, etc.) shortages were reported on 30th itself due to power failure and short supply. It took nearly a month to bring back electric supply throughout the district.

Table 5
Damages to Houses

S.No	Name of Taluk	Huts		Titled Houses (severely damaged)	Total
		Fully damaged	Partly damaged		
1	Cuddalore (Rural)	49511	-	26835	76346
2	Cuddalore (Town)	302	16094	15833	32229
3	Panruti	18545	50650	26153	95348
4	Kurinjipadi	3058	39799	10916	53773
5	Chidambaram	1362	82556	16458	100376
6	Vridhachalam	413	6883	-	7296
7	Kattumannarkoil	101	175	10	286
8	Thittagudi	228	-	-	228
	Total	73292	196385	96205	365882

Source: National Institute of Disaster Management JUNE, 2012

Damages to Infrastructure of Electricity Board

People also have suffered complete power shutdown, leaving the entire district in darkness. In Cuddalore the situation was very bad as the total electricity system was paralyzed for more than 10 days. According to the estimate, at least 45,460 electric poles, Transforms 4500 Nos, High level towers 27Nos, Electric line or wires, 12,100kms across the district have been damaged and considerable number of transformers rendered non-functional. Landlines (including fax) were not working at district head quarters, but mobile phones (including internet) were reported to be working, though the network was very poor.

Damage to Fishing Boats and Accessories

Fishing Boats have been damaged in the Coastal villages of Cuddalore District. , creating a detrimental impact on coastal communities and their activities, particularly fishing. This has in turn affected their livelihood to a great extent. In this context, a group of ten villages (Thazhanguda, Sonankuppam, Sothikuppam, Rasapettai, Chithiraipttai, Thammanampettai, Pettodai, Reddiarpettai, Samiyarpettai, ChinnurPudupettai). Most active fishermen at sea and fishermen engaged in net mending, auctioning and marketing activities on the seashore, have suffered loss of life, health or property. Maximum damage to fishing boats has been recorded in the case of catamaran, wooden and FRP boats, in that order. Widespread damage caused by recurrent cyclones has upset the economy of the fishing communities anchored in these villages. The loss and damages to boats, nets and fishing craft have made fishing impossible without rehabilitation for several fishing families. Households participating in fishing and related activities like fish processing and fish marketing have been severely affected. The workers in fishing industry were the worst hit as they belong to the below poverty line (BPL) categories.

Table 6
Damage to Fishing Boats

Details	Fully damaged	Partly damaged	Others	Total
Motor Boats	4	- 101		105
FRP Catamarans	58	1430	-	1488
MFB Outboard Engines	67	106		- 173
Ordinary Catamarans	240	16		256
Engines			1262	1262
Fishing nets (kgs) -			194949	194949
Total	369	1653		

Source: National Institute of Disaster Management JUNE, 2012

Relief Measures in the Post Thane Cyclone

- Tamil Nadu Chief Minister released Rs. 150 crore towards immediate relief works.
- Ex-Gratia payment to families of deceased persons. - Rs. One Lakh per deceased
- Ex-Gratia payment for loss of a limb or eyes -Rs.35,000/- per person (disability is between 40% and 75%) -Rs.50,000/- per person (when the disability is more than 75% duly)
- Grievous injury and hospitalization for more than a week Rs.7,500/- per person .
- Relief for the old, infirm and destitute, children. Rs. 20/- per adult, Rs. 15/- per child, per day. Rs.1,000/- for loss of clothing per family and Rs.1,000/- for loss of utensils / household goods per family.
- For agriculture crops, horticulture crops and annual plantation crops. Rs.2,000/- per hectare in rainfed areas-Rs.4,000/- per hectare for areas under assured irrigation -Perennial crops Rs.6,000/- per hectare for all types of perennial crops.
- Contributed 8 Kgs of wheat or 5 Kgs of rice per person per day - subject to the availability of stock in the State.
- For repair/replacement of boats, nets and damaged or lost Rs.2,500/- (for repair of partially damaged)
- Rs.7,500/- (for fully damaged traditional crafts(all types) plus net). (b) Input subsidy for fish seed farm - Rs.4,000/- per hectare.
- Assistance for repair / restoration of damaged houses
- Pucca house Rs.25,000/- per house
- Kucha house Rs.10,000/- per house
- Huts: damaged / destroyed Rs.2000/- per hut.
- After the devastating “Thane Cyclone”, Tamil Nadu Government approved construction of 90,000 Concrete houses in rural areas which would replace the existing thatched roof huts.

- Sanction has been accorded by the Government for the scheme called 'replanting in Thane cyclone affected areas' for restocking of the affected coastal areas in Cuddalore and Villupuram districts with tree species like teak, casuarina, eucalyptus etc., over a period of four years commencing from 2012-13 at a cost of Rs.14.96 crores.
- Provision of emergency supply of drinking water in rural areas and urban areas □ Provision of medicines, disinfectants, insecticides for prevention of outbreak of epidemics.
- Medical care for cattle and poultry against epidemics
- Evacuation of people affected /likely to be affected
- Hiring of boats for carrying immediate relief & saving life.
- Provision for temporary accommodation, food, clothing, medical care, etc. of people
- Air dropping of essential supplies.
- 2000 electricity board workers from other districts were engaged for power restoration in Cuddalore
- A flood control room has been opened in the Collector's Office, Cuddalore with a direct/line phone similarly flood control rooms are opened in Divisional and Taluk officers also.

Conclusion

The cyclone "Thane" was reported timely, regarding timing and location of its land fall and the early warning was very helpful for preparation to face the situation. But people did not evacuate to safe shelters before the weather conditions deteriorated. This approach of 'wait and see' might have become very costly, had there been greater storm surge than what was observed during Thane. Essential commodities such as water, milk, kerosene and petroleum products have gone scarce in Cuddalore district following the disruption in the supply chain due to road blocks caused by uprooted trees. Supplies of drinking water were being maintained through tankers mobilized from Chennai, Trichy, Thiruvanamalai, Perambalur and Dharmapuri. Though there has been arrangements made for drinking water by the local administration, residents were found searching for water in the affected districts.

Findings

While poor maintenance of cyclone shelter remains one of the issues for people not moving easily to such shelters, a long absence of any severe cyclone affecting these areas has also been widely cited to be the reason for not believing that the cyclone's impact can be so damaging.

The other issue which was noticed was the lack of crop insurance in place in many areas. The areas where cashew nut tree plantation (Panrutty/Thaluk) was heavily damaged, though this area was not very near to the coast, there is a realization among farmers that that they should have gone for crop insurance, as these crops take 6-7 years for full growth after cashew plantation.

The trees uprooted include jackfruit, mango, banana, coconut and cashew trees among others. The uprooted trees, including those in houses, roads, streets and by lanes, were cleared but they had been dumped at several places for final removal.

But, the respondents report that the Government did not assist in providing basic needs to the commons. The Government action in the pre and post Thane cyclone is not satisfactory. The farmers report that the loss for house and land is not given properly.

The community can be taught to be better prepared through awareness, training and community involvement in planning for such disasters.

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