A Satellite-based Water Quality information service for Lake Victoria

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1. Rationale

Lake Victoria, an important freshwater lake that is shared by three countries and its catchment, which spans five countries, is affected by landuse changes in the lake's basin. It is therefore, vulnerable to climate variability and population growth. Satellite base data collection is cost effective, can provide environmental information at high spatio-temporal scales and guide informed decision making. The Lake Victoria satellite based information service will greatly complement in-situ based lake monitoring efforts by different agencies within the region.

2. Objectives

- Identification of key areas of landuse change
- trends in water quality changes
- determination of hyacinth movement trends and area
- processing of water quality maps, and
- application of Empirical Orthogonal Functions (EOFs) to assess trends and dominance of above/ below "normal" water quality conditions

3. Approach/Project Activities

Two main approaches were used in this analysis:

- Analysis of water quality parameters derived from MODIS data, and
- Assessment of land cover changes using LandSAT imagery.

4. Earth Observations and Other Inputs

- LandSAT imagery.
- The L1A MODIS-Aqua
- Lake Surface Temperature (LST),
- Total Suspended Matter (TSM),
- Chlorophyll-a (CHL-a), and
- Diffuse Attenuation Coefficient (KD490)

5. Results

Achievements (Summary)	Amount
No of stakeholders (individuals) trained	41
No of climate adaptation tools developed	2
No of stakeholder engagement events	2
No of agencies engaged (Govt and NGOs)	17
No of data layers generated	5

Figure 1: The user engagement workshop participants. They came from five countries i.e. Rwanda, Kenya, Malawi, Uganda, and Tanzania

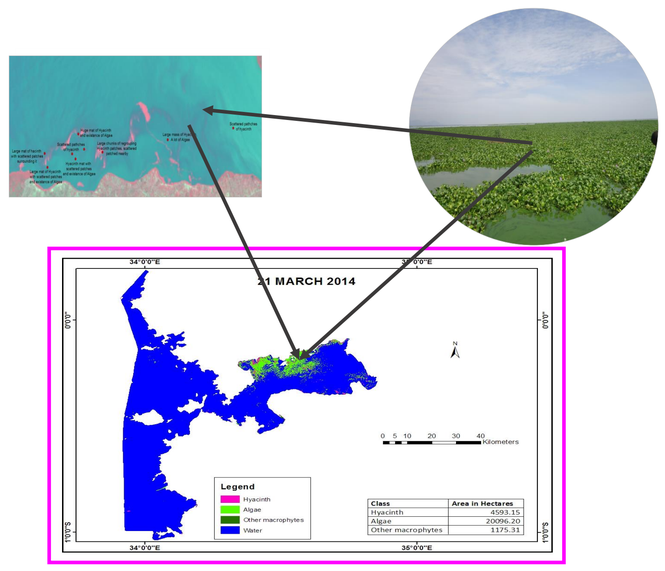

Figure 2: Remote Sensing Capabilities in Hyacinth detection

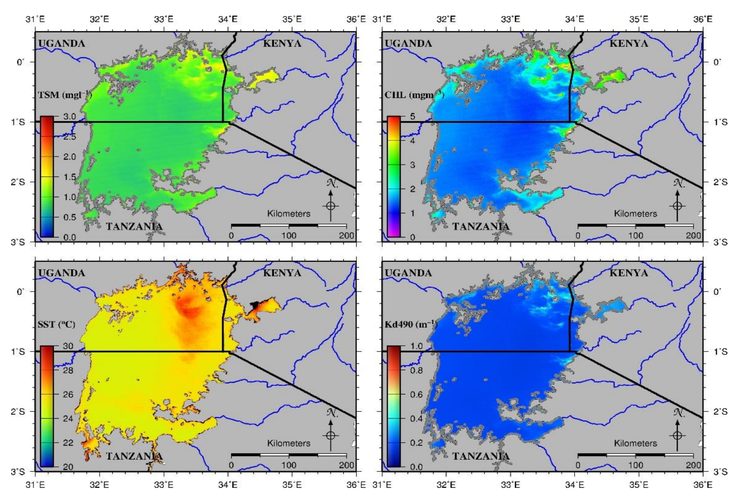

Figure 3: WQ maps from MODIS L3 data showing TSM, CHL-a, SST, and KD490 WQ parameters

