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Departmental Seminar

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Seminar Title	: Conference Return Seminar : Long- and Short-Term Shoreline Changes of Puri Coast, Odisha (India): Impacts of Natural Processes and Human Activities Through Remote Sensing and Statistical Analysis
Speaker	: Debabrata Mishra
Supervisor	: Dr. M. Gattu
Venue	: CE Seminar Hall
Date and Time	: 30 Dec 2024 (1000 am)
Abstract	: India's coastal regions, including Puri district in Odisha, are characterized by dense populations and biologically productive ecosystems, but they face significant threats from erosion, natural disasters, and human activities. This study investigates the long- and short-term shoreline dynamics along the Puri coast over the past 30 years (1990–2020) using multi-temporal Landsat satellite imagery (TM, ETM+, and OLI) and statistical methods such as Endpoint Rate (EPR), Linear Regression Rate (LRR), and Weighted Linear Regression (WLR). The long-term assessment reveals an average shoreline accretion rate of 0.43 m/year, with mean accretion and erosion rates of 1.28 m/year and 1.74 m/year, respectively. Coastal erosion was predominantly observed in the northern parts of the Puri coastline. Short-term analysis identified cyclic patterns of accretion (1990–1995 and 2000–2005) and erosion (1995–2000 and 2010–2015), correlating significantly with severe cyclone landfalls. These cycles consist of three distinct phases: erosion, accretion, and stabilization. The findings underscore that shoreline changes are driven by both natural factors, such as tropical cyclone landfalls, and human interventions, including coastal infrastructure development, encroachments in regulated zones, and upstream dam construction. Future shoreline impacts were also evaluated using EPR and LRR techniques to project changes by 2050. Population density and household projections were calculated using geometric and arithmetic growth methods, respectively, and integrated with predicted shoreline conditions to assess erosion risks. Results indicate substantial erosion threats by 2050, potentially impacting a significant portion of Puri's coastal population. Risk maps highlight areas of high vulnerability, emphasizing the urgent need for adaptive strategies to mitigate erosion impacts exacerbated by climate change. This research provides critical insights for policymakers and coastal managers to develop sustainable measures for protecting vulnerable coastal communities while monitoring dynamic ecosystem boundaries. Furthermore, the use of open-source satellite data and statistical methods demonstrates a cost-effective approach for shoreline monitoring and vulnerability assessment.