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## Detection of land use-land cover changes in Anzali Wetland using a remote sensing-based approach

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Wetlands are valuable ecological resources which play an essential and important role in the ecosystem of the region. Hence, there is a crucial need for monitoring and characterization of wetland changes caused by natural and anthropogenic disturbance. In this study, we developed a remote sensing-based approach to investigate long term land use/land cover changes (LULC) of Anzali Lagoon located in the southern coast of the Caspian Sea. In recent years, Anzali Wetland has experienced severe threats by human- and climate-induced changes and is drying up at an alarming rate. Here, an enhanced LULC change detection method is presented using a seasonal harmonic analysis of satellite image based on Normalized Difference Vegetation Index (NDVI) that combined with remotely-sensed thermal observations. Machine learning and object-oriented approaches were implemented on high-resolution satellite images to obtain a comprehensive land-use classification map of the study area. Then, wetland vegetation changes, such as marshes, were investigated during 2013 to 2020. Additionally, the long-term sea level trend in Caspian Sea was used, along with groundwater storage changes derived by GRACE satellite data, to study their impacts on wetland ecological changes. Results of the developed hybrid model indicate that the western and central parts of the wetland are more subjected to drought stress. Moreover, spatial and temporal changes in density of aquatic plants related to external stressors were identified in the wetland. The results of this study enhance a better understanding of long-term LULC changes in coastal wetlands in response to climate changes and anthropogenic activities.