

Gaja cyclone: Revival of livelihood and restoration of greenery in the coastal areas of Nagapattinam District

1.0 Background:

According to the Indian Meteorological Department, Government of India, a severe cyclonic storm named ‘Gaja’ crossed the Tamil Nadu coast between Nagapattinam and Vedaranniyam near latitude 10.5°N and longitude 79.8°E with a wind speed of 100–110 km/h gusting to 120 km/h during 0030 to 0230 hours on 16th November, 2018 (Fig 1). It was reported by private weather observers that in Vedaranyam the speed of the cyclonic wind was more than 160 km/h. As per the observation of fishers, the cyclonic wind generated a storm surge of more than 5 m in height.

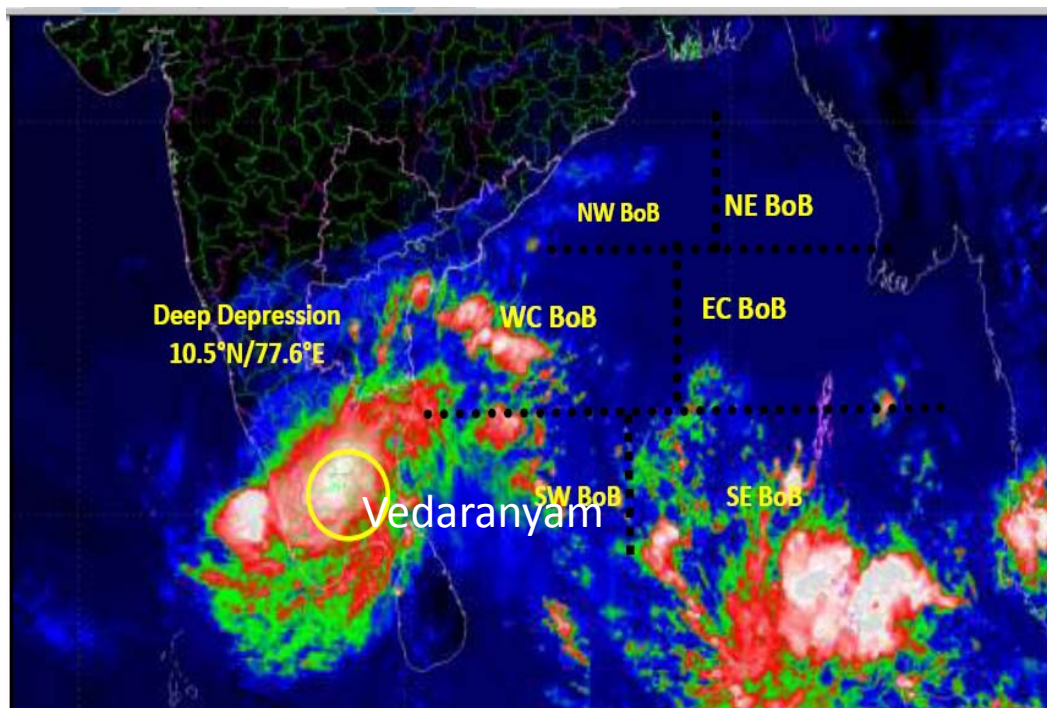


Fig 1. Crossing of Gaja cyclone between Nagapattinam and Vedaranyam

The Gaja cyclone caused extensive damages in six districts of Tamil Nadu, namely Nagapattinam, Tiruvarur, Thanjavur, Pudukkottai, Dindigul and Ramanathapuram, including the coastal areas of Nagapattinam, Thiruvarur and Thanjavur districts. The coastal areas of these districts and interior part of some these districts suffered heavy damage due to the high wind speed and the associated storm surge. A major disaster was averted due to the elaborate preparedness measures taken by the government, supported by the civil society organizations. Approximately 250,000 vulnerable people were evacuated to relief camps along the coastal areas, and fishermen were not allowed to go fishing. However, the high wind speed that sustained for a long time caused heavy damage to public infrastructure, houses, standing crops

(particularly tree crops), fishing craft and gear, avenue trees and trees in common land, forest and wildlife associated with the Point Claimere Wildlife Sanctuary and Muthupet mangrove wetland.

