



NIVAR CYCLONE: ITS IMPACT ON ANDHRA PRADESH

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Abstract

Historical records show that the Bay of Bengal (BoB) basin, with the highest disaster and death tolls, had the most deadly cyclones. The North Indian Ocean has the largest number of tropical cyclones in this basin, and the frequency is almost five times greater than in the Arabian Sea (AS). The semi-enclosed structure of this basin, in combination with its funnel form, steers the cyclone path that hits the ground. The four maritime states located on the east coast of India are highly vulnerable to tropical cyclones. One of them, Andhra Pradesh has been exposed to frequent hydrological and meteorological hazards due to variations in the geographical and bathymetric characteristics like tropical cyclones generated by the Bay of Bengal. To reduce risk in coastal areas, understanding of hazard factors and threat risk levels is important. Five out of nine districts along the coastal Andhra Pradesh were slightly damaged and three districts (Chittoor, Kadapa and Kurnool) severely damaged due to cyclone Nivar. The state government has deployed eight NDRF and six SDRF teams in 4 districts and has been able to prevent much of the disaster by providing relief measures. Based on a preliminary assessment, 1.12 lakh people, more than 1,400 km of roads, 2,706 animals and crops on about 5 lakh acres were affected. The main objective of the paper is to discuss and analyze the impacts, mitigation measures and disaster management plan of the major disasters of Andhra Pradesh with a particular reference to the recent hit Nivar cyclone.

Keywords: Bay of Bengal, Nivar cyclone, Arabian Sea (AS), Wind, Hazard.

Introduction

The International Decade for Natural Disaster Reduction (IDNDR, 1992) defines a disaster as "a serious disturbance in the functioning of society, causing widespread human, material or environmental losses that exceed the capacity of the affected community to cope with its own resources only. A significant disturbance in the functioning of society, causing substantial human, material or environmental losses that surpass the capacity of the affected community to cope with only its own resources, is also classified according to the pace at which it occurs. Disasters are also categorised according to the speed at which they occur (natural or man-made). Every year, numerous meteorological, hydrological and climate-related natural disasters trigger major losses of life and disrupt economic and social growth. Large areas are made uninhabited due to climate and water-related disasters such as floods, storm surges and tsunamis. The financial losses caused by disasters are in the billions of dollars and are rising, according to Alexander^[1], and this increase is largely due to the increase in population density in coastal communities^[2]. The number of hazard-attributable deaths has halved in developed countries as warning systems and evacuation measures have been developed. As well as displacing large numbers of people, hurricanes and tornadoes can destroy homes and resources^[3]. Disasters such as floods, droughts and tropical cyclones can have significant ecological, epidemiological and secondary consequences^[4].

India is highly exposed to different natural hazards almost every year, leading to a major loss of life and property. These natural hazards are obstacles to the country's economic and industrial development, including earthquakes, extreme hurricanes, floods, droughts, landslides, avalanches, etc^[5]. Cyclone or hurricane disasters are among the main challenges that need to be addressed and managed effectively in order to achieve sustainable development and to alleviate poverty, especially in developing countries like India^[6]. Cyclone incidents can trigger one-third of the world's natural catastrophes. Cyclones and tropical storms have been the most costly threats worldwide over the last 100 years^[7]. In particular, tropical cyclones are the most destructive natural disasters, due to the loss of human life they inflict and the economic harm they cause^[8].

The eighth depression and fourth named storm of the 2020 North Indian Ocean cyclone season, Nivar originated from a disturbance in the Intertropical Convergence Zone. Nivar made its landfall over North Coastal Tamil Nadu between Puducherry and Chennai close to Mahabalipuram. Eight people were reported dead in Andhra Pradesh. The rainfalls made a significant impact on the districts of Chittoor, Prakasam, Kadapa and Nellore, 112000 people, 2,706 animals and crops on about 5 lakh acres were affected.

The paper on evaluating the socio-economic effects and government response to cyclone Nivar provide information for the key focus of this work. Two main categories of socio-economic damage caused by this cyclone which includes agricultural damage and loss of livelihood are spatially analyzed and explained about the effects of the tidal wave, gusty winds and rain across the delta. Finally, an assessment is made of the effectiveness of governmental and non-governmental disaster mitigation policies in cyclone-affected areas, including early warning measures, evacuations and "post-event" rehabilitation programs.



