MANGROVE CHANGE ANALYSIS IN THE EVERGLADES NATIONAL PARK OF FLORIDA IN THE GLOBAL WARMING AND CLIMATE CHANGE CONTEXT
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Because of global warming and climate change, sea-level rise and subsequent changes to the freshwater-forested wetlands along the coast are biggest concern to sustainable environmental managers. It is observed that a 2m tidal surge is probable in the coastal areas submerging the low-lying areas and converting the fresh water forested wetlands to brackish water forested wetlands, thus increasing the coverage of the mangroves in those areas. We tested this hypothesis of increase in coastal mangroves in the Everglades National Park in Florida analyzing temporal imageries and ground trothing. The goal of the study was to analyze and examine the increase or decrease of mangroves in the said study area through the years of 1990, 2000, and 2016. The Everglades National Park is an International Biosphere Reserve, World Heritage Site (UNESCO) and a Wetland of International Importance (RAMSAR Wetland), which spreads over more than 1.5 million acres. Landsat 5 TM (YR-1990), Landsat 7 ETM+ (YR-2000), and Landsat 8 (YR-2016) comprising of the study area were downloaded from USGS Earth Explorer site and processed (mosaicked, extracted to the masked AOI, and developed Soil Adjusted Vegetation Index (SAVI) raster using band 3 and 4) in ArcMap for classification in IDRISI Taiga. ISODATA classification algorithm was used in IDRISI to obtain three main classes- water, mangroves (brackish water forest species), and non-mangrove plants (freshwater forest species) and reclassified again in ArcMap to obtain two (mangrove and rest) land covers. Stratified Random Sampling, Sample, Layer to KML tools were used to verify (ground truth) the classified mangrove pixels for all three dates on Google Earth, which refers to a very high-resolution imagery and even clearing showing the mangrove plant species' absence or presence. In all three (years) cases, more than 90% overall accuracies were obtained in classifying mangroves. Instantly, a tremendous increase in mangroves were observed visually on classified images. We also completed a statistical analysis on the mangroves coverage increase in the study area. It was more than 30% increase over the years from 1990 – 2000 and 2000 - 2016. This increase in mangroves in the Everglades could be attributed to the Everglades National Park Protection and Expansion Act- Dec 13, 1989, the Comprehensive Everglades Restoration Plan (CERP) authorized by Congress in 2000, and above all due to the increase in sea-water inundation in the park due to sea-level rise. Although, the study results provided a positive picture for environmental conservationists but this increase in mangroves may be alarming to the ecosystems in the other low-lying coastal areas, where instant adaptation to such brackish water ecosystems modification may be a challenge.

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