Abstract: Mahanadi delta, the second largest delta in the Indian subcontinent is gradually losing its coastal lands mainly due to sea-level rise and erosion. To comprehend the coastal dynamics of the delta and to forecast the future, Digital Shoreline Analysis System (DSAS) coupled with Fractal Dimension Index (FDI) have been used on the historical shorelines. From 1990 onwards, the historical shorelines of the delta have been extracted from the satellite imageries using semi-automated classification technique. The historical shoreline alteration trend has been calculated using Endpoint Rate (EPR) method. The shoreline for a year whose position is known is calculated from the previous two years' data and the value is compared with the actual position. The rate of change in position is modified accordingly to reflect this difference and it is used to predict the future coastlines. FDI of the historical shorelines of the delta have been calculated, an empirical relation with FDI and the rate of erosion has been established. From this the future trend of the coastline derived from EPR method have been validated. Using EPR, shorelines of the Mahanadi Delta have been predicted for the 2040. The result shows significant loss of area near Puri, Konark, Saharanathi, Nagpore, Utamapur.

Key Words: Digital Shoreline Analysis System (DSAS), Fractal Dimension Index (FDI), Erosion, Endpoint Rate (EPR), Mahanadi Delta

Conclusion: Future coastline position has been predicted by the analysis of historical data using EPR method. Historical data extracted from satellite imageries dating 1990, 1995, 2000, 2006, 2010, and 2015. Subsequently, FDI of the coastline is calculated for the purpose of validation of the EPR results. It is found that for FDI > 1.34 shows erosion; for FDI between 1.1 and 1.3 the coastline remains unaltered and for FDI < 1.1 erosion takes place. The predicted coastline of 2040 has been validated with the range of FDI.