

# Study on the Impact of Gaja Cyclone on Trees and Infrastructure at Thetthanviduthy, Karambakudi Taluk, Pudukottai District, Tamil Nadu, India

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**Abstract:-** An impact of the Gaja cyclone, 2018 in karambakudi taluk, pudukottai, Tamil Nadu was the deep depression strengthened into a cyclonic storm named Gaja that was originated on November 5 in Gulf of Thailand and intensified into a depression over the Bay of Bengal on November 10 with a wind speed of 145km/h. Gaja crossed pudukottai on Friday the entire district received just 43mm rainfall it was the wind velocity that left the district shattered. A total number of trees 2155, in this tree mortality was 40% DBH is (>3.2cm DBH) in Thetthanviduthy, Pudukottai were uprooted due to Gaja cyclone. Tree mortality (uprooted) and damage (broken) were observed more in *Cocos nucifera* (age of 18-20 years) than the other trees in response to Gaja cyclone. The wood density did not show any significant relationship between the damage, mortality of resistance *Cocos nucifera* was more susceptible to Gaja cyclone followed by *Casuarina equisetifolia* (age of 6-10 years) and *Tectona grandis* (age of 16-19 years). These trees are mostly damaged in Thetthanviduthy, 26 acres of agriculture lands, live stock 47, are disturbed by cyclone Gaja in this village. This cyclone mostly damaged the Agricultures as 80%. However *Borassus flabellifer* trees were observed more resistance to Gaja.

**Keywords:-** Gaja cyclone, mortality, *Borassus flabellifer*.

## I. INTRODUCTION

The major disasters are (Flood, Earthquake, Tsunami, Volcanic Eruption, Landslide and Cyclone). It can be defined as an occurrence either nature or manmade that causes human suffering and creates human needs that victims cannot alleviate without assistance. Severe Cyclonic Storm Gaja was the fifth named cyclone of the 2018 North Indian Ocean cyclone season, after cyclones Sagar, Mekunu, Luban and Titli. On November 5, a low pressure system formed over the Gulf of Thailand. The system crossed through Southern Thailand and the Malay Peninsula on November 8. The next day, it crossed into the Andaman Sea and lingered there throughout the day and intensified into a depression over the Bay of Bengal on November 10. The next day, the system was designated by the IMD as BOB 09. Soon after, the Joint Typhoon Warning Center (JTWC) issued a Tropical Cyclone Formation Alert (TCFA).

The highest wind speed for 150 km/h (90 mph) and lowest pressure 975 mbar. Thailand, Sumatra, Malaysia, Andaman and Nicobar Islands, Sri Lanka, South India, Somalia are affected in Gaja. At 12:00 AM UTC on November 11, the deep depression strengthened into a cyclonic storm, and the name was coined by Thailand as "GAJA". It is a Sanskrit word means elephant. After tracking west-southwestward for a number of days, it made landfall near Nagapattinam. Gaja Eye Crossing at Vedaranyam and eye passes through Thagattur, Voimedu, Thiruuthuraipoondi, Muthupet, Pattukotai, Adirampattinam and Mallipattinam.

At the time of landfall of the cyclone, heavy winds of about 140-160 kmph speed were experienced. The highest wind speed is recorded in Adhirampattinam at 162 kmph and secondly Muthupet recorded 160 kmph. Regions of Karaikal and Nagapattinam also experienced 100 kmph winds. The affected areas were the districts of Nagapattinam, Thanjavur, Thiruvarur, Pudukottai, Karaikal, Cuddalore, Trichy and Ramanathapuram. As of November 22, 63 people were killed by the storm.

Tamil Nadu seeks Rs 15,000 crore from Centre to rebuild after cyclone Gaja. About 1 lakh electric poles, 1000 transformers, 201 electricity substations and 5000 boats were destroyed by the cyclone. 1000s of cattle, birds died due to the cyclone. 63 people died mostly in the districts of Thiruvarur, Thanjavur and Pudukottai. About 18000 hectares of Coconut trees were damaged mostly uprooted. Totally 56,000 hectares of crops and trees were destroyed due to the cyclone.

