

Coping with Disaster: Lesson Learnt from Super-Cyclone Amphan in India

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Abstract

With the double burden of Super-cyclone and COVID-19, India is grapple with the situation. Cyclonic Storm 'Amphan' wreaked havoc on the eastern part of India especially West Bengal and Orissa on 20th May 2020 and destroyed natural resources, infrastructures and lives. Among all calamities, the devastation caused by cyclones tends to be the most sudden and severe. An attempt was therefore made in the study to assess damages, impact, preparedness measures taken by the people, the role played by government organization and suggestions given by the respondents to minimize the effect of disaster and thereby find out the alternative livelihood opportunity who losses their job to sustain their life. This paper aims to find out knowledge about the source of information of disasters, precautionary measures for safeguard of lives both human and domestic animals, assets, and crop etc. management approach after disasters for dwellings, household articles, crops, animals and public infrastructure were selected as variables for assessing knowledge level. A total of 200 respondents were selected. Data were collected from July-August, 2020 through the mail, social media and telephone conversation using a structured schedule developed by the investigators. Data were processed into frequency, percentage, mean scores and rank position. The findings of this study indicated that the main occupation of the respondents was cultivation (33%) followed by service. News media played important role in forecasted warning system. The role performed by the government is a moderate amount. The majority of the respondents' taken preparedness measures for the preservation of safe drinking water and almost all the respondents demanded government support in terms of the warning systems, relief materials and shifting important documents/ infrastructure to a safer place. Respondents suggested that concrete/ permanent coastal embankments should be built and monitored regularly.

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1. Introduction

India is prone to different kinds of disasters. Floods, cyclones and earthquakes are the most common and widespread of all natural disasters and can occur almost anywhere in the State. Local self-governments are the grass root level extension functionaries' who deal with the villagers. Local self-government has a pivotal role to play in disaster management. The major tasks entitled by the local self-government in managing natural calamities are implementing relief, rehabilitation and reconstruction activities (Mondal et al., 2014). Villagers of the disaster prone areas have great role towards precautionary measures to manage disasters. Making people conscious, common settlement and cooking, safe storage of essential commodities, regular liaison with government machineries etc are precautionary measures to be taken up by the villagers. All the developmental departments of the government had also equal responsibilities for different management approaches to keep the disaster affected areas in normal condition as early as possible. This paper examined impact of Amphan and measures taken by the people themselves and government functionaries to cope with the disaster. The central and state governments strengthened their efforts to minimize the loss of economy as well as to generate alternate livelihood strategies. Both government and non-government organizations have distributed reliefs after the disaster. Human beings were mostly affected due to disruptions of electricity, drinking water, telecommunication and uprooting of trees on the road.

2. Cyclone Amphan

2.1 Background

On 18 May, at 12:10 P.M. Amphan reached its peak intensity with 3-minute and 1-minute with a sustained wind speeds of 150 metre per hour and 160 metre per hour respectively, and a 920 mbar barometric pressure (27.17 in Hg) (https://en.wikipedia.org/wiki/Cyclone_Amphan).

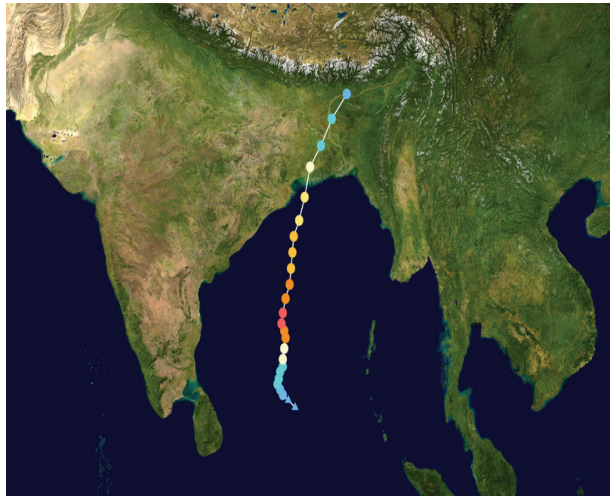


Figure 1: Map Plotting the Track and the Intensity of the Storm

(Source: Wikipedia)

