**NASA DEVELOP National Program**

****NASA Langley Research Center

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**Great Lakes Climate II**

*Monitoring the Impacts of Climate Change and Decreasing Water Levels on Wetlands in the Great Lakes Region of North America*

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**Abstract**

The Laurentian Great Lakes region of North America includes several types of coastal wetlands (e.g., swamps and marshes) that support a high diversity of biota. The health of these ecosystems is very important for ecological communities and economic industries, which benefit from fisheries and tourism. Great Lakes wetlands have been estimated to provide over 10,000 USD per acre in economic and ecosystem services. The effects of climate change, including variations in temperature, precipitation, and evapotranspiration, could impact the water level of the Great Lakes directly, and therefore, the development and survival of coastal wetlands. Increasing environmental pressures from rising populations, invasive species, and pollution will also negatively affect these wetlands if they are not managed appropriately. An updated land cover classification was developed, using a Random Forest classification method, to evaluate and monitor changes in the wetlands around Georgian Bay and the Southern portion of Lake Ontario. NASA Earth observation data from Landsat 5 Thematic Mapper (TM) and Landsat 8 Operational Land Imager (OLI) provided historical images and current images to classify land cover. Terra Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER) data provided digital elevation model (DEM) data, from which slope was calculated. Resultant land cover classifications were validated with ground truth data. Additionally, TOPEX/Poseidon Jason-1 and Ocean Surface Topography Mission (OSTM)/Jason-2 radar altimeters and *in situ* water gauge data served as a resource for tracking water levels over time. This methodology offers a more cost-effective approach to monitoring wetlands in the region.