

ASSESSMENT OF TIDAL FLOOD VULNERABILITY OF PUTHENVELIKARA PANCHAYAT

Shafna K J¹, Akshay Murali², Akhina Ravindran³, Meghna K R⁴, Sreelakshmi K J⁵

¹Assistant Professor SNMIMT Engineering College, Malianakara, Paravur, Kerala

^{1,2,3,4,5} UG Student SNMIMT Engineering College, Malianakara, Paravur, Kerala

Abstract

Puthenvelikara is located in Ernakulam district of Kerala which is frequently a victim of the heavy rainfall and tidal flooding since it is surrounded by rivers like water bodies. Undoubtedly, saline water intrusion is an after effect of tidal flooding even if it badly attacked the region many times, not considered as disaster by the government. So the predominant focus of this study is to identify the most vulnerable part of the region by weighing all the negative impacts that happened there so far as well as to propose the mitigation measures on this considering all the factors.

Key words: Puthenvelikara, Tidal flooding, Water bodies, Saline water intrusion, Mitigation measures

1. INTRODUCTION

On 16 August 2018, severe floods affected the south Indian state Kerala, due to unusually high rainfall during the monsoon season. Puthenvelikkara is an estuary situated in Ernakulam district of central Kerala in India, which is occasionally affected by heavy rainfall and tidal flooding and is surrounded by water bodies such as rivers and lagoons. The panchayat is badly hit by saline water intrusions during tidal flooding as well though it has never been recognized by the government as a disaster. Tidal flooding is a problem that the people of Puthenvelikkara have been facing for years. For the past three years this issue has reached its peak. The flood situation in Puthenvelikkara has worsened following the 2018 floods. Most severe flood event was also occurred in 2018, so that Puthenvelikkara panchayat has embarked on a detailed scientific survey for drawing up a disaster mitigation plan. Flooding or salt water intrusion has affected the drinking water, housing, agriculture, livelihood, transportation, social and cultural activities in that area. Greatly amplified flooding effects can be caused by normal rainfall and also petite surge storms. One passive solution to intrusion through drainage systems are one way back-flow Valves in drainage ways. However, while this may prevent a majority of the tidal intrusion, it also inhibits drainage during exceptionally high tides that shut the valves. While North Paravur in general was badly affected in the floods, Puthenvelikkara being the confluent point of Periyar and Chalakudy rivers was among the worst hit. The main canals located in Puthenvelikkara are Company Canal, Akathuchal Canal & Athirathi Canal. Also flooding now occurs with high tides in many locations due to climate-related sea level rise, land subsidence, and the loss of natural barriers. Identification of the most critical portion of the panchayath as well as mitigation measures to narrow down the negative effect of tidal flooding are the predominant focus of the current study.

1.1 Objectives

- To study the effect of natural and artificial barriers at shore areas including mangrove forests, lagoons and tide gates.
- To identify and analyze the geographical features of shorelines of Puthenvelikkara panchayat.
- To prepare DEM of Puthenvelikkara panchayat
- To analyze the effect of celestial bodies on tidal flooding in Puthenvelikkara panchayat.
- To understand the necessity of proper watershed management in flooded area.
- To identify the drawbacks of unorganized coastal development and land use.

1.2 Study area

Puthenvelikara is situated in Ernakulam district of central kerala in india. The village is 29 km north of kochi and 21 km west of the Cochin International Airport. The territory of puthenvelikara covers an area of 19.87 km². Puthenvelikara shares it's borders with poyya and methala villages in the North, karumalloor and kannukara villages in the south, parakkadavu, kunnukara and kuzhur villages in the East, and chendamangalam, vadakkekkara and methala villages in the west. The village is between latitude 10.1847° N and longitude 76.2421° E. The boundaries of puthenvelikara are shared by rivers and lagoons. The chalakudy river merges with the periyar river at Elenthikara in the village of puthenvelikara. It is on the banks of the river periyar, chalakudy and kottapuram lagoon. The provices or wards such as kurisingal, kurumbathuruth, Thuruthipuram, Thuruthur, Panjipalla, Manancherikunnu, karottukara, vattekkattukunnu, keezhupadam, kodikuthiyakunnu, Elenthikara, kanakkankadavu, cherukadappuram, Thelathuruth, kozhithuruth, chowkakadav, malavana, station kadav and some small island, together form the village of puthenvelikara. Main canals in puthenvelikara include Company canal, Athirthi canal (Thiruthipura- vellottupuram) and Akathu chal canal. These are the three main canals that are associated with salt water intrusion. Company canal is located in the low lying areas. This canal is the main canal which cause tidal flooding in the low lying areas near it. This canal is located near ward 16 of puthenvelikara panchayat.

