A ROLL ON PUBLIC ADMINISTRATION ON VARDHA CYCLONE WITH REFERENCE TO COASTAL AREA OF CHENNAI AND THIRUVALLUR DISTRICTS OF TAMILNADU

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***Abstract*: Tamil Nadu is historically one of the most vulnerable States to tropical cyclone. The total geographical area of Tamil Nadu is 13 Million hectares and it has a coastline of 1,076 km which is about 15% of the coastline of India. The State is multi-hazard prone, the major natural hazards being Cyclonic storms, Urban and Rural floods, and periodic Droughts. Some of the tropical cyclones that hit Tamil Nadu are Gaja (2018), Ockhi (2017), Vardha (2016), Nilam (2012), Thane (2011), Jal (2010) and Nisha (2008). This study revealed various damages to buildings and properties during the cyclone through a field study, which is supported by published secondary data. Further, the article explores the causes of damages and remedial measures to avoid those in future cyclones. The instances of cyclones are becoming more frequent as well as intense in the recent times which raises a pressing need for disaster preparedness. Information plays a crucial role in the context of disasters and the same is disseminated through media. People seek information from media to become aware as well as adopt precautionary measures to safeguard themselves and their property from cyclones to the extent possible. A question arises as to how frequently people use media in the context of disaster, the pattern of information seeking, what are the factors that determine the information seeking behaviour and whether they pave way for the adoption of disaster preparedness. The thesis proposes the disaster preparedness model that conceptualizes structural relationships among media use, information seeking behaviour and disaster preparedness. The proposed structural relationships are empirically investigated in the context of tropical cyclones in the coastal districts of the state of Tamil Nadu, India.**

***Keywords*: public administration, vardha cyclone, coastal area, chennai and thiruvallur districts.**

Introduction

Cyclone Vardha, which was formed in the Southeast Bay of Bengal on Thursday, 08 December, was close to the Andaman and Nicobar Islands and wreaked havoc over the region. The system intensified into a severe cyclone and thereafter into a very severe cyclonic storm. (ECHO, 11 Dec 2016) Northern Tamil Nadu and Southern Andhra Pradesh battered by a Super Cyclonic Storm on 12 December, 2016 that made landfall at Chennai. The estimated maximum wind speed reached 110-130 kmph in the core area which produced a huge storm surge that led to sea-level elevation of more than 3 m and took away valuable lives of nearly 10 people. Downed trees and some structural damage were reported. More than 8,000 were evacuated to relief centers.

The India Meteorological Department (IMD) warned of a storm surge about 1 meter (3.2 feet) above normal tide levels in low-lying areas of Chennai, Thiruvallur, Kanchipuram and Nellore districts. Underground personal weather stations measured 6 to 10 inches of rainfall as of Monday afternoon in the Chennai metro area. Heavy rainfall was likely to spread westward into southern India as Vardha slowly weakened. Emphasis is laid on the real-time handling of this event, impacts made by the cyclone and the services rendered in relation to disaster management by the State and Central Agencies.

On 12 December, its centre was located approx. 134 km east of Chennai (Tamil Nadu state) and it had max. Sustained wind speed of 139 kmph (equivalent to a Category 1 on the Saffir-Simpson scale). An Orange Warning for heavy to very heavy rain is in effect for the states of Tamil Nadu and Andhra Pradesh. (ECHO, 12 Dec 2016) On 13th December, the depression over north interior Tamil Nadu weakened into a well-marked low pressure area. (Govt. of India, 13 Dec 2016) The Government of India stated that 16 people had died in rain related incidents linked to the cyclone, and more than 15,000 people in low lying areas were evacuated to 104 relief camps and provided food, water and medical services. (Govt of India, 14 Dec 2016).

Objectives

The objectives of this study were as follows:

• To critically analyze the role of disaster managers in the management of Cyclone Vardha with special reference to early warning, preparedness, impact, response, and community preparedness.

• To assess the impact of Cyclone Vardha on the infrastructure, services, and communities.

• To study the measures undertaken by the Central Government, State Governments and District Administrations to reduce the mortality and impact of cyclones in the State of Tamil Nadu.

• To document the best practices undertaken during the management of Cyclone Vardha.

• Suggest evidence-based recommendations for better management of Cyclones in the future.

MATERIAL AND METHODS

Field surveys were conducted in after math of SCS Vardha to assess damages visually; photographs were taken at the affected areas by the survey team. A total of 65 GPS points were collected and the local people were interviewed to gather information about the actual situation and the damages caused by the cyclone. Nearly, 50 places along the coastal area were covered, starting from south of Mahabalipuram to north of Kattupalli during December 13 and 14, 2016. 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. Moreover, the tourism trade of the capital city of the state of Tamil Nadu also suffered enormous loss. The cyclone damage details are given in Table 1.The cyclone Vardha-affected field photos are given in Figures 2–4.