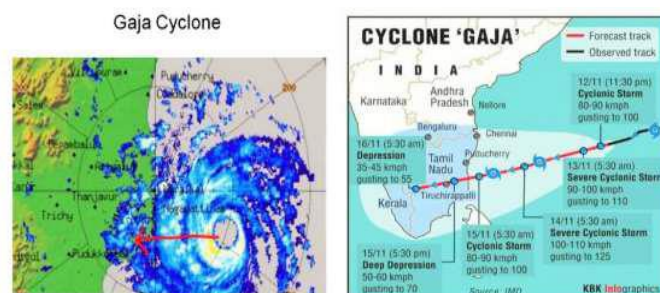


Fig 1:- Gaja Cyclone

### A. Study Area

District was carved out of Tiruchirappalli and Thanjavur districts in January 1974. The district has an area of 4663 sq.km with a coast line of 42.8 km. The district lies between 78.25' and 79.15' of the Eastern Longitude and between 9.50' and 10.40' of the Northern Latitude. It is bounded by Tiruchirappalli district in the North and West, Sivaganga district in the South, Bay of Bengal in the East and Thanjavur district in the North East. It has a coastline of about 39-km. The average rainfall in Pudukkottai is 821 mm. During northeast monsoon this district receives the highest rainfall of 397 mm followed by, South west monsoon with 303 mm of rainfall. The summer and winter rainfalls are 81mm and 40mm respectively.

The study area is experiencing two monsoon climates. These are Southwest monsoon climate – (June, July, August, and September) and Northeast monsoon climate – (October, November, December). “Gaja” cyclone was formed by northeast monsoon period of the November 11 in the year of 2018.

Karambakudi is a Taluk located in Pudukkottai district, in the state of Tamil Nadu with a total population of 110604 and 24980 households. It is one of 11th Taluks of Pudukkottai district. The village was on the latitude of 10.458°N and on 79.135° E with an average elevation of 36 metres (118 feet). There are 48 villages and 1 town in Karambakudi Taluk. Thettanviduthy is a largest village located in Karambakudi Taluka of Pudukkottai district.

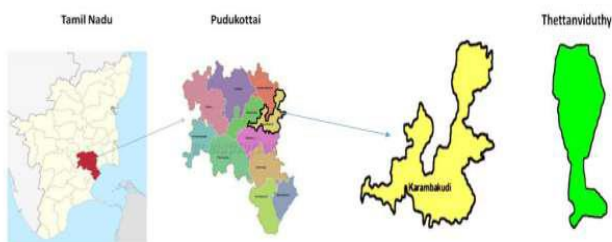


Fig 2:- Graphical view of study area

## II. MATERIALS AND METHOD

### A. Direct Method

Direct observed method also followed in this work. For my survey directly went to Thettanviduthy then observe the Gaja affected area and surveyed the damaged, uprooted trees, defoliate trees, agricultural lands etc. I started my first visit to the Thettanviduthy on 22.11.2019 Second, third visit on 27.11.2019, 10. 12.2019 and

continuously made the visit in regular interval to observe the affected area.

### B. Questionnaire method

For my study, questionnaires method was used to collect the data from the people of Thettanviduthy. In Gaja affected area of this village there are 25 suitable questions were framed and it was asked to the Thettanviduthy people, through these collection of information like types of trees affected by Gaja, total number of trees affected by Gaja, number of trees uprooted, resistant verity were calculated using this method. Questions were asked to the people who lived in Thettanviduthy.

The objective of this paper is to assess post-cyclone livelihood capitals status, identify major livelihood groups, adversity and crisis, and present the livelihood strategies of coastal households. The data is collected from sources of the information. This study comprises of spatial and non spatial data. Field visit to different parts of the cyclone affected area in study area also incorporated for the analysis. Geographical information system is used to demarcate the study area and mapping of cyclone affected area. The analysis of the damages caused by the cyclone is described and given in tabular form.

## III. RESULTS AND DISCUSSION.

Thettanviduthy panchayat is one of the largest area in karambasgudi, located at pudukottai district in Tamil Nadu, India. It is situated 4km away from the karambakudi ,and 45 km away from district headquarter Pudukkottai. As per 2009 the Thettanviduthy is a gram panchayat of Karambakudi village. The total geographical area of this village is 367.57 hectaers. The total population of this village is 2,447 and houses 557 with a 249 families. The male population is 1205 while female is 1242. The head of the village is Mr. Malathi Rangaraj. K (Farmer). Agriculture is the main profession of this village. The Coconut tree, Casuarina, Teak, Banana grove and Groundnut are the main agricultural crops and trees. Coconut and Groundnut are cultivated as a food crop as well as commercial products for their income. The Teak and Casuarina are long term investment used as a timber, gives more economic support to the farmers. In the Pudukkottai district the Thettanviduthy punchayat affected severely by Gaja during the month of November 2018. Most of the trees were uprooted, broken and defoliation. Tree mortality percentage was more than 40.

