Lake Victoria Water Resources – Developing an Automated, Near Real-Time System to Monitor *Eichhornia Crassipes*

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Abstract

Lake Victoria has a surface area of **68,800 km²**, making it the largest lake in Africa. The lake is surrounded by Kenya, Tanzania, and Uganda and is home to more than **30 million people**. These people rely on the lake for all aspects of their lives including **fishing** and **agriculture**. However, the increasing population has negatively **impacted water quality** due to sewage, as well as agricultural and industrial run off. Furthermore, the introduction of *Eichhornia crassipes*, or water hyacinth, has been **detrimental** to local communities by **blocking fishing access** and **providing breeding grounds** for diseases carried by mosquitoes and snails. Ongoing efforts between the NASA SERVIR Coordination Office at Marshall Space Flight Center, the SERVIR-Eastern and Southern Africa Hub, the Regional Centre for Mapping of Resources for Development (RCMRD), and the Makerere University Department of Geomatics and Land Management have been assessing and monitoring water quality parameters for Lake Victoria using the Moderate Resolution Imaging Spectrometer (MODIS) sensor on the Aqua satellite. This project sought to include the use of Sentinel-2 Multispectral Imager (MSI) and Landsat 8 Operational Land Imager (OLI) to assess water hyacinth presence in addition to current monitoring activities. As a continuation project from Fall 2015, this project used data previously collected to create an automated model to detect water hyacinth. This model employed Python scripting to continuously download and process new Landsat 8 images and automate the methodology for Sentinel-2 images. These end products will be utilized by partner organizations in their water hyacinth monitoring efforts.

Objectives

➤ **Develop** the Surface Aquatic Vegetation Detection Tool (SAVDT) to automate data download and hyacinth detection over the Winam Gulf
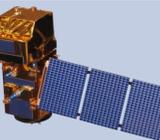➤ **Assess** the accuracy of the SAVDT

Methodology
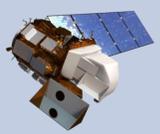
Landsat 8 OLI
• Automate download and processing data
• Assess accuracy of Landsat 8 output

Landsat 7 ETM+
• Automate processing data
• Assess accuracy of Landsat 7 output

Sentinel-2 MSI
• Automate processing data
• Assess accuracy of Sentinel-2 output

Conclusions

➤ **Automated** script allows for almost **real-time** water hyacinth monitoring
➤ The inclusion of **Sentinel-2** increased temporal resolution of the model
➤ The Landsat MNDWI extracts water hyacinth and other macrophytes with **87%** accuracy

Acknowledgements

Results

MNDWI < 0, Landsat 8 November 29, 2015 — Non-Water Features

MNDWI < 0, Sentinel-2 December 19, 2015 — Non-Water Features

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