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## **A study on the impact of Gaja Cyclone on agricultural land and rural infrastructure in Thettanviduthy village, (Pudukottai district), Tamil nadu, India.**

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### **ABSTRACT**

The present study was carried out about the effect of Gaja Cyclone on the Thettanviduthy village located in Karambakudi Taluk, Pudukottai District. About 80% destruction of agricultural crops were occurred during the gaja cyclone in this area. The major crops affected were Pulses, Rice, Ground nuts, Brinjal, Banana and Casuarina plants. The economic losses suffered by the cultivators were very pathetic. Of these, pulses (60%), Paddy (70-85%), Vegetables (40-60%), Banana (100%), Casuarina (60-80%) were vanished during the Gaja. It was observed that after one month 40% of cultivation was restored in the cyclone effected area. Effect of Gaja was very worst among the farmers of this village and their rehabilitation work was still lagging.

**KEYWORDS:** Gaja cyclone, 80% destruction, 40% reconstruction, re-habitation

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## INTRODUCTION

A cyclone is a rapidly rotating storms system characterized by a low-pressure center, a closed low-level atmospheric circulation, strong winds, and a spiral arrangement of thunderstorms that produce heavy rain. Most of the cyclone have wind speed less than 110 miles per hour (177 km/h), and approximately 250 feet (80 m) across, and travel a few miles (several kilometers) before dissipating. The most extreme cyclone can attain wind speeds of more than 300 mph (480 km/h), stretch more than two miles (3 km) across, and stay on the ground for dozens of miles (perhaps more than 100 km) <sup>2</sup>. Cyclones are mostly formed over the South Pacific and Indian Ocean due to pressure variations<sup>1</sup>. Hurricanes are tropical storms that form over the North Atlantic Ocean and Northeast Pacific. Typhoons are cyclic monsoon winds formed over the Northwest Pacific Ocean<sup>2</sup>.

### *Gaja cyclone in 2018:*

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.

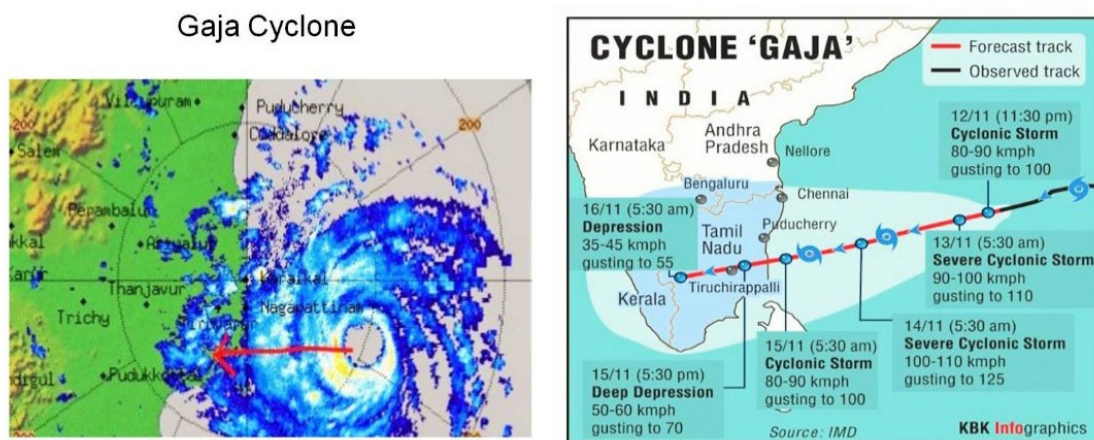


Figure 1: Gaja Cyclone

The highest wind speed was 150km/h and lowest pressure 975 mbar. Thailand, Sumatra, Malaysia, Andaman and Nicobar Islands, Sri Lanka, South India, Somalia were affected in Gaja. At 12:00 AM on November 11, a deep depression strengthened into a cyclonic storm, and the name was coined in Thailand as "GAJA". After tracking west-southwestward for a number of days, it made landfall near Nagapattinam. Gaja passes through the Vedaranyam and eye passes through Thagattur, Voimedu, Thiruuthuraipoondi, Muthupet, Pattukotai, Adirampattinam and Mallipattinam on 12<sup>th</sup> November.

At the time of landfall of the cyclone, heavy winds of about 140-160 kmph speed were experienced. The highest wind speed were 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 on November 22, 63 people were killed by the storm. Tamil Nadu Government 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. Thousands 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 and mostly uprooted. Totally 56,000 hectares of crops and trees were destroyed due to the cyclone.

