



## **Analysis and Assessment of Tidal Flood Potential at Different Locations in the East Coast of India**

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Sea water inundation has always remained a major problem for human civilization in coastal regions. Increase in the frequency of severe to very severe cyclones in Bay of Bengal has made the Eastern Coast of India highly vulnerable for sea water inundation. Tidal effect has a significant contribution to coastal inundation. Wood (1976) proposed a Combined Astronomical Meteorological Index (CAMI) to quantify the risk of tidal flooding due to astronomical tides as well as meteorological parameters. This study deals with the analysis of major tidal components and the changes in sea level as observed from the tidal gauge records of Visakhapatnam, Chennai and Ennore situated in the East Coast of India. The study envisages to analyse (1) tidal characteristics observed at different stations by using Harmonic analysis, (2) to synthesise the missing tidal information using Artificial Neural Network (ANN) and wavelet analyses, (3) to quantify the diurnal as well as seasonal trends in sea level, and (4) to assess the tidal flooding potential at the sites by using the CAMI under different meteorological conditions. The harmonic analysis of Visakhapatnam, Chennai and Ennore shows that Principal Lunar Semidiurnal (M<sub>2</sub>) is dominant tidal constituent in all three stations. The Form Number (FN) obtained for Visakhapatnam (17.69N 83.27E), Chennai (13.08N 80.29E) and Ennore (13.25N 80.33E) are 0.14, 0.29 and 0.33 respectively. FN of these stations indicates semidiurnal nature of tide in Visakhapatnam and mixed tide in Chennai and Ennore. The monthly fluctuations of sea level in Visakhapatnam from January to July 2014 show that the sea level tends to decrease at a rate of 0.2 m from January to March and then it starts to rise upto May with a similar rate. The network prediction finds high correlation ( $R=0.9684$ ) between the observed and the target values of ANN. Finally, we also assess the coastal vulnerability by tidal flooding at the time of perigean spring tide based on the sea level trend and the astronomical parameters combined with various meteorological parameters and conditions during extreme weather events.