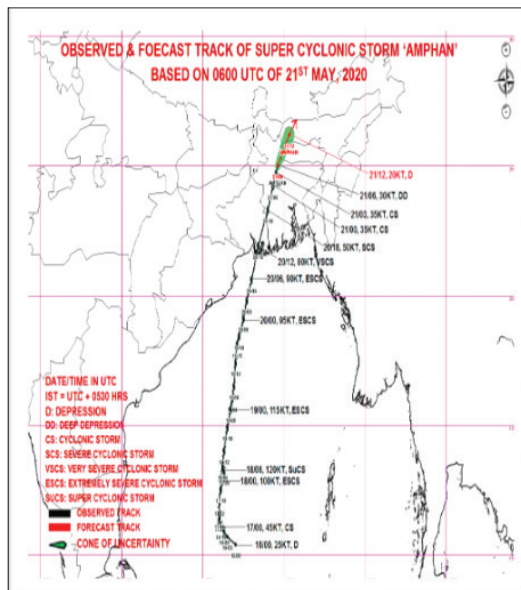


Figure 2: Track on Cyclone Amphan

(Source: Indian Meteorological Department)

The Amphan started with dry air, weaken the eastern coastline of India (Figure 1 and 2). Just After one day on 20 May 2020 the Amphan made landfall in the state of West Bengal, India between 10:00 and 11:00 A.M. with wind speeds spiralling of 165-185 kilometres per hour has smashed away state by the COVID-19. The neighbouring country Bangladesh and state Odisha were also severely affected by the Amphan.

2.2 Impact:

The West Bengal government reported that 86 people died due to electrocution or the collapse of homes and financial losses to around 1,00,000 cores (US\$15.38 billion) in West Bengal (The Times of India) and it directly hits the 70 percent of the state's population (Sabarwal and Harshit, 2020). The greatest tidal surge were expected in the Coastal areas like North and South 24 Parganas, where flooding could extend upto 15 km (9.3 metre) inland (Nag Choudhary and Paul, 2020). Embankments in the coastal region were swept away by the storm surge and flooding, resulting inundation in the coastal areas (Figure 3) (The Indian Express). Bridges linking coastal islands (Sundarbans) to the Indian mainland were washed away (The New York Times).

The Government of West Bengal estimated that cyclone impacted around 22,000,00 hectare of area effecting millions of lives of people. In the North and South 24 Parganas, where more than 10,00,000 habitats have collapsed (Figure 4) and the reaction is 'we don't have one drop of water and we don't have electricity, how we can survive' (Majumdar and Dasgupta, 2020).



Figure 3: Water Breaches an Island in North 24 Parganas. Photo by Sudhansu Maity.



Figure 4: Houses Destroyed in Patharpratima, South 24 Parganas.

Photo by Prasenjit Mandal

The cyclone destroyed the standing rabi crops such as paddy, mangoes, lychee, sesame, vegetables, gram and betel. It was time to harvest paddy. Due to lockdown, most of the farmers were facing shortage of labour and lack of transportation. It seems that they are facing survival challenge for the loss of income. The cyclone followed by heavy rainfall uprooted about 5000 trees as well as disruption of power supply in electrical, cable, and traffic across the state and after the cyclone, the snapped of electrical wires and damage to water pipes led to power outages and water shortages across the state (Singh, 2020).

2.3 Relief and Rehabilitation

According to Government of West Bengal, over 3,00,000 people were evacuated by using HAM radio volunteer (Figure 5) to around 100 shelters which were school, office building, and an average rate of 3,000 people per shelters in West Bengal, including 2,00,000 from district North 24 Parganas (Figure 6) and more than 40,000 from South 24 Parganas district (Freedman, Andrew; Slater, Nag, Loiwal). The National Disaster Response Force reported that over 5,00,000 people evacuated from States of Orissa and West Bengal (Misra and Sekhar, 2020). In comparison with Cyclone Bulbul which occurred in 2019, an estimated 1.8 lakh people were evacuated to cyclone shelters (The New India Express, “Cyclone Amphan”).



Figure 5: HAM Radio Volunteers Urging people to shift to Cyclone Shelters.

Photo by: Ambarish Nag Biswas



Figure 6: Residents Affected Cyclone Amphan Shifted to Shelters in West Bengal

(Source: ANI News)

To maintain social distancing norms, shelters could fill one-third of their capacity (Nandi and Thakur, 2020). COVID-19 and Social distancing norms reduced 50,000 to 20,000 capacities in shelters in West Bengal (Brackett 2020). In West Bengal, schools and government institutions/organizations were used for cyclone shelters accompanying more than 2,000 shelters (Free press Journal, 2020).