Objectives

- To see the impact of Nivar recent cyclone in coastal Andhra Pradesh and its mitigation measures taken by government.
- To assess the losses taken place in the selected districts of coastal Andhra Pradesh

Data and methodology

The methodology used in this study was the combination of descriptive and analytical. The secondary data was also including; those were available from different newspapers, bulletins, journals and published books. Furthermore, personal knowledge was used to make a meaningful interpretation of the data.

Analysis of Andhra Pradesh

As defined by the Indian Meteorological Department (IMD) in 1999, Andhra Pradesh has two meteorological sub-divisions, Coastal Andhra Pradesh (CAP) and Rayalaseema (RSM). The CAP consists of nine districts and is further subdivided into North Coast Andhra Pradesh (NCAP) and South Coastal Andhra Pradesh (SCAP) respectively to easily represent the climatic parameters of the Srikakulam, Visakhapatnam, Vizianagaram, East Godavari, West Godavari (NCAP) and Krishna, Guntur, Prakasam, Nellore sub-regions (SCP). The climate of Andhra Pradesh is normally graded as semi-humid and dry (NCAP) and receives total rainfall of about 1128 mm and 996 mm. Due to its different geo-climatic conditions, it has always prone to natural disasters. It has been made vulnerable to tropical cyclones by the physical geographic position of the state along the eastern coast of India. 44 per cent of the state is cyclone-prone. In the past century, the AP has been hit by 103 hurricanes and the coast between Ongole and Machilipatnam is extremely vulnerable to tropical waves.

History of cyclones in Andhra Pradesh

Cyclones often occur on the coasts of the Indian peninsula, i.e., the west coast (Arab Sea) and the eastern coast (Bay of Bengal). Yet the East Coast is one of the most cyclone-prone regions of the world. Each year, about eighty tropical cyclones (with wind speeds equal to or greater than 35 knots) form in the waters of the world. Around 6.5% of these are found in the Bay of Bengal and the Arabian Sea. The Bay of Bengal's share is about 5.5 percent since the frequency of cyclones in the Bay of Bengal is about 5 to 6 times the frequency of hurricanes in the Arabian Sea. One of the world's largest formation centres for tropical storms is the Bay of Bengal. Cyclones over the Bay of Bengal typically travel westward or northward and cross the east coast of India or Bangladesh. It brings heavy winds and high rainfall to the coastal area when this occurs, causing property damage and loss of life^[9]. The annual cyclone frequency reported along the Bay of Bengal is inevitably one of the four cyclones that cause human and property losses, such as Divi (1977), Kavali (1989), KKD (1996), Oghi (2006) Laila (2010), Nilam (2012), Phailin, Helen, Lehar (2013), Hud Hud (2014), Fani (2019) and BulBul (2019) are formed and caused damage in the Andhra Pradesh.

While the entire Andhra Pradesh coast has a coastline of 974 kms and is vulnerable to cyclones, storm surges, floods and drought. The coastal region as a whole is distributed over 92,906 Sq. kms. Cyclones are most vulnerable in the nine coastal districts (S P S Nellore, Prakasam, Guntur, Krishna, West Godavari, East Godavari, Visakhapatnam, Vizianagaram and Srikakulam) and have reported some levels of landfall in the last century.

History of Nivar cyclone

The third name to use in the new list is Cyclone Nivar, a name suggested by Iran. 'Nivar' means 'light' in Persian, as per sources. Nivar is set to be the first cyclone to strike Tamil Nadu after Gaja cyclone (November 2018). It crossed the Tamil Nadu coast near Puducherry as a 'very severe' cyclonic storm with wind speed of 120-130 kmph to 145 kmph on Thursday morning, November 26. In late November 2020, the very extreme cyclonic storm Nivar was a tropical cyclone that had severe effects on parts of Tamil Nadu and Andhra Pradesh. Nivar formed from a disturbance in the inter-tropical convergence zone, the seventh depression and fourth named storm of the 2020 North Indian Ocean Cyclone Season. Nivar made its landfall near Marakkanam in Tamil Nadu. On November 22, in the Bay of Bengal, off the coast of Tamil Nadu, an area of low pressure was formed. In the early hours of November 23, it intensified into a depression. On November 23, both the Joint Typhoon Warning Centre (JTWC) and the India Meteorological Department (IMD) announced the existence of a tropical depression. Both agencies upgraded the system to a tropical storm the next day with the latter giving it the Nivar name. It developed into a cyclonic storm in the early hours of November 24. Off the coast of Tamil Nadu, Pondicherry, Andhra Pradesh and Sri Lanka, the IMD issued cyclone warnings. It made landfall and hit the coast between Karaikal and Mamallapuram in Tamil Nadu and Puducherry at midnight on November 25 and it weakened the early hours of 27 November^[10].