Sl.No	Type of damages	Unit
1	Trees	863
2	Agriculture damages (Lands & Plants)	26Acers
3	Biological damages:	
	i) Human being	02
	ii) Goat, Cow, Ox & Buffallow	17
	iii) Chickens	30
4	Houses	07
5	Electrical goods damages:	
	i) Electrical post	80
	ii) Transforms	03
	iv) Electric line or wires	5KM

Table 1:- Infrastructure Affected By Gaja in Thettanviduthy

In that storm a lot of Agriculture lands, Trees, Live stock, Houses, Electrical post, Transformers and Towers were heavily damaged. And 2 persons also died in Gaja. The head of the village Mr. Malathi Ranagarj also died in this storm. The Coconut Trees (345) and Casuarina (295) were the most affected trees. Most of the coconut trees were uprooted, some were damaged. Once coconut saplings

are planted it take 15 to 20 years to reach peak production. Teak trees are takes 20 to 25 years to grow into one mature tropical tree to final harvest. So the people has been suffered for their income and lost their livelihood. Nearly 10 different types of trees were damaged, the list are given below. The total number of trees affected by Gaja were calculated.

S.No	Trees Affected by Gaja (Common Name)	Binomial of Trees	Number of Trees Affected	Age of Trees
01	COCONUT	<i>Cocos nucifera</i>	348	18-20
02	TEAK	<i>Tectona grandis</i>	124	16-19
03	SEA SHORE	<i>Casuarina equisetifolia</i>	295	06-10
04	NEEM	<i>Azadirachta indica</i>	024	22-25
05	PORTIA	<i>Thespesia populnea</i>	036	16-18
06	LEMON	<i>Citrus</i>	008	09-12
07	PONGAMIA	<i>Millettia pinnata</i>	013	14-18
08	MANILA TAMARIND	<i>Pithecellobium dulce</i>	004	20-23
09	BLACK BOARD	<i>Alstonia scholaris</i>	006	14-18
10	CAMPHOR	<i>Cinnamomum camphora.</i>	005	16-18

Table 2:- Types of Trees Affected by Gaja

Every year November month the groundnut cultivation were started, due to Gaja the work had been stopped for one month. Because the basic needs for their agriculture was affected. In theethanviduthy people used natural manures, the replacement of chemical fertilizers. After Gaja the village has struggled for water, current supply for next 35 days. They want to go 4km away for making mobile charge. It also may cost for per hour 30 Rupees. The government could not take any method to recovery and did not alot any funds to the people.

The people joined together and cleared the affected trees in the village. After 40 days only the electric poles, transformers were cleared and current supply given to them. Still this village people need good education, industrial development, drinking water, road and electricity are the main concern of this village. Young generation is more attracted towards mobile, laptop and computer technology these days. If Government gives any loan and financial support to the villagers, this village will see the real development. Medicinal and health services has to be improved.



Fig 3:- Tress affected by Gaja

#### IV. CONCLUSION

The current was carried out the impact of the Gaja cyclone, 2018 in karambakudi taluk, pudukottai, Tamil Nadu damaged the Agriculture as 80% and remaining 20% is live stock, houses, electric poles and transformers. The damaged trees affected by Gaja in Theethanviduthy, Coconut (age of 18-20 years), Teak (age of 16-19 years), Casuarina (age of 6-10 years) was mostly uprooted by this cyclone. The Coconut tree root system have numerous thin root that grow outward from the plant, only a few of the roots penetrate deep into the soil for stability. So that Coconut trees are mostly uprooted trees in Gaja cyclone.

The people joined together and cleared the affected trees in the village. As for this survey tree mortality rate was 40%, damaged, defoliation of trees were calculated. Through this study I give the suggestion to the people who lived in Theethanviduthy advised to plant the more resistant varieties of trees for their cultivation and farmers preplan to protect the trees from natural disaster. *Borassus flabellifer* trees were observed more resistant variety of the tree in Gaja.

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