

# Demarcation of Tidal Flood Affected Areas in Puthenvelikkara Panchayat

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**Abstract** - Demarcation is the act of creating a boundary around a place or thing. A tide survey has to be carried out to demarcate the tidal flood affected areas in Puthenvelikkara panchayat. Tidal flooding is among the most tangible present-day effects of global sea level rise. Using localized sea level rise projections based on the Low tide and, High tide, we then determine the frequency and extent of such flooding at these locations. Tidal flooding usually occurs through the combination of winds, offshore storms, and full moon cycles during high tide events such as full moons and new moons. As relative sea level increases, it no longer takes a strong storm or a hurricane to cause coastal flooding. Flooding occurs at high tide in many locations due to climate related sea level rise, land subsidence, and the loss of natural barriers. Tidal flooding is among the most tangible present-day effects of global sea level rise. The tidal flood affected areas has been identified by the local survey. The data and information required for flood stimulations by the modeling tools were collected from various existing sources including the relevant department, regional global data basis. Tidal flooding is capable of majorly inhibiting natural gravity-based drainage systems in low-lying areas when it reaches levels that are below visible inundation of the surface, but which are high enough to incapacitate the lower drainage or sewer system. With higher sea levels, local flooding thresholds can be reached more easily during average high tides. Coastal cities are particularly vulnerable to flood under multivariable conditions, such as heavy precipitation, high sea levels. The satellite images of the project area are interpreted for topographic and geomorphic features in the vicinity of the proposed project site. In the absence of coastal adaptation measures to protect against rising seas, some coastal areas could fall below the high tide line. Before that permanent inundation occurs, however, unprotected coastal areas could experience more frequent flooding with high tides.

**Key Words:** (demarcation<sup>1</sup>, tidal flood<sup>2</sup>, high tide<sup>3</sup>, inundation<sup>4</sup>)

## 1. INTRODUCTION

Tidal flooding is the temporary inundation of low-lying areas, especially streets, during exceptionally high tide events, such as at full and new moons. The highest tides of the year may be known as the king tide with the month varying by location. These kinds of flood tend not to a high risk to property or human safety, but further stress coastal infrastructure in low lying areas. This kind of flooding is becoming more common in cities and other human-occupied coastal areas as sea level rise associated with climate change and other human-related environmental impacts such as coastal erosion and land subsidence increase the vulnerability of infrastructure.

Demarcation is the line of rule that shows the limit of something or how things are divided. Demarcation of high tide level and low tide level will be undertaken one of the agencies authorized by coastal zone management. Local level coastal zone management map on cadastral scale, are for the use of local body and other agency to facilitate implementation of the coastal regulation zone. High tide level and low tide level are adopting different methods resulting in some variation in the accuracy level.

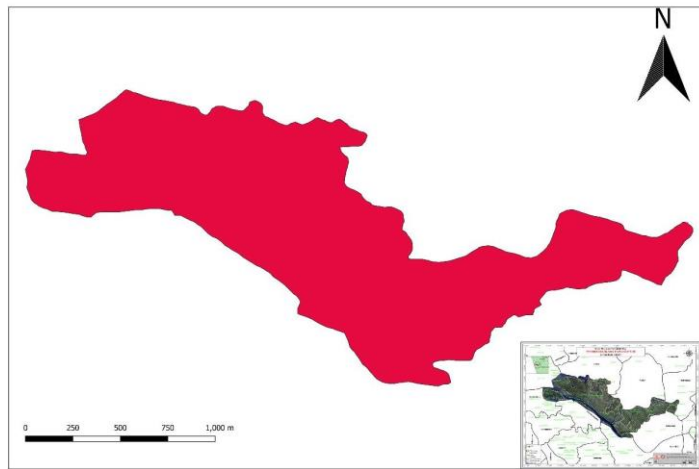
A coastline or a sea shore is the area where land meets the sea or ocean. A precise line that can be called a coastline cannot be determined due to the coastline paradox. The exploratory surveys of coastlines of India are carried out by mariners by sketches and notes prepared by the land travellers and observations from the ships plying along the coastline which is time consuming. About 60 percent of the world population lives near the coast and in one way or the other depends directly or indirectly on the coastal zone and its resources.

### 1.1 DIGITAL ELEVATION MODEL

A digital elevation model (DEM) is a 3D computer graphics representation of elevation data to represent terrain, commonly of a planet, moon, or asteroid. A global DEM refers to a discrete global grid. DEMs are used often in geographic information systems, and are the most common basis for digitally produced relief maps.