Fig 1: The projected path of the system that is likely to intensify into a severe cyclonic storm. (Source: IMD)

Wind speed

In the tropical cyclones are natural hazards and are responsible for large-scale deaths and damage. The destructive factors associated with tropical cyclones are the extremely violent wind, heavy rains that cause floods and storm surges that cause coastal flooding and are responsible for the large-scale loss of life and property. Super Cyclonic Storm ≥ 222 km/h, Very Severe Cyclonic Storm 119 to 221, Severe Cyclonic Storm 89 to 118, Cyclonic Storm 62 to 88, Deep Depression 50 to 61, Depression 31 to 49 and Low-Pressure Area < 31 km/h are standards followed by the Indian Meteorological Department for low-pressure systems in the Arabian Sea and the Bay of Bengal adopted from the WMO (World Meteorological Organization) classifications. Cyclone Nivar is a very severe cyclonic storm, according to the India Meteorological Department (IMD), and its wind speed is 120 to 130 km/h and the lowest pressure was 980 hPa (mbar); 28.94 inHg^[11].



Fig 2: Banana crop destroyed by storm winds



Disaster mitigation strategies AP state government

Eight NDRF and six SDRF teams were deployed by the state government in the four districts to launch rescue operations. There were three teams in Nellore and 1 team in Chittoor. Three pre-positioned Visakhapatnam squads. A total of 22 teams on the field and 8 teams on standby, with a total of 30 teams committed. On November 26, under the influence of Cyclone Nivar, IMD issued a red alert for Rayalaseema alerting moderate to extremely heavy rains. INS Jyoti (navy ship) was deployed to cyclone in Visakhapatnam. Orange warning issued for south coastal Andhra Pradesh (orange alert indicates rainfall between 6 and 20 cm, red alert indicates moderate to very heavy rainfall of over 20 cm in 24 hours and yellow alert 6-20 cm of rainfall in 24 hours). People who live in vulnerable low-lying areas have been asked to switch to cyclone shelters. Zonal teams are placed in each block/panchayat, which can be mobilised to clear roads, set up electricity poles, etc. The District Magistrate of Andhra Pradesh's Nellore district announced that 3,363 people were housed in 115 relief camps^[12]. The health department has kept 465 ambulances in coastal areas on high alert for Cyclone Nivar. Meanwhile, two people stranded in the Mallimadugu reservoir near Renigunta in the district of Chittoor were rescued, as were 60 stranded in the local canal at Gudur Mandal village of Tippapadu in the district of Nellore. 223 relief camps have been set up by the authorities and 40,306 people have been evacuated and accommodated in camps, while 265 medical camps have been organised to provide health care. Rs. 2.50 crore was issued to the four districts as a temporary relief to discuss immediate relief work. For the affected persons accommodated in relief camps, special assistance of Rs 500 each was given.



Fig 3: Staff giving instructions to people in cyclone shelters

Andhra Pradesh Chief Minister YS Jagan Mohan Reddy held a virtual meeting over Cyclone Nivar with the collectors of the districts of Chittoor, Kadapa, Kurnool, Anantapuramu, Nellore and Prakasam. He spoke to Tamil Nadu CMs, Puducherry. On our eastern shores, a cyclone is active which will impact these states. Teams from GOI (Government of India) are involved and on the spot. The Centre and States work together, evaluating and saving lives is a priority.

