**FLORIDA WATER RESOURCE MANAGEMENT**

**MONITORING INVASIVE AQUATIC VEGETATION IN LAKE OKEECHOBEE, FLORIDA, USING NDVI DERIVED FROM MODIS DATA**

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**INTRODUCTION**

- Lake Okeechobee is approximately 1,700 km² in size with a drainage basin covering 12,000 km² (Flaig and Reddy, 1995; Philips et al., 1995).
- The lake provides drinking water for several small towns in central and southern Florida (Earthjustice, 2006) and is also host to recreational activities.
- High phosphorus levels caused by agricultural run-off have threatened the lifespan of the lake by increasing the rate at which algae species and aquatic vegetation multiply (Mackool, 2007).

**INVASIVE SPECIES OF CONCERN**

- Excessive vegetative growth is both aesthetically displeasing and harmful to the human environment and surrounding ecology.
- Uncontrolled algae growth can lead to dense vegetative mats on the water’s surface that deplete resources for native organisms.

**RESEARCH GOALS**

- Apply MODIS data to water resource and water quality management.
- Use NDVI to monitor aquatic, rather than terrestrial, vegetation.
- Show growth and movement of invasive aquatic vegetation spatially and temporally.

**METHODS**

- Acquired MOD09 daily surface reflectance imagery from 1 May 2008 to 1 October 2008.
- Processed raw images using TPST, which performed the following operations:
  - Projection: all images set to UTM WGS84 Zone 17N.
  - NDVI: calculated NDVI on each image.
  - Clear: removed pixels with cloud cover and shadow.
  - Maxvza: removed pixels with view zenith angle ≥50°.
  - Fuse: combined MOD09QK (original surface reflectance) and MOD09GA (includes observation data and geolocation statistics) data.
  - Outlier: removed NDVI values outside of set thresholds.
  - Time: replaced missing pixel values using temporal interpolation.
- Processed raw images using TPST, which performed the following operations:
- Stacked processed images into a single image with 116 layers in ERDAS IMAGINE®.
- Color-coded each layer to show areas of suspected aquatic vegetation, which included NDVI values >0.2 and <1, with all other values suspected to be water.
- Used a STACK MAX model to show total maximum NDVI values for all five months and for each month individually.
- Compared visual results with U.S. Army Corps of Engineers spray treatment data.

**RESULTS**

- Maximum NDVI Values by Month:
  - May 2008
  - June 2008
  - July 2008
  - August 2008
  - September 2008

**REFERENCES**


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**CONCLUSIONS**

- NDVI values can be calculated from MODIS-derived products and applied to aquatic vegetation.
- Spatial and temporal change can be deduced from time analysis assessment.
- Individual images should be correlated against meteorological and nutrient level in-situ data; however, current data is limited.
- Temporal analysis of NDVI values could be conducted to assess impacts of sugarcane harvesting (to the south) and cattle farming (to the north) on nutrient levels in the lake.
- The time period could be broadened to gain an understanding of long-term NDVI changes associated with land use change.