



Assessing the distribution and vulnerability of wetlands in Tennessee, USA using Geoinformatics

Clement Akumu, Javar Henry, and Chandra Reddy

Tennessee State University, Agricultural and Environmental Sciences, United States (aclemen1@tnstate.edu)

Wetland ecosystems are continuously being threatened by anthropogenic and natural stressors including urbanization and climate change. Understanding the distribution and vulnerability of wetlands are important in order to enhance resource management and conservation efforts by stakeholders. The objectives of this study were: 1) to classify and map wetland types in middle Tennessee using Landsat 8 Operational Land Imager (OLI) satellite data; 2) to understand the distribution pattern of the wetlands types; and 3) to predict wetlands vulnerable to natural and human activities such as climate change (temperature increase) and urban development. Wetland types such as forested/shrub, emergent and open water bodies were delineated and classified using maximum likelihood standard algorithm. Spatial distribution patterns of wetland types were examined using average nearest neighbor analysis. A weighted geospatial vulnerability analysis was developed using variables such as roads, landcover and climate data (current and projected temperature) to predict vulnerability of wetland types. Geographic Information System (GIS) provided the framework for analysis and modeling. Wetlands were successfully classified and mapped with overall accuracy of about 73%. Forested/shrub wetland type had the most extent (63%) relative to emergent (20%) and open water bodies (17%) within the study area. Clustered spatial distribution pattern was found among all wetland types. The study also found about 13% of open water bodies, 11% of forested/shrub and 7% of emergent wetlands vulnerable to human and natural stressors. This information could be used to improve natural resource planning and management by wetland managers at both local and international level. Furthermore, improving policies regarding the protection of wetlands could help curb their vulnerability to human and natural impacts.