2.0 Coastal blocks of Nagapattinam district

The coastal blocks of the Nagapattinam district, namely Vedaranyam, Keelaiyur and Thalaingayar, bore the brunt of the Gaja cyclone where it made landfall. These blocks are rich in sensitive ecosystems and diverse livelihood systems. For example, the analysis of the remote sensing imagery of the year 2016 indicates that in Vedaranyam block nearly 28% of the geographical area comprises ecologically sensitive areas. As indicated in Table 1, paddy cultivation, tree crops, casuarina plantation and jasmine cultivation occupy about 40% of the geographical area. Other livelihood activities such as salt farming and coastal aquaculture occupy 4% and 0.88% of the area, respectively. Many farmers close to the shoreline are solely dependent on tree crops for their income, whereas others earn their daily income from jasmine cultivation, seasonal income from tree crops and casuarina plantation (once in five years).

The total number of households of the block is about 39,774 and the total population is 140,948 (male 70,357; female 70,591); nearly 21% of the population is classified as belonging to scheduled castes. The total number of cultivators is 11,295 and agricultural labourers is about 19,000. About 10,000 workers are involved in salt farming. At the district level, agricultural labourers constitute nearly 51% of the workers (Census of India 2011: District Census Handbook, Nagapattinam).

Table 1: Major land use and land cover of the Vedaranyam block

Land use/land cover	Area in ha	
Ecologically Sensitive Area		
Forest (tropical dry ever-green forest)	1,273	2.00%
Mangrove	98	0.15%
Marsh land with vegetation	66	0.10%
Marsh land	203	0.32%
Mud flat (included in the Ramsar site)	16,063	25.28%
Net cropped area		
Paddy	13,481	21.22%
Tree crops – coconut, mango, cashew	7,415	11.67%
Casuarina plantation	4,040	6.36%
Floriculture area – Jasmine, etc.	504	0.79%
Salt pan		
Salt pan	2,482	3.91%
Coastal Aquaculture		
Aqua farm	556	0.88%
Other vegetation		
Area occupied by <i>Prosopis juliflora</i>	2,781	4.38%
Others		
Built-up land	779	1.23%
Water	10,814	17.02%

Saline land	167	0.26%
Barren land	244	0.38%

Source: MSSRF-Remote Sensing and GIS Unit

3.0 Recommendations for rehabilitation

The Government of Tamil Nadu, the central government and other players – including voluntary and civil society organizations, public and private sector industries, the mass media and many donors – are implementing intensive and extensive relief measures. Experts from MSSRF visited the cyclone affected areas and conducted a rapid assessment of the ground situation in Vedaranyam block in November 2018. A farmers’ meeting with about 60 farmers from 10 villages was also organized in Sembodai on 1st December 2018. The meeting was organized by a group of volunteers from different governmental and non-governmental organizations, and MSSRF facilitated the process.

The following are suggestions from the rapid assessment survey and farmers’ meeting for the revival of the livelihoods and restoration of greenery in the Nagapattinam coastal areas.

Short-term rehabilitation measures (next 3 months)

A 1: Agriculture

1. Removal of fallen trees and debris so that land can be prepared for planting tree crops and inter-crops such as vegetables;
2. Removal of biomass from agricultural land and in and around residential areas. Demonstration and technical guidance to farmers/grassroot institutions (GRIs) in converting biomass into compost (aerobic/anaerobic). This manure can be used for plantation during the coming season;
3. Assessing the likelihood of survival of partially affected trees such as mango and others and advise on what kind of care needs to be taken to save the affected tree crops. For example, a tree with less than half of its branches remaining may not be able to produce enough foliage to remain nourished in the coming seasons;
4. Soil and water testing in the affected areas and appropriate remedial action;
5. Formation of an agriculture expert committee with soil scientists, agronomists, horticulture specialists to visit the site and provide expert advise to revive the agriculture;
6. Removal of marine sediments that have entered during the storm surge from agriculture fields;
7. Facilitation to recover damaged/affected bore wells;
8. Providing green leaf and other fodder for livestock;
9. Measures to control livestock disease;
10. Providing technical support to paddy growers on integrated pest management (IPM) and integrated nutrient management (INM).

A 2: Fisheries

1. Removal of marine sediment that have entered due to storm surge, from fishing hamlets;
2. Removal of boats and nets that were tossed away into the bushes and buried in marine sediment;
3. Repair of boats and boat engines.

