Tidal freshwater wetlands are the interface between marine and terrestrial ecosystems, hence they are directly impacted by sea level rise and climate change (Nunes & Gobitha, 2012). Little is known about the hydro-ecological functions and ecosystem services provided by these important and widely distributed coastal ecosystems. These functions are of immense importance in the southeastern US Atlantic coastal plain, as well as other coastal areas. Tidal freshwater forested wetlands (TFFW) occur in freshwater reaches near the coastal zone along freshwater rivers that are subject to tides. They are more prominent along the southeastern Atlantic lower Coastal Plain, where it is estimated that 200,000 ha of TFFW exist. The majority of TFFW are concentrated along the coast of South Carolina, Georgia, Florida, Virginia and Maryland, with smaller areas along the Gulf coast and upper portions of the Atlantic Coastal Plain. South Carolina is considered to have the most land, over 40,000 ha, due to the relatively large land range and low topographic gradient. There is considerable uncertainty in the estimates of TFFW area, and inconsistent use of terminology complicates assessments of the resource. Occupying the freshwater (salinity < 0.5 ppt) intertidal zone between non-marine riparian zones and freshwater marshes, the hydrodynamic regime is subject to both tidal and fluvial influences. The resulting hydrology and hydrodynamics is complex due to the interactions among groundwater discharge, microtopography, local climate patterns, and tidal forcing. TFFW are sensitive to biogeochemical feedbacks that are only now being recognized. These forests are susceptible to sea level rise, coastal subsidence, and storm surges from tropical storms. TFFW are hotspots for biodiversity, carbon export, nutrient/sediment exchange, and groundwater, seasonal river discharge, microtopography, local climate patterns, and tidal forcing. The study of TFFW is important for understanding the distribution and zonation of TFFW in the southeastern Atlantic coastal plain, as well as other coastal areas. Tidal freshwater forested wetlands (TFFW) are important for understanding the distribution and zonation of TFFW in the southeastern Atlantic coastal plain, as well as other coastal areas. Tidal freshwater forested wetlands (TFFW) are important for understanding the distribution and zonation of TFFW in the southeastern Atlantic coastal plain, as well as other coastal areas.

Introduction/Background

Total suspended sediment in the Cooper River Basin watershed (Figure 1) was driven by rainfall, tidal range, and river discharge. The sediment concentration in the Cooper River Basin watershed (Figure 1) was driven by rainfall, tidal range, and river discharge. The sediment concentration in the Cooper River Basin watershed (Figure 1) was driven by rainfall, tidal range, and river discharge. The sediment concentration in the Cooper River Basin watershed (Figure 1) was driven by rainfall, tidal range, and river discharge.

Methodology

1. The study area was delineated using ArcSWAT (Soil & Water Assessment Tool) hydrologic model to delineate the watershed and the stream network using an up-to-date DEM (Figure 2).
2. The soils were classified using Object-Based Image Analysis (OBIA) classification was conducted using Object Based Image Analysis (OBIA).
3. The study area was delineated using ArcSWAT (Soil & Water Assessment Tool) hydrologic model to delineate the watershed and the stream network using an up-to-date DEM (Figure 2).
4. The soils were classified using Object-Based Image Analysis (OBIA) classification was conducted using Object Based Image Analysis (OBIA).
5. The study area was delineated using ArcSWAT (Soil & Water Assessment Tool) hydrologic model to delineate the watershed and the stream network using an up-to-date DEM (Figure 2).
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7. The study area was delineated using ArcSWAT (Soil & Water Assessment Tool) hydrologic model to delineate the watershed and the stream network using an up-to-date DEM (Figure 2).
8. The soils were classified using Object-Based Image Analysis (OBIA) classification was conducted using Object Based Image Analysis (OBIA).
9. The study area was delineated using ArcSWAT (Soil & Water Assessment Tool) hydrologic model to delineate the watershed and the stream network using an up-to-date DEM (Figure 2).
10. The soils were classified using Object-Based Image Analysis (OBIA) classification was conducted using Object Based Image Analysis (OBIA).

Results

1. Tidal range and low topographic gradient. There is considerable uncertainty in the estimates of TFFW area, and inconsistent use of terminology complicates assessments of the resource. Occupying the freshwater (salinity < 0.5 ppt) intertidal zone between non-marine riparian zones and freshwater marshes, the hydrodynamic regime is subject to both tidal and fluvial influences. The resulting hydrology and hydrodynamics is complex due to the interactions among groundwater discharge, microtopography, local climate patterns, and tidal forcing. TFFW are sensitive to biogeochemical feedbacks that are only now being recognized. These forests are susceptible to sea level rise, coastal subsidence, and storm surges from tropical storms. TFFW are hotspots for biodiversity, carbon export, nutrient/sediment exchange, and groundwater, seasonal river discharge, microtopography, local climate patterns, and tidal forcing.

Discussion

This study’s ultimate objective was to classify, delineate, and calculate the areal extent of ecosystems affected by tidal flux and subsequent saltwater intrusion in the study TFWF region. The areal extent of freshwater emergent wetlands will continue to decrease. This will lead to conditions unsuitable for current freshwater vegetation to survive. The advanced image processing approach conducted on a smaller portion of the study area provided very promising results in land use classification as well as the tidal surge line delineation using LiDAR data with DEM proved very accurate.

Conclusion

This study’s ultimate objective was to classify, delineate, and calculate the areal extent of ecosystems affected by tidal flux and subsequent saltwater intrusion in the study TFWF region. The areal extent of freshwater emergent wetlands will continue to decrease. This will lead to conditions unsuitable for current freshwater vegetation to survive. The advanced image processing approach conducted on a smaller portion of the study area provided very promising results in land use classification as well as the tidal surge line delineation using LiDAR data with DEM proved very accurate.

References

1. Nunes, M., & Gobitha, S. (2012). Aquatic and coastal wetlands in the southeastern US Atlantic coastal plain, as well as other coastal areas. Tidal freshwater forested wetlands (TFFW) are important for understanding the distribution and zonation of TFFW in the southeastern Atlantic coastal plain, as well as other coastal areas. Tidal freshwater forested wetlands (TFFW) are important for understanding the distribution and zonation of TFFW in the southeastern Atlantic coastal plain, as well as other coastal areas.