State Disaster Management Action

The official bulletins published by the IMD, during and after the passage of the cyclone jointly with the services provided by Indian National Centre for Ocean Information Services (INCOIS) (https://incois.gov.in/), were used to understand the environmental conditions and technical aspects of the cyclone, its formation, and its effects on the coastal region. Weather warning signals were issued by the IMD during Cyclone Vardha four times on December 12, 2016, at 04:45 am (Signal no. 1: Greater Danger), 9:30 am (Signal no. 2), 11 am(Signal no. 3), and (Signal no 4: Local Cautionary) at 8.15 am (Source: Chennai Port Trust).

Role of IMD and INCOIS

IMD and INCOIS worked jointly for calculating cyclone forecast and its impacts on coastal areas. IMD continuously monitored and predicted Cyclone Vardha since its inception over south Andaman Sea from December 6, 2016. At the genesis stage, the system was monitored mainly through satellite observations and buoy observations. Since the morning of December 12, the system was continuously monitored by the Doppler Weather Radar at Chennai and Machilipatnam. Various national and international Numerical Weather Prediction models and dynamic statistical models were utilized to predict the genesis, track, and intensity of the cyclone. Tropical Cyclone Module—the digitized Economic and Social Commission for Asia and the Pacific forecasting system of IMD—was utilized for analysis and comparison of various models guidance, decision-making process, and warning product generation(http://www.incois.gov.in/portal/IMD_Chennai_bulletins.jsp).

IMD issued regular bulletins to World Meteorological Organization/Economic and Social Commission for Asia and the Pacific Panel member countries, national and state disaster management agencies, general public, and media since inception of the system over Bay of Bengal. IMD continuously monitored, predicted, and issued bulletins containing track, intensity, and landfall forecast up to 120 hours or till the system weakened into a low pressure area. The above forecasts were issued from the stage of deep depression onwards along with the cone of uncertainty in the track forecast. The tropical cyclone forecasts along with expected adverse weather, such as heavy rain, gale wind, and storm surge, were issued as three hourly updates during cyclone period to the central-, state-, and district-level disaster management agencies, including Ministry of Home Affairs, National Disaster Response Force (NDRF), National Disaster Management Authority, Andhra Pradesh, Tamil Nadu, Puducherry, and Andaman & Nicobar Islands (NDMG, 2008). The bulletin also contained expected damage and suggested action by disaster managers and general public. These bulletins were also issued to Railways; surface transport; Defence, including Indian Navy and Indian Air Force; Ministry of Agriculture; Ministry of Information and Broadcasting; etc. Perodic bulletins (three/six hourly bulletins) were issued by the cyclone warning division at New Delhi and regional warning centres of IMD at Chennai, Kolkata, Visakhapatnam, and Bhubaneswar to ports, fishermen, coastal and high sea shipping community for precautionary measures during the passage of cyclone (http://www.rsmcnewdelhi.imd.gov.in/images/pdf/publications/preliminary-report/Vardha.pdf).

Storm surge of 1 m height above the astronomical tide occurred near Pulicat Lake at 1200 hours on December 12, 2016. The astronomical tide at that time was 0.47 m and hence the total tidal wave was 1.47 m. IMD predicted storm surge of about 1 m height above astronomical tide at the time of landfall over low lying coastal areas of Chennai of Tamil Nadu based on INCOIS Storm Surge and coastal inundation model guidance. Thus, the wind, storm surge, and rainfall warnings issued by IMD have been found to be correct.

Preparedness

Based on the warning and bulletins issued by IMD about the Cyclone Vardha, the Government of Tamil Nadu took many preparatory measures to avoid loss of life and property. The government arranged around 104 temporary cyclone camps and evacuated nearly 13,578 people residing in low lying areas. All essential needs were provided by the government to the people in these camps. Apart from this, the government also issued alerts to the public to be safe by providing a toll free helpline number (Tamil Nadu Press Note No. 150, dated December 13, 2016). The electricity board shut down the power during the passage of cyclone around the whole city.

Risk Reduction Strategies

Risk reduction during a hazard depends on preparedness and its efficiency. Early warning and forecasting of the hazard has been established by the Government of India for coastal hazards, and bulletins are issued at regular intervals and steps are taken to disseminate the information by various methods with media playing a pivotal role in the dissemination. The forecasting system for cyclone is robust and is possible with the help of satellite data supported by sophisticated network of equipment and tide gauges. The position and intensity of the cyclone and its possible track were analysed and bulletins were issued every 6 hours giving complete information on the cyclone, including wind speed and storm surge estimates.

The fishermen, port authorities, and coastal hamlets were issued the first advisory more than 48 hours in advance when the cyclone was few hundred kilometres from the coast. Most of the cyclones either move northwest or westward. Cyclones formed in the southern part of north Indian Ocean are more likely to make their landfall in pulicat lake of Tamil Nadu. The threat of cyclone hazard may continue even after landfall in the form of heavy rains that may extend for more than 48 hours. The coastal community in Tamil Nadu and the administration has enough experience to face cyclone hazard when a severe cyclone is set to make a landfall.