Effect of Nivar Cyclone

Eight lives were claimed by heavy rainfall under the influence of the Nivar Cyclone Storm, including six in Chittoor and two in Kadapa, while four people were missing in the district. Based on a preliminary assessment, 1.12 lakh people were affected, 6,133 houses marooned, 2,294 houses/huts destroyed, 88 large animals, 2,618 small animals, 8,130 poultry birds killed, as the rainfall had a significant impact on the districts of Nellore, Prakasam, Chittoor and Kadapa. In 124 mandals, up to 1,597 villages/towns were affected, while six villages experienced flooding due to floods. Out of 126 mandals in Chittoor, Nellore, Kadapa and Prakasam districts, it flooded 973 villages in 105 mandals. In those areas, more than 1,400 km of roads were destroyed. 20 small water sources have been affected in Chittoor district, 14 in Nellore and one in Kadapa district. 10 km of roads, 12 km of sewers, 4.4 km of drinking water supply pipes and 400 street lights were damaged in the municipality in the district of Chittoor.



Fig: Andhra Pradesh State Agriculture Mission vice-chairman MVS Nagi Reddy inspects paddy fields.

10 districts have been hit hard by Hurricane Nivar in the state. By the preliminary State records of Agriculture and Horticultural Department, 3828 hectares of paddy at transplantation stage, 3,23,734 hectares of paddy, 42,112 hectares of black gramme, 7,680 hectares of tobacco, 20,750 hectares of cotton, 62,598 hectares of bengal gram, 7,909 hectares of brinjal and 1,300 hectares of horticultural crops were damaged in 6600 villages 449 mandals of 13 districts. Chief Minister YS Jagan Mohan Reddy conducted an aerial survey of the areas affected by the heavy rains caused by the cyclone.

He declared that he would pay an input subsidy for crop losses for November and December. In addition, the government of the state agreed to procure cotton and groundnut^[13]. Cage culture units at the Annamayya reservoir in the Kadapa district and farms in the Prakasam district have been flooded in the fisheries department, causing an estimated loss of Rs 51.15 lakh. The damage and loss of infrastructure to departments such as roads and buildings, water supplies, municipal administration, electricity, panchayat raj, rural water supply, handlooms and textiles are estimated at Rs. 56,993.31 lakh for temporary and permanent reconstruction works^[14]. A report has been submitted to the government that it would cost Rs 5.07 crore due to the Nivar storm to restore power supply in Nellore, Kadapa and Chittoor districts. Officials said that in three districts, 151 special teams were deployed. 33 KV feeders 261, 11 KV feeders 1,029 and distribution transformers 1238 were destroyed by the Southern Power Company. 60 street lights were damaged in Prakasam district. In Nellore district, 629 power poles dropped, 259 in Kadapa and 95 in Chittoor.

Disaster management plan

Better use of the available channels of communication by the revision of current procedures. Plans to be ready for evacuation by focusing on villages that are inaccessible in affected areas for the spread of warnings when the storm route is changes. Increase the level of consciousness of officials and the public. Increase the ability of the villages affected to receive alerts over and above the distribution through the revenue channel through other media outlets. Emergency shelters should be adequately maintained and more shelters should be allocated in the future for the purpose of cyclone shelters while new shelter buildings should be constructed in disaster-affected areas and more funds should be allocated to these buildings for additional safety measures. In order to carry out disaster relief operations efficiently and effectively, political commitment and rapid decision-making are required.

Conclusion

The current research study aims to generate up-to-date information on disaster usage and procedures for coastal risk management. In order to analyse the occurrence, severity and impacts of the natural hazards affecting the coastal Andhra Pradesh, the current research systematically examines existing literature. The storm management in Andhra Pradesh has been organised and implemented with the commitment by all the participants involved in the various activities in view of the pre-and post-storm impacts. The damage was assessed swiftly. In the districts of AP, Chittoor, Nellore, Kadapa and Guntur were most affected by the cyclone. The government is taking action and offering rapid assistance to relief efforts in rain-affected areas notified authorities. However, before danger can arise, further consideration is needed and sufficient funding should be allocated for this reason. Monitoring of mitigation and cyclone relief funds should be undertaken in a consistent manner due to different disasters and there is a need to increase the cost of cyclone relief wherever possible. It is also recommended to promote shelterbelt planting along the coast to minimise wind speeds as part of protective measures and to enable farmers to grow disaster-resistant crops.



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