### ***Study area***

Tamil Nadu, with an area of 1, 30,058 sq.km is situated in the South East part of the Indian peninsula between Latitudes 11.1271 and longitudes 78.6569. It is bounded in the east by the Bay of Bengal, in the south by Indian Ocean, in the west by the Kerala state and Arabian Sea while in the north by Karnataka and Andhra Pradesh. The climate of the state is tropical monsoon type. In the plains, the temperature during winter seldom goes below 18°C while in peak summer it rises to 43°C. Tamil Nadu and Puduchery receive rains from both the northeast and southwest monsoons.

Pudukkottai 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 81 mm and 40 mm respectively.

Karambakudi is a Taluk located in Pudukkottai district of Tamil Nadu. It is one of 11<sup>th</sup> Taluk of Pudukkottai district. The village was on the latitude of 10.458°N and on 79.135° E with an average elevation of 36 meters (118 feet). There are 48 villages and 1 town in Karambakudi Taluk. Thettanviduthy is a large village located in Karambakudi Taluk of Pudukkottai district. The location map of the study area is given below. 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.

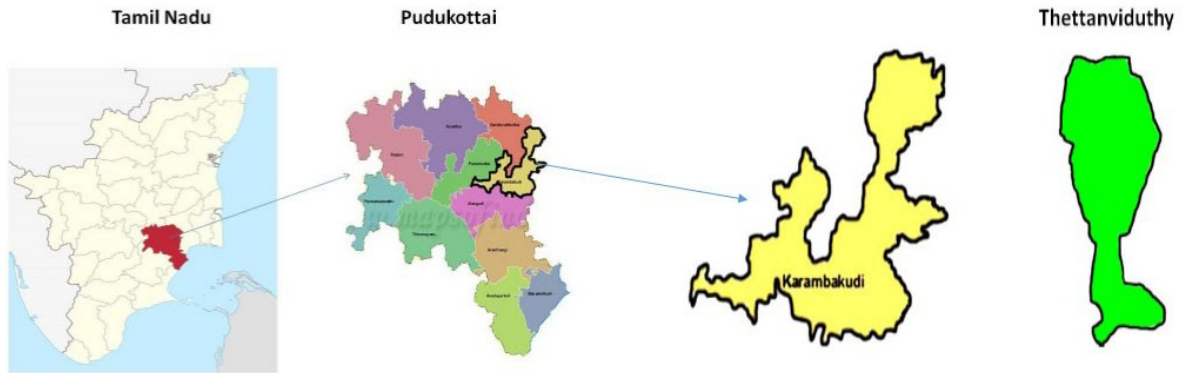


Figure 2: Geographical location

## MATERIALS AND METHOD

Data Collection Note Book, Questionnaire, Measuring Tape, Camera and GPS.

Survey method of data collection was used in this study. The objective of this paper is to assess post-cyclone conditions of farmers, identify major livelihood groups, adversity and crisis, and evaluate the livelihood strategies of coastal households. The data was collected from about 50 Gaja victims (point sources of information) through simple random sampling method and personal interview. This study comprises of spatial and non-spatial data. Questionnaire was developed by expert advice for collecting data from the cyclone affected area. Simple statistics and descriptive diagnostic approach for the study has done. Geographical information system was used to demarcate the study area and mapping of cyclone affected area<sup>3</sup>. The damages caused by the cyclone is described and given in tabular form.

Interview with Farmers



Figure 3: Interacting with Farmers

## RESULT AND DISCUSSION

Thettanviduthy was a large village located in, Karambakudi Taluk for Pudukkottai District, Tamil Nadu. It was affected by the cyclone of Gaja during the month of November 2018. The total population of this village was 2447 with 557 families and 350 houses. The male population was 1205 while female was 1242. The gaja disturbed the Agricultural lands, Crop production, Trees, and livestock. Two peoples were killed by gaja. More than 25 acres of land was disturbed by gaja. It also damaged the Houses, Transformers and Electric post. The living population was totally affected as

the main source of income was agriculture. Most of them were farmers and using their own land for cultivation. Following table show the details for destruction caused by Gaja.