Recovery and Rehabilitation Services

Recovery of power supply was taken up on war footing. Power supply too many affected places was restored within a month. Additional technical manpower and materials were mobilized for restoration of electricity to all affected villages/consumers; however, it took longer in interiors. For a temporary period, telecommunication operators shared their infrastructure to provide mobile network and remove fallen trees. NDRF personnel, police, fire service were widely used; equipment, such as power saws, JCBs, and tipper Lorries, were mobilized from all over Tamil Nadu.

More than 16,000 people were evacuated from low lying areas as a result of Vardha. The Indian armed forces were kept on standby for any relief operations (http://www.hindustantimes.com/india-news/Vardha-makes-landfall-two-killed-in-tamil-nadu-life-thrown offgear/story-sT5AyIF3QIf0slBLZPc5dN.html). Two warships—INS Shivalik and INS Kadmatt—sailed out of Visakhapatnam to Chennai carrying medical teams, divers, inflatable rubber boats, an integral helicopter, and material, including food, tents, clothes, medicines, and blankets, to aid with relief efforts. Fifteen teams of the NDRF were deployed in various coastal regions.

The evacuation of fishermen from the hamlets Pulicat using transport by engaging 65 buses and 6 trips each from Pulicat to Ponneri town on the previous day of cyclone. Affected Pulicat area was divided into six zones and Indian administrative officers and Hon'ble Ministers were allotted to each zone along with extra work forces drawn from various connected departments from the state to rectify damages and replace the electrical water supply, telecom infrastructures. Besides health camps, free food delivery , special ration, free sarees and dhotis , compensations to the damages houses and cattles , compensation to the damages boats and fishing boat engines were done for two weeks after cyclone till their restore of normal life . Timely evacuation of the people from Pulicat and from nearby low lying areas to the safe relief shelters at Ponneri town arranged well away from the coastal area had prevented life loss and cattle loss during the course of ScS vardha . Disaster management plan and timely predictions and notifications from meteorological Dept. INCOIS, Ports monitoring systems, State Disaster department have helped the management of disaster meticulously.

Disaster Management Strategy

The coastal belt of Chennai is vulnerable to impact of cyclones and the vulnerability is increasing with urbanization, industrialization, and increase in tourism industry whose potential is not tapped fully. Any disaster management plan and developmental activities shouldtake into consideration vulnerability for natural hazards. Cyclones are more frequent in Chennai and Kanchipuram districts, and major cyclones occur at an interval of three to five years. Most cyclones are associated with heavy rainfall and consequent flood hazard. Cyclone damage details are presented in Table 1.

Remedial Measures

The intensity of hazard to any natural disaster increases with the size of development and population of a particular place. Chennai is one of the blooming sites of the nation in terms of development and employment opportunities. The natural increase in population and subsequent demand to infrastructures to accommodate the population exaggerates the vulnerable situation during hazard-prone seasons. As cyclones cause variety of damages to the living communities, certain precautionary measures can reduce the risk of the cyclone damages.

Buildings in vulnerable areas should be retrofitted to withstand the force of the wind, particularly public buildings, industries, coastal structures, and resorts. During Cyclone Vardha, mobile towers, transformers, and electric posts fell causing power outage and blocking the traffic. The design of the structures were not made taking into consideration wind speed. So, guidelines should be framed for design of the structures to withstand a possible wind with a speed above 250 kmph.

Cyclones modify structural components of trees, which include stripping of leaves from branches and breakage of branches, roots, and stems. Effects of cyclone on structure and production of forests are often species specific. Species may vary in their capacity to resist wind (resistance), offset the effects of injury (tolerance), and recover from injury (resilience). It is unlikely that any one taxon will display all three of these characteristics. This is because of site- and habitat-specific resource limitations, which will force a trade-off among them. Trimming and removal dead or weak branches will reduce the damage due to trees during cyclones.

Accommodation at shelters, forming bio-shields, drainage regulations, construction of homes at higher level with the ground floor not used for dwelling. Insurance cover for homes and belongings against damage and loss during disasters, early warning system, and proper dissemination of the threat, evacuation route, etc., are recommended for minimizing the disaster impacts.

Conclusion

The article details the SCS Vardha that brought heavy financial loss to the city of Chennai, which almost took a week to get back to normal. There are many possibilities of fall of cyclone on the city in the near future in the context of global warming and climate changes scenario. The present study presents the disaster action plans taken by the state with the advisory services provided by the IMD and how management actions are effective in reducing the risk of loss of life and property damage. The management action has to be improved in terms of reducing the economic loss by providing precautionary services to the public well before any development or extension plan in any part of the city.

The coastal belt of Chennai is vulnerable to the impact of cyclone and the vulnerability is increasing with urbanization, industrialization, and increase in tourism industry, whose potential is not tapped fully. Any disaster management plan and developmental activities should take into consideration increasing vulnerability for natural hazards. Cyclones are more frequent occurrence in Chennai, Kanchipuram, and Thiruvallur districts of Tamil Nadu, and major cyclones occur at an interval of three to five years. Most cyclones are associated with heavy rainfall and consequent flood hazard. Therefore, priority should be given to cyclone and flood hazard.

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