While a digital surface model (DSM) may be useful for landscape modelling, city modelling and visualization applications, a digital terrain model (DTM) is often required for flood or drainage modelling, land-use studies, geological applications, and other applications, and in planetary science

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**1.2 MATERIALS AND METHODS**

Landsat spatial data pertaining various years are processed using models to improvise the accuracy of shorelines to be delineated which are further to be passed into DSAS module for categorization. The instantaneous shoreline was obtained from the available imageries by performing Tasseled Cap Transformation which is a common technique of data transformation for classification purposes and Normalized Difference Moisture Index which segregated the available imagery into land and sea. The shoreline obtained by this method is digitized carefully and it is passed as input vectors to DSAS module with suitable parameters for spacing and length of transects to be generate

**1.3 OBSERVATION**

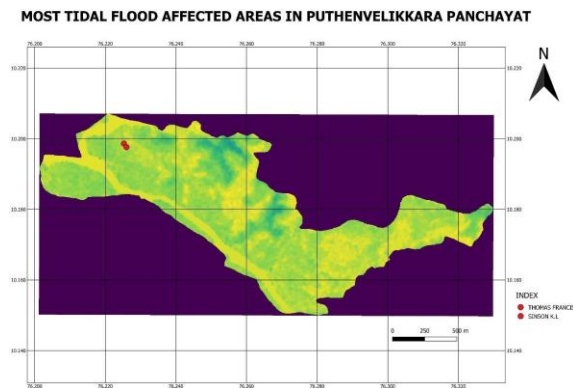
As per the survey conducted for tidal flood survey to understand the amount of tidal flood water entering the Puthenvelikkara Panchayat. The survey was conducted from 27<sup>th</sup> to 30<sup>th</sup> of April. As we know that 27<sup>th</sup> is supermoon the amount of tidal flood water entering would be more compared to other ordinary days of the month. The recorded details of the survey have been tabulated in the form of a table.

<b>Tidal Flood Survey Details of April</b>	<b>Tidal Flood Survey Details of May</b>
1. On 27 <sup>th</sup> tidal flood water enters at 12pm at maximum height of 35cm and the minimum height obtained is 3cm.	1. On 26 <sup>th</sup> tidal flood water enters at 2.30pm at maximum height of 45cm and the minimum height obtained is 3cm.
2. Meanwhile on 28 <sup>th</sup> tidal flood water enters at 12pm at maximum height of 35cm and the minimum height obtained is 2cm.	2. Meanwhile on 27 <sup>th</sup> tidal flood water enters at 1.30pm at maximum height of 45cm and the minimum height obtained is 3cm.
3. When it comes to 29 <sup>th</sup> tidal flood water enters at 12pm at maximum height of 60cm and the minimum height obtained is 2cm.	3. When it comes to 28 <sup>th</sup> tidal flood water enters at 2.30pm at maximum height of 45cm and the minimum height obtained is 4cm.
4. On the 30 <sup>th</sup> tidal flood water enters at 1pm at maximum height of 60cm and the minimum height obtained is 5cm.	4. On the 29 <sup>th</sup> tidal flood water enters at 11.30am at maximum height of 10cm.

**2. RESULT**

As per the survey conducted in Puthenvelikkara Panchayat, we had obtained two tidal flood survey details which contains the max tidal flood water entering the house with the time. In order to analyze the exact tidal flood affected area, we compared both the details with the maximum height and time. From the comparison we could found out that 2 houses were mostly affected by

the tidal flood. By making a call to these respective houses we could conclude that they both reside in Vellotupuram of Puthenvelikkara Panchayat. Hence, we can conclude that Ward 16 of Vellotupuram is the most tidal flood affected area in Puthenvelikkara Panchayat. Hence, we demarcate that Vellotupuram of Puthenvelikkara Panchayat is the most tidal flood affected area. Based on our conclusion we have located the respective houses on the map which is situated in Vellotupuram and has been marked as the most tidal flood affected area in Puthenvelikkara Panchayat



**Fig -1:** most tidal flood affected areas in puthenvelikkara panchayat

The above figure represents the tidal flood affected areas in Puthenvelikkara Panchayat. Specific colour are provided which represent the height of tidal flood water entering the house. Green colour indicate that the tidal flood water entering the house is in the range 0- 14cm. Yellow colour indicate that the tidal flood water entering the house is in the range 15-29cm. Orange colour indicate that the tidal flood water entering the house is in the range 30-44cm. Red colour indicate that the tidal flood water entering the house is in the range 45-60cm

### 3. CONCLUSIONS

Tidal flooding usually occurs through the combination of winds, offshore storms, and full moon cycles during high tide events such as full moons and new moons. At-risk areas can experience this flooding multiple times a year. As per the survey, Puthenvelikkara is taken into consideration due to high rise in tidal flood. Puthenvelikkara is on the banks of the river Periyar, Chalakudy and Kottapuram lagoon. This project was undertaken in order to provide the tidal flood details experiencing multiple times a year. In the end, we came to identify the high lying and low-lying areas that were severely affected by tidal flood in Puthenvelikkara Panchayath.

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