

Assessment of Vegetation Changes and Seawater Intrusion in the Lower Bentota Ganga Sub River Basin: A Study of Land Use and Land Cover Change

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Abstract

The Lower Bentota Ganga sub-river basin faces challenges associated with both Land Use and Land Cover changes (LULCC) and seawater intrusion (SWI), impacting environmental sustainability and community livelihoods. This study investigates these issues using a multi-method approach. The primary objectives were to analyze historical LULCC and to understand community experiences of these changes. Landsat images were analyzed and classified using satellite imagery from 1988 to 2022 using ArcGIS Pro, to determine changes in LULC. A questionnaire survey was conducted among 150 respondents in key locations identified through the image classification, offering qualitative insights into the community's experience of LULCC and SWI impacts. 135 groundwater samples were taken around the region to determine electrical conductivity (EC) and geographic changes in salinity levels. The study reveals significant alterations in the landscape between 1988 and 2022. A notable reduction in vegetation cover was observed, alongside a rise in built-up and barren land, while water bodies remained relatively stable. A questionnaire survey provided valuable insights into the adverse effects of SWI on daily activities and local livelihoods, with respondents reporting increased salinity in groundwater affecting household and agricultural activities. These perceptions were corroborated by EC measurements, which showed significant spatial variation in salinity levels, particularly near the estuary and upstream areas. The study provides critical insights into LULCC and SWI in the Lower Bentota Ganga sub-river basin by integrating community insights with remote sensing (RS) and geographic information system (GIS) data. The findings emphasize the need for targeted interventions and ongoing monitoring to mitigate the impacts of these changes effectively and efficiently. This underscores the need for improved maintenance of floodgates and seawater exclusion structures and greater community involvement in land use planning. The study highlights the importance of addressing environmental challenges in coastal regions to develop effective sustainable development and environmental management strategies.

Keywords: *Land use and land cover changes, Seawater intrusion, Geographic information systems, Lower Bentota ganga sub-river basin, Community experiences*