The government of West Bengal has released a fund of Rs. 1,444 crore just after the cyclone Amphan for rehabilitation. Chief Minister of West Bengal, Mamata Banerjee said that the state government has transferred cash to almost five lakh affected people for repairing their homes, other than crop failure assistance to 2.33 million farmers apart from 0.2 million betel farmers (Press Trust of India, 2020). Banerjee also added Prime Minister Narendra Modi had announced an immediate relief package of Rs. 1,000 crore for the cyclone-hit state of West Bengal (Press Trust of India, 2020).

The national and state disaster relief forces working together by clearing out trees and helped the people during relief work. During COVID-19, protests against the disruption of power supply and drinking water abated with time, health officials cautioned that the social distancing norms could adobe the state in the weeks to come (Majumdar and Gupta, 2020).

Government, non-government organizations and international agencies helped the affected areas. The local self-government provided relief materials, compensation to victims, arranging health facilities during and after the disaster. Affected people demanded more support from government organizations. The roles performed by the local self-government in respect of disaster management were not remarkable. (Mondal et al, 2018).

Raghavulu and Bose (1992) pointed that ‘ politics pursued by the states and centre concerning natural hazards as well as the biological disasters such as the set procedures, damage assessment, accounting procedures, providing assistance, role of different agencies in providing relief materials etc.

Therefore, this study describes the damages caused by the cyclone, how it affected the population in various districts of West Bengal, and how prepared the authorities were in responding to the disaster. We found that the participants were most adversely affected in this disaster due to disruption of services like electricity, phone and internet (as opposed to uprooting of trees and water-logging).

Therefore, the study is relevant to the strategy and the implication is worth of the following points.

- i. It can serve as a source of information for related research in future.
- ii. The results can serve as a reference/guidance for the disaster management authorities in West Bengal.

- iii. It can also be used as reference material in academic affairs as well for disaster affected people for management of the disasters.
- iv. The district administrators, planners and executors can refer the recommendations for prevention and mitigation of the disasters.
- v. The findings can serve as a guideline for the National Disaster Management Agency, Ministry of Home affairs, Govt. of India while developing National Disaster Management frame work.
- vi. The opinion/perception of the affected people and the official of institutions (i.e. PRI) is a definitive indicator of the ground situation or facts essential for management of natural disaster in the study areas. The information can effectively utilized for precaution, management and mitigation of disasters in those areas and other similarly located areas or for other type of disasters.

3. Materials and Methods

3.1 Study Area

An ex-post-facto research design was conducted to find out the aftermath of cyclone Amphan and adaptation measures in West Bengal, India (Figure 7). The study also concentrated on the perception of people about the role of government functionaries after the disaster. 200 respondents were selected for the study from four districts- Hooghly, Howrah, North 24 Parganas and South 24 Parganas districts (Figure 7) purposively where a random sampling technique was followed to the selection of villagers. Both purposive and random sampling techniques were followed for this study. The districts (Figure 8) were selected purposively.