2 METHODOLOGIES

- DATA COLLECTION
- DATA ANALYSIS
- MAPPING USING QGIS
- SHAPE FILE
- DETECTION OF TIDAL FLOOD

2.1 Data collection

Data collection includes collecting the Location details, Basic details, flood details including tidal flood details, drainage details, etc. All these informations are collected by questionnaire survey using ZOHOO FORMS.

Basic details includes the details like name ,ward number, house number, and contact number of the residents of the region. Location Details includes taking the latitude, longitude of each house being surveyed. Salt water intrusion is a major problem faced by the people of Puthenvelikara so the tidal flood details are taken. Tidal flood details are taken by measuring the tidal flood level from ground level.

2.2 Data Analysis

Data Analysis is done to extract useful information from collected data. In this study, based on the analyzed data the tidal flooding or salt water intrusion in Puthenvelikara began to increase after the 2018 flood. A total number of 293 houses were surveyed from wards 15 & 16 of Puthenvelikara. Among the wards surveyed, the highest number of houses affected by tidal flooding was in the 16th ward as compared to the 15th ward. Most of the houses in the 16th ward were facing many difficulties due to tidal flooding or salt water intrusion. It has affected the drinking water, housing, agriculture, livelihood, transportation, social and cultural activities in that area. Height of flood water is more during full moon days and the maximum tidal flood level observed is 90 cm. Here the main reasons that cause tidal flooding are,

- Celestial effect
- Blocked drainage

- Houses surrounded by streams
- High intensity of rainfall

3 RESULTS AND CONCLUSION

From the survey so far conducted we came to a conclusion that the ward 16 is more vulnerable compared to ward 15. The maximum height of the tidal flood level till now is observed to be 90cm which is also from ward 16.

Maximum height of tidal flood level from ground level – 90 cm

Latitude – 10.20027

Longitude -76.22469

Minimum height of tidal flood level from ground level – 2 cm

Latitude – 10.20097

Longitude – 76.22284

The Map below shows the tidal flood levels of different areas among ward 15 & 16 of Puthenvelikara panchayat. We have divided the maximum height (90 cm) into three different units ranging from 0-30, 31-60, and 61-90 and the levels for each are marked by different colors, which makes it easier to differentiate least and highly affected areas.

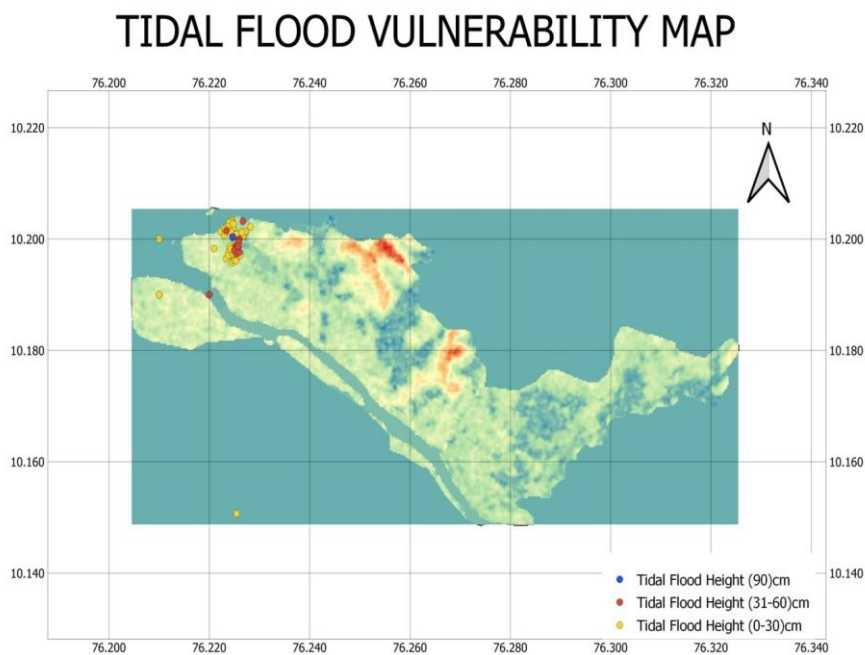


Fig 1 Tidal Flood Vulnerability Map

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