The research work has utilized Remote Sensing and GIS techniques for assessing vulnerability of the Gujarat coast due to predicted sea level rise. Multi-sensor satellite data has been interpreted using on-screen visual interpretation techniques to generate coastal thematic information followed by ground truth data collection and validation. Geospatial models for carrying out regional coastal vulnerability assessment of the entire Gujarat coast on 1:50,000 scale and for selected five coastal sectors representing diverse coastal characteristics were taken up for Integrated Coastal Vulnerability assessment on 1:25,000 scale. A new approach of integrating physical and socioeconomic variable has been developed and demonstrated in GIS environment.

Coastal Vulnerability Index (CVI) has been computed for entire Gujarat coast based on integration of five physical variables viz., coastal geomorphology, coastal slope, rate of shoreline change, mean spring tide range and significant wave height in GIS environment. The CVI analysis resulted into total 1248 segments of the Gujarat coast with CVI values ranging from 31 to 74 indicating vulnerability of the coast to predicted sea level rise (lower value represents lower vulnerability and higher value represents higher vulnerability). The CVI values were utilized to categorize the entire Gujarat coast into four risk level classes.

The results show that 785 km (45.67 %) of the Gujarat coast is under high to very high risk category and 934 km (54.33 %) of the Gujarat coast is under Moderate to Low risk category due to the threat of predicted sea level rise.

The area under very high risk category are along north-western parts of the Gulf of Khambhat for the sector between Bhavnagar-Dholera-Khambhat, the northernmost parts of the Gulf of Kachchh for the sector between Navlakhi-Maliya-Gandhidham and western parts of the Kachchh coast for the sector between Jakhau-Ramwada. The area under high risk category are along the coastal region of Central parts of the Gulf of Kachchh viz. Mundra – Gandhidham sector on the northern parts of the Gulf of Kachchh and Jamnagar-Jodiya sector on the southern parts of the Gulf of Kachchh. The entire southern parts of the Saurashtra coast,
region between Jakhau-Mandvi along south-western parts of the Kachchh coast and small, isolated segments along eastern parts of the Gulf of Khambhat coast are under low risk category and rest of the Gujarat coast is under Moderate category of risk due to predicted sea level rise.

Detailed analysis for five coastal sectors representing diverse coastal characteristics were taken up for Integrated Coastal Vulnerability assessment on 1:25, 000 scale based on both physical and socio-economic vulnerability analysis. The integration of physical and socioeconomic variables have made it possible to assess the coastal vulnerability more realistic for prioritising the coastal segments for planning remedial actions while preparing integrated coastal zone management plans. The major parameters affecting vulnerability are slope, population density, landforms and land use / land cover.

The approach developed for assessing vulnerability of the coast to predicted sea level rise using remote sensing and GIS techniques can be used effectively by coastal managers and decision makers to devise better coastal zone management plans as well to ensure efficient mitigation measures to minimize the losses due to possible impact of predicted sea level rise.