Impacts of natural- and human-induced disturbances on Estuarine Wetland Ecosystems: Case study from Grand Bay National Estuarine Research Reserve (NERR), Mississippi, USA

Estuarine wetland ecosystems serve many ecosystem products and services. Their role as future terrestrial carbon sinks however, remains at very high significance largely due to their very high rates of carbon burial and sequestration rates. Their ecological health is however, closely tied to surrounding watersheds and is strongly affected by increasing levels of anthropogenic activities and climate change impacts, in particular to sea level rise and wetland conversion to industrial and domestic uses.
This study aims to understand impacts of natural and human-induced disturbances on wetland LULC changes of the Grand Bay NERR, Mississippi, USA. Specific objectives were to: 1) evaluate and quantify LULC changes within estuarine wetland extent and its immediate surrounding from 2001 to 2015; 2) understand if the changes observed were due to the errors associated with classification algorithms and/ data rather than actual change on ground; and 3) to evaluate the impacts of shoreline change (as affected by rising sea levels and shore line erosion), and increased human disturbances (as reflected in upland LULC conversions) on the changes in wetland LULC.
We applied a remote sensing based LULC change modelling approach using medium- to very high-resolution remote sensing data (Landsat and Worldview 3 data, respectively). LULC maps were verified using ground observations and were used to derive LULCC maps that we used to map and evaluate spatial extents of the changes in each LULC class.
Findings of LULCC analyses show significant changes in both estuarine wetland and upland landscapes and thus, indicate the need for further analyses to map and evaluate potential impacts of human disturbances and shoreline changes on these observed changes in wetland LULC. These finding will then provide baseline information for establishing improved management practices for sustaining important ecosystem products and services provide by these vulnerable ecosystems.