A3: Others

1. Replacing the lost equipment of salt load workers so that they can get into action during the summer season;
2. Measures to avoid water-borne diseases;
4. Trauma counselling for children and counselling to continue education, especially for those who are appearing for the public exams in classes 10 and 12;
5. Providing nutritious food to children and young mothers in cyclone affected areas;
6. Counselling to vulnerable households (women-headed households, households who have lost their house and livestock, horticulture crops, and tree crops);
7. Specific counselling for parents of school and college-going children on not discontinuing their children's education;
8. Assessing the impact on Muthupet mangroves and Point Calimere Wildlife sanctuary by expert committees.

B: Medium-term measures (4 months to 3 years)**B1: Agriculture**

1. Intervention to reduce the salt content of agriculture land;
2. Facilitating the supply of good quality saplings of horticulture and tree crops to farmers and livestock holders;
3. Establishing a Sapling Bank of Tree Crops – which should contain all types of tree crops – in order to ensure diversity and cater to the needs of the farmers at least for the next three years;
4. Promoting vegetable cultivation by distributing quality vegetable seeds, which will give income to farmers in six months from now and also satisfy household vegetable requirement;
5. Providing solar pump/drip irrigation/sprinklers for irrigating vegetable crops. This will help increase the area under vegetable cultivation and also help in conserving water. Water conservation is an important aspect in reviving agriculture in this cyclone affected sandy soil;
6. Developing a fodder bank for livestock using common land or grazing land, which is available in plenty in this area;
7. Promoting shallow farm ponds in agriculture fields;
8. Continuous advisories from agricultural experts.

B2: Salt farming

1. Helping salt farmers remove mud from their salt pans, and facilitating financial assistance to farmers to retrieve their salt pans;
2. Providing solid and liquid resource management techniques to all households.

B3: Greening the coastal areas

1. Establishing a large, permanent nursery for common native shade trees such as neem, *pongamia*, *callophyllum*, *mahua (illupai)*, banyan, etc., to raise seedlings year to year;
2. Establishing a large permanent nursery for tropical dry ever-green forest (TDEF) trees;
3. Promoting shade plantation and planting common trees in Panchayat-owned lands, school campus and other common places;
4. Restoring Point Calimere Wildlife Sanctuary with TDEF trees;
5. Restoring sacred groves that are affected by the cyclone by planting TDEF trees.

B4: Others: Education and Housing

1. Many of the children of the tree crop growers are now studying engineering and other professional courses, and income earned from the tree crops would have met the education related expenditure. With the complete damage to tree crops, these students would drop out due to the expected financial crisis. Special care needs to be taken and support extended for these children to continue their education.
2. The houses of many households, particularly SC households, have been totally damaged. These have to be rebuilt.

C: Long-term measures (3–5 years)

1. Training farmers on good and sustainable coastal agriculture practices;
2. Establishing a mango pulp production plant;
3. Promoting floriculture in order to ensure regular income to farmers;
4. Promoting inter-cropping of multiple crops in tree crop plantation areas to increase the income of the farmers;
5. Promoting farmer producers organizations in the affected areas;
6. Replacing casuarina plantation with other crops. Farmers are not happy with casuarina, as its productivity has declined over a period of time and income has drastically reduced.

Observations made during the rapid assessment

The following are the observations made during the rapid assessment:

Damages to infrastructure



Damages to houses

More than a lakh houses, including thatched huts, tiled houses, etc., have either fully collapsed or partially damaged. Household items in the thatched and tiled houses were completely damaged and many households lost their furniture, clothes and text books. Almost all the houses of scheduled caste households have been completely damaged. Toilets built outside the houses are also damaged. Roofs of the toilets have gone in almost all places, and in many places the walls also have fallen. A number of families in each village are still staying in and taking food from the relief camps. The government has made elaborate arrangements to provide food in the camps. Volunteers and NGOs provided biscuits, foods, bed sheets, etc. Availability of milk is a serious problem in all relief camps. Following government intervention in arranging generators, water is being pumped into overhead tanks and piped water supply has been restored in many places.



Several farm ponds are available in this area. People use the water from these ponds for non-drinking purposes. However, after cyclone, all these ponds are contaminated and emit a strong, foul smell.

Impact on agriculture

More than three-fourth of the agricultural land is under tree crops such as coconut, mango, cashew, other fruit trees, casuarina, etc. Farmers grew a variety of trees, most of which are inter-cropped. More than three-fourth of these trees are completely destroyed now. No tree crop, except palm trees, escaped the impact of the cyclone. Only around 20% of these trees are surviving now. According to the farmers, even the survival of coconut trees that have not fallen down cannot be ensured. These coconut trees now look green because of high moisture in the soil, but all these trees may dry and die in the summer season. More than 75% of mango trees have been lost. However, farmers felt that the remaining trees can be protected if the branches are pruned properly and growth-promoting hormones are applied.



