

MODELLING OF STORM SURGE INUNDATION USING MIKE21 HD MODEL ALONG THE COAST OF NORTH TAMILNADU

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Abstract-

A storm surge is a coastal flood or tsunami like phenomenon of systems. The severity of which is offered by the shallowness and orientation rising water commonly associated with low pressure weather of the water body relative to storm path, and the time of tides. This study is an attempt to assess the storm surge inundation along the north coast of Tamil Nadu (Chennai, Cuddalore, and Nagapattinam). Storm surge causes the severe damage to the infrastructures, human life, and agricultural fields. The storm surge is simulated by means of MIKE 21 HD flow model for various storm events along the study area. Mapping of coastal inundation hazard related to storms require a combination of multiple source of information regarding meteorological, morphological, and dynamic characteristics of study area at risk. Variable parameters such as wind speed, central pressure have been used. In this research, high resolution satellite data was used to create a DEM. Arc GIS is used for data preparation, integration, and analysis purposes. Based on the research outcome of storm surge inundation area, the people can be evacuated from vulnerable zone to a safer zone.

Keywords - Storm Surge, Inundation, Vulnerable, DEM, Hydrodynamic Model

I. INTRODUCTION

1.1 GENERAL

Approximately two third of world population, lives in the coastal region. Hence proper safety systems have to be put in place to safe guard the human life and their properties and other social cultural resources. Today the world face many disasters, like Storm surge, earthquake, volcanic eruption, landslides, snow avalanche, flooding. In this study the inundation of coastal areas due to storm surges are analyzed.

Atmospheric disturbance in the form of regions of low pressure over tropical oceans, sometimes intensity form in to nearly circular low pressure areas surrounded by regions of extremely strong winds. They are the tropical cyclones and are commonly referred to as cyclone storms or storms. These storms are large vortices in the atmosphere extending from 100 to 1000 km in the horizontal direction with strong winds spiraling around a central low pressure area called the eye of the cyclone. From the eye, a calm zone at the centre of the cyclone, the wind speed increases rapidly to a maximum value and then decays slowly towards the storm periphery. When a storm approaches a coast from the ocean, the onshore winds to the right of the storm path force the water towards the coast causing a rapid rise in the sea level, while the offshore winds to the left, force the water away from the shore causing a decrease in the sea level. This rapid sea level rise in the near shore region, known as the storm surge and the high waves induced by storm destroy coastal marshes, erode the shore line, flood the low lying areas and increase the salinity of estuaries, bay and aquifers along the coast. Most of the damages caused to life and property in the coastal region during a storm are mainly due to the storm surge flooding the populated low lying areas the coast. The Bay of Bengal is one of the favored ocean basins for the transformation of regions of low-pressure in the atmosphere at the ocean surface into cyclone storms. Due to this, storms and surges are frequent along the coastal regions surrounding this bay. Between the years 1891 to 2011, the Bay of Bengal has generated about 400 cyclonic storms with different degrees of intensity. The effects of these storms are more pronounced in the states located on the East coast of India i.e., West Bengal, Orissa, Andhra Pradesh, and Tamil Nadu. Table 1.1 shows the various cyclone categories.