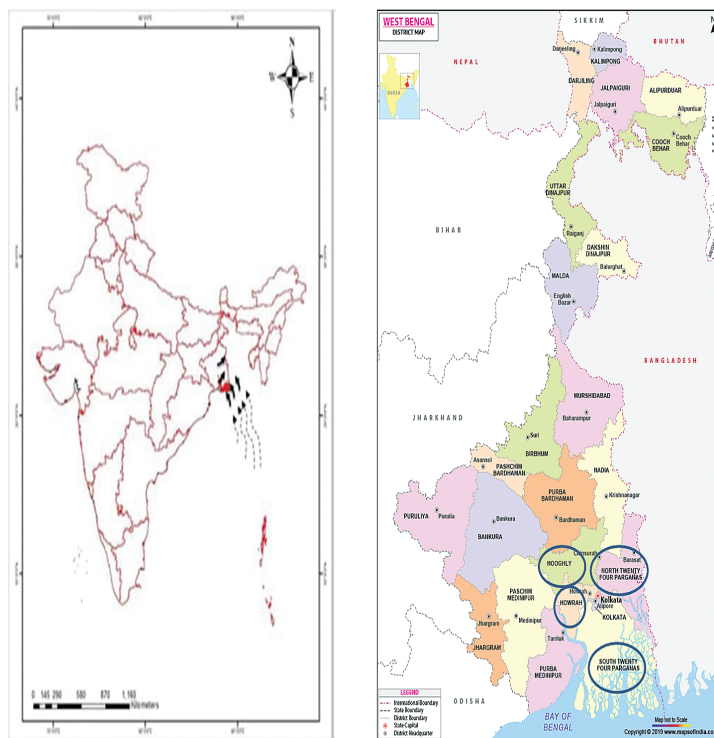


Figure 7: Map of West Bengal, Circle Representing the Study Area

Both dependent and independent variables (Table 1) were selected for the study and the data were collected from June 2020 to August 2020 through mail, social media and telephone conversation using a structured schedule developed by the investigator. Apart from primary level data collection, the researcher collected resources from secondary sources such as articles, journals, the internet, media and other pertinent documents that were also used for conducting this study.

Measures relating to this study were collected from respondents. More than one hundred measures were collected. These were then grouped into four components in disaster management based on prima facie emphasis on each measure. The measures were then scrutinized and edited as per the objective of the study. After pretesting the measures twice with the respondent, a total of 40 measures were retained.

The scale consists of a set of items (measures) to which the subject is asked to react. On the other hand, a 3 point scale was used. These are: 'Always', 'Sometimes' and 'Never'

with scores 3, 2, 1 respectively. Data were processed into frequency, percentage, score value and rank position. Measures that seem to be either definitely favourable (strongly agree) or definitely unfavourable (strongly disagree) to the attitude under study are used. The respondents indicate their agreement or disagreement with each item.

Table 1: Variable and their Empirical Measurement

Sl. No.	Variables	Measurement
	Independent Variables	
1.	Age	Chronological (number of years) age of the respondents
2.	Educational level	Structured schedule developed for the study
3.	Occupation	Structured schedule developed for the study
4.	Type of house	SES scale (rural) of Trivedi 1963
5.	Annual income	Structured schedule developed for the study
6.	Social participation	Structured schedule developed for the study
7.	Mass media exposure	Structured schedule developed for the study

B. Dependent variable

1. Measures taken by individual and different organizations in disaster management
Structured schedule developed for the study

4. Results and Discussion:

Table: 2 Distribution of the respondents according to age

(n=200)

Sl. No.	Category	Number	Percentage
1.	Young (up to 35 yrs)	40	20.00
2.	Middle age (36 – 50yrs)	100	50.00
3.	Old (above 50 yrs)	60	30.00

Table-2 showed that 50 percent of the respondents belonged to the middle age group followed by old age (30.00%) and young (20.00%).

Table 3: Distribution of respondents according to their occupation

(n=200)

Sl. No.	Occupation	Number	Percentage
1.	Agriculture	66	33.00
2.	Farming+Business	27	13.50
3.	Student	36	18.00
4.	Service	41	20.50
5.	Daily Wagers	30	15.00

It is noted from the table 3 that the main occupation of the respondents was cultivation (33%) followed by service (20.50%). Rests of the people were engaged in small business (13.50%) and daily wages (15.00 %). Before the disaster, the maximum number of respondents was largely dependent on agriculture for their livelihood. After the catastrophic majority shifted their occupation agriculture to daily wages as most of the agriculture land was inundated with saline water which caused huge damage to crops. For this, a major portion of the workforce migrates to nearby districts even to outside states for gainful employment. But due to restrictions in transportation people are not able to migrate for searching jobs. However, some government scheme such as Mahatma Gandhi National Rural Employment Programme which is typically known as “100 days work” has helped to generate additional employment to the job seekers at grass-root level.

Table 4: Sources of Information Utilized by the Respondents in the Time of Disaster

(n=200)

Sl. No.	Source of information	Extent of Utilization of Information Sources			Mean Score	Rank
		Always (3)	Sometimes (2)	Never (1)		
		No.	No.	No.		
1.	Social media (Facebook/ Whatsapp/Twitter)	110	52	38	2.36	II
2.	News Media (Newspaper/TV/Radio)	122	51	27	2.47	I

3.	Government Official (SMS/Phone/e-mail)	57	68	75	1.91	IV
4.	Friends and Relatives	92	63	45	2.23	III
(Maximum obtainable score-3)						

From table-4, News and Social media play an important role in the forecasting of weather conditions. It is observed from the table that the means score was highest in electronic media and followed by print media. The least score was obtained in case of government officials. It means that respondents got information about the intensity, impact of the disaster from news media and government officials did not forecast information about the disaster.