**Table: 1Gaja cyclone damage details in Thettanviduthy (Karambakudi Taluk)**

Sl. No	Type of damages	Units
1.	Agriculture damages	26 acres
2.	Roadways damages	5 kms
3.	Biological damages: i) Human being ii) Goat, Cow, Ox & Buffallow iii) Chickens	2 persons 204 380
4.	Electrical goods damages: i) Electrical post ii) Transforms iii) High level towers iv) Electric line or wires	80 Nos 7 Nos 8 Nos 50 kms

Ground nut, Paddy, Banana, Casuarina and teak were the mostly affected crops in Gaja cyclone. Casurina, Groundnut and Banana are the most economic cultivars of the people. Ground nut was another main income sources from Agricultural production in Thettanviduthi. They cover more than 80% of the total ground nut production in Pudukottai District. After Gaja, the Groundnut crop production was stopped for one month as the condition for cultivation was worse. The harvesting stage of Banana crop and Casuarina woody plants were totally affected by Gaja cyclone. The Cereals, Pulses, Oil seeds, Condiments, Fibers, fruiting plants, Vegetables and leafy vegetables were totally affected by Gaja. The economic losses suffered by the farmers were very pathetic and they were not in a condition to payback the loans.

**Table: 2Types of Agriculture Land or crop production affected in Gaja Cyclone:**

Sl. No	Category	Common name	Acers	Botanical Name
1.	Cereals	Paddy	4-5	<i>Oryza sativa</i>
2.	Pulses	Black gram Green gram	1-2 1-2	<i>Phaseolus mungo</i> <i>Phaseolus aureus</i>
3.	Oil seeds	Ground Nut	3-4	<i>Arachishypogaea</i>
4.	Condiments	Chillies	1-2	<i>Capsigumannuum</i>
5.	Fibres	Cotton	2	<i>Gossypiumhirsutum</i>
6.	Fruiting plants (large herbaceous flowering plants)	Banana	5-6	<i>Musa sp.</i>
7.	Vegetables	Brinjal Tomato Ladies finger	1-2 1-2 1-2	<i>Solanummelongena</i> <i>Solanumlycopersicum</i> <i>Abelmoschusesculentus</i>
8.	Green leafy vegetables	Brown Indian hemp (pulichakeerai) Tropical amaranth (sirukeerai) Tropical amaranth (manathakkalikeerai)	1 1 1	<i>Hibiscus cannabinus</i> <i>Amaranthus tricolor</i> <i>SolanumNigrum</i>
9.	Woody plants	Casuarina	2-3	<i>Casuarina equisetifolia</i>

Black soil was the soil type in the village and was used for agriculture. The Bore water and well water sources are used for the cultivation in agricultural land. Crop rotation, mixed farming and Intercropping were the methods followed by the farmers for crop production. Legumes and vegetables were used for intercropping. Coconut tree and Neem were the barrier tree used around the

agricultural land to control grazing animals, and to control weeds, mechanical weeding practices were done. Nitrogen fixation, wind control and Soil enrichment were the benefits of keeping barrier plants along the edges of their fields.

The farmers utilize only the organic fertilizers (Livestock manure, Green manure etc.). Biological and Organic control method was used to control the pests and diseases. Chemical fertilizers were not using for the Agriculture purpose as the people had awareness on health defects that chemical fertilizers brought. Livestock and poultry inventories were practiced along with agriculture. The crop yields were sold through exporters and agencies in market. The farmers of the village were well conscious about the schemes, Government plans and funds providing for agriculture. But the people were not receiving any timely compensation or payment for their agricultural losses. Immediate clearing and rehabilitation measures have to be taken from the government officials in the cyclone affected area<sup>4</sup>. But the people were not getting immediate relief and support from the authorities. Most of the people were illiterate and being exploited by others as in the case of most of the underdeveloped countries<sup>5</sup>. The local groups and relatives of the farmers only helped them to clear out the gaja wastes from their land.

From the diagnostic chart prepared using the personal interview with gaja victims, about 83% of Banana, 71% of Paddy, 76% of Groundnut, 39% of Casuarina and 91% of green Leafy vegetables were affected by Gaja Cyclone.



Houses Affected



Figure 3: Affected areas

## CONCLUSION

The present study has been carried out in order to identify the effect of the ‘Gaja’ cyclone especially agriculture damages, settlement damages, transport damages, communication damages and biological damages due to cyclone affected places of the Thettanviduthy village located in Karambakudi Taluk, Pudukottai District. About 80% destruction occurred during the major crops and the affected Pulses, Grams, Rice, Ground nuts, Brinjal, Banana and Casuarina plants. The economic losses suffered by the cultivators were very pathetic. Of these, pulses (60%), rice (70-85%), Vegetables (40-60%), Banana (100%), Casuarina (60-80%) were totally vanished during the Gaja. After one month 40% of cultivation was restored in the cyclone effected area.

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