Casuarina trees have fallen, and they need to be removed from the field. Generally, they get Rs 1 lakh per acre from casuarina after five years; now, they would get only Rs. 10,000 to 20,000 per acre. Paddy was comparatively less affected compared to other tree crops. However, there is an increase in pest attack in paddy crop after the cyclone. According to the farmers, the yield will be lower due to this cyclone



because tree crop residue is dumped in the paddy fields. They predict that the paddy yield will be lower by at least 25% this year. In Kadinavayal, salt has been dumped from the nearby salt pan in the paddy fields and around; paddy cultivation in about 50 acres have been affected due to this. Salinity in these fields may increase in the coming years.



Impact on livestock

Most of the households owned one or two cows for their own use. Landless households, especially scheduled caste and other agricultural labourer households, owned goats as a source of livelihood. Many cows and goats have perished now. The remaining livestock is also suffering due to lack of green fodder and paddy straw.

Impact on fisheries

In the fishing hamlets, many of the mechanized boats are found washed deep inland, and engines and fishing nets are very badly damaged. The storm surge generated by cyclonic winds caused inundation of sea water into the fishing hamlets. The sea water traversed through the fishing hamlets into adjoining farmlands to a distance of 1–2 km from the shoreline and deposited 2–5 feet deep marine sediment.



Impact on salt farming

Small and marginal farmers in Vedaranyam own salt pans to the extent of 1–2 acres. Many farmers store their salt in dry places in the field itself and cover them with palm leaves or tarpaulins. The strong winds blew away these covers and strew the salt all over the place including nearby agricultural land. For example, salt harvested from 86 acres (350 tonne/acre) stored near the salt pan in Kovilthavu village was lost due to the cyclone. Apart from this, wind also brought in a lot of mud and dust, dumping them in the salt pans. According to the salt farmers, they can start their operation in the coming summer only if the mud is removed from the salt pans and bore wells, the submersible motors are repaired and the earthen embankments are strengthened. The supply of electricity should be restored at the earliest to start their operation. Many of the temporary sheds established in the salt pans are also completely damaged.

The salt loaders, who are generally landless or marginal farmers, have lost their equipment such as spades, iron buckets, and wood slabs used to load salt. They cannot carry on with their work unless they get all these equipment.



Women and children

The burden on women has increased due to various impacts of the cyclone. Many suffer from the lack of access to relief supplies, drinking water and water for common use. Lack of sanitation facilities in relief camps is another serious problem faced by the women. Availability of sanitary napkins is hampered due to temporary closure of many stores. However, this problem is solved to some extent by the generous distribution of napkins by civil society organizations and others.

Children less than 5 years do not take food properly, and according to their mothers these children were totally shocked and are yet to come out of the shock. Since all ICDS centres have been converted into relief camps, no supplementary food is being served in the area. More than three-fourth of children have lost their books and other stationery items. The government is planning to provide free books and stationeries to the children studying in government schools. It is not clear whether free books will also be provided to students studying in private schools. One of the parents remarked that they have no other way than asking their children not to attend the schools if books and notebooks have to be purchased.

Many children less than 10 years of age are suffering from fever and other ailments due to the unhygienic conditions that currently exist. The government is taking steps to improve the situation by spraying mosquito repellents. The affected children are also given medication. Milk powder is provided by volunteers and NGOs, but not regularly. Some of the parents said that they plan to discontinue their children's education as they have to pay at least Rs.30,000 as fees in private colleges for arts and science courses and Rs. 60,000 for engineering courses. They managed to pay the fees and meet other expenditure through the income earned from tree crops, which is not going to be available to them in the coming future.

Impact on sacred groves

A number of sacred groves are present in the coastal areas of Nagapattinam district. These sacred groves also suffered heavy damage due to cyclonic winds.



Impact on Muthupet mangroves

Muthupet suffered heavy damage due to Gaja cyclone. Large trees that lined the shoreline were uprooted and many trees in the interior part of the mangroves were broken. The bark of many trees, particularly young trees, peeled off, and according to the local people these young trees will not survive. Many canals that supply tidal water to the mangroves, particularly in the restoration areas, are partially silted and in some



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cases filled with leaves, twigs and broken branches of nearby mangrove trees.



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