Here, score value 3, 2, and 1 were used as sources of information used. As for example, 110 respondents always used social media as a source of information at the time of disaster.

Table 5: Distribution of the Respondents According to the of Mass Media Exposure

(n=200)

Sl. No.	Medium	Frequency	Percentage	Listening/Reading/Viewing		
				Regular (2)	Occasional (1)	Never (0)
1.	Radio	102	52.00	64	38	00
2.	Television	148	74.00	98	50	00
3.	Newspaper	160	80.00	100	60	00
4.	Magazines/ Journals	00	00.00	00	00	00
5.	Internet	138	69.00	112	26	00
6.	Mobile	175	87.50	162	13	00
1.	Kisan Call Centre	00	00.00	00	00	00

As observed from the table-5, 52.00 percent of the respondents had radio, 74.00 percent T.V., However; it is noted that the person listening radio on regular interval was 64 and occasionally was 38 whereas regular and occasionally TV viewing was 98 and 50 respectively. But 80 percent of the respondents were subscribing for newspaper and 87.50 percent had mobile set The respondents used to get first hand information from mobile

but detail information can be only obtained from newspaper. None of the respondents subscribed magazine or farm related journals in the study areas. Similarly, mobile phone are very much essential at the time of disasters for exchange of information mainly for intimating about the weather condition and preparedness related information and damages, rescue operation, relief measures etc. after occurrence of disaster.

Table 6: Preparedness Measures taken by the Respondent as Pre-disaster Management

(n=200)

Sl. No.	Precautionary Measures	Extent of Measures Taken					
		Always		Sometimes		Never	
		Number	%	Number	%	Number	%
1.	Shifted to cyclone shelter	69	34.50	60	30.00	71	35.50
2.	Storing of essential relief commodities	85	42.50	57	28.50	58	29.00
3.	Shifted livestock to a safer places	78	39.00	53	26.50	69	39.50
4.	Collect medicine from Govt./local administration	44	22.00	65	32.50	91	45.50
5.	Storing safe drinking water	93	46.50	84	42.00	23	11.50
6.	Collection of materials for cooking food	55	27.50	67	33.50	78	39.00
7.	Collection and storing of cattle feed	56	28.00	55	27.50	89	44.50
8.	Helped from administration/official	78	39.00	54	27.00	68	34.00
9.	Demanding government services for all support	114	57.00	86	43.00	00	00.00
10.	Keeping communication materials with self	92	46.00	75	37.50	33	16.50

The scale for administration was provided with three response categories: 'Always', 'Sometimes' and 'Never', with scores 3, 2, 1, respectively. The scale consists of set of items (measures) to which the subject is asked to react. Measures that seem to be either definitely favourable (Always) or definitely unfavourable (Never) to the attitude under study were used. The respondents indicate their agreement or disagreement with each

item. The individual's total score indicates his or her position on a scale of favourable–unfavourable attitude towards the object.

Table-6 showed that the preparedness measure taken by the individual respondents. The majority of the respondents' taken preparedness measures for the preservation of safe drinking water (46.50%) and almost all the respondents demanded government support in terms of the warning systems, relief materials and shifting important documents/infrastructure to a safer place. About 46% of respondents reported that they always keeping communication materials with themselves for getting information and connected with the government officials about further sensitization of disaster and during emergencies. In fact, some respondents from coastal areas i.e. North and South 24 Parganas of West Bengal commented that the Government of West Bengal warned us through SMS that those who were staying at mud houses, find someplace safe and stay there for the next few days.

Table 7: Management Support by Government Officials as Perceived by the Respondents
(n=200)

Sl. No.	Measures	Extent of Measures					Mean Score	Rank
		Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree		
1.	Repairing of damaged houses	72	83	00	24	21	3.80	III
2.	Temporary shed for rehabilitation in the village	52	47	22	138	41	3.15	IX
3.	Arrange relief and rehabilitation programme for the victims	65	75	26	13	21	3.75	IV
4.	Rescued vulnerable group	51	76	32	24	17	3.60	V
5.	Provide compensation for houses/ crops/animals loss/damages	64	54	30	36	16	3.57	VI

6.	Immediate repairing of transport/roads	77	73	12	14	24	3.82	II
7.	Arrange long term programme for food, shelter and livelihood support for fully and partially damaged persons	53	65	36	25	21	3.52	VII
8.	Restoration of electricity and telephones connectivity	87	75	08	12	18	4.00	I
9.	Arrange training and education facilities	00	00	39	75	86	1.76	X
10.	Supervise and monitor long term reconstruction	35	47	65	39	14	3.25	VIII

(Maximum obtainable score-5)

Mixed responses were observed from the respondents on scale points towards various management support provided by the government functionaries (Table-7) after occurrence of disasters. Maximum people reported that disruption of electricity due to uprooting of trees was prevalent in all localities. The disruption of drinking water supply is closely correlated with electricity service which is disrupted after the disaster, rendered electric water pumps inoperable. Governments restore the electricity and telephone cable as early as possible. Poor responses were obtained from the respondents on arrange training and education facilities after the disasters. The respondents expressed favourable attitude towards the assistance provided by the government authorities after the Amphan. A cursory look into the table-6 reveals that a significant number of respondents have no viewpoints towards the measures as because these respondents belongs to city/town and are service holders therefore the effect on Amphan on these respondent were comparatively less.

Table 8: Suggestions to Protect the Areas from Disaster given by the Respondents

(n=200)

Sl. No.	Suggestions Given by Respondents	Always	Sometimes	Never
1.	Arrangement of disaster shelters permanently	77	67	56
2.	More financial support from the government	82	65	53
3.	Repair/maintenance of concrete river embankment	112	57	31
4.	Planting trees besides the river to protect from wind	81	85	34
5.	Early warning system forecasted in advance	68	77	55
6.	Local government must be taken more initiative in future	93	68	39
7.	Need more relief materials from government	87	75	38
8.	Training and orientation for capacity building	110	80	10
9.	Repair of roads, local institutions as early	108	76	16
10.	Alternative sources of drinking water	112	78	10
11.	Arranged underground cable for power distribution	145	55	00

Table 8 showed suggestions given by the respondents. One of the important suggestions is the arrangement for permanent disaster shelters in near future for the coastal people. Though few temporary cyclone shelters are available at present these are not sufficient to protect the majority of people. The maximum number of respondents suggested that repair and maintenance of the damaged embankments should be given priority to protect the affected areas. The important measure as suggested by respondents is to provide an early warning system well in advance, before 3-4 days of occurrence of cyclonic storms. The other significant suggestion given by the respondents is that local governments must take more initiative and play proactive role in disaster management. While distributing relief materials and financial support by the local institutions there were some biases in selecting the victims. People in the coastal areas reported that the financial support provided by the government is too meagre to mitigate the suffering. The government provides only Rs.20, 000 for the victims whose houses were

fully damaged and Rs. 28,000 for part of their wages for 100 days of work under the Mahatma Gandhi National Rural Employment Guarantee Scheme (MNREGS). They suggested more financial support from the government. The maximum number of respondents suggested (1) planting trees beside the river to protect from strong wind and (2) providing training for capacity building; in the two districts - North and South 24 Parganas. Some of the respondents suggested that they need more relief materials from the government. This suggestion, therefore, bears significant importance. A glance at the table suggests that the majority of the respondent were in favor of permanent solutions rather than taken and temporary measures.

5. Conclusion

In this paper, we analysed the responses of 200 participants to get insights about the damages, impact by the super-cyclone Amphan as well as opinion of the respondents towards preparedness measures, role of government agencies and suggestions to combat the disaster in near future. Amphan landfalls during the COVID-19 pandemic, when West Bengal and the whole of India was under strict lockdown protocols. It is concluded from this study that the villagers got information about the disaster from news and social media. Most of the respondents were farmers and they lost their land totally by the inundation of flood. People prepared themselves in arranging many facilities prior to the disaster such as storing food and drinking water, keeping important documents to the safer places, storing medicine etc. Government functionaries extended help on many occasions but people demanded more support from the government departments. The official did not forecast the weather in advance. People in the coastal areas helped themselves prior to the disaster. Therefore, they suggested that repair and maintenance of coastal embankments should be given top priority as it serves to protect coastal communities and other productive resources (e.g. agricultural land) from tidal surges. It is therefore suggested that the central government and district administration should take appropriate steps for mitigation of the disasters in disaster-affected areas and more particularly in the vulnerable areas of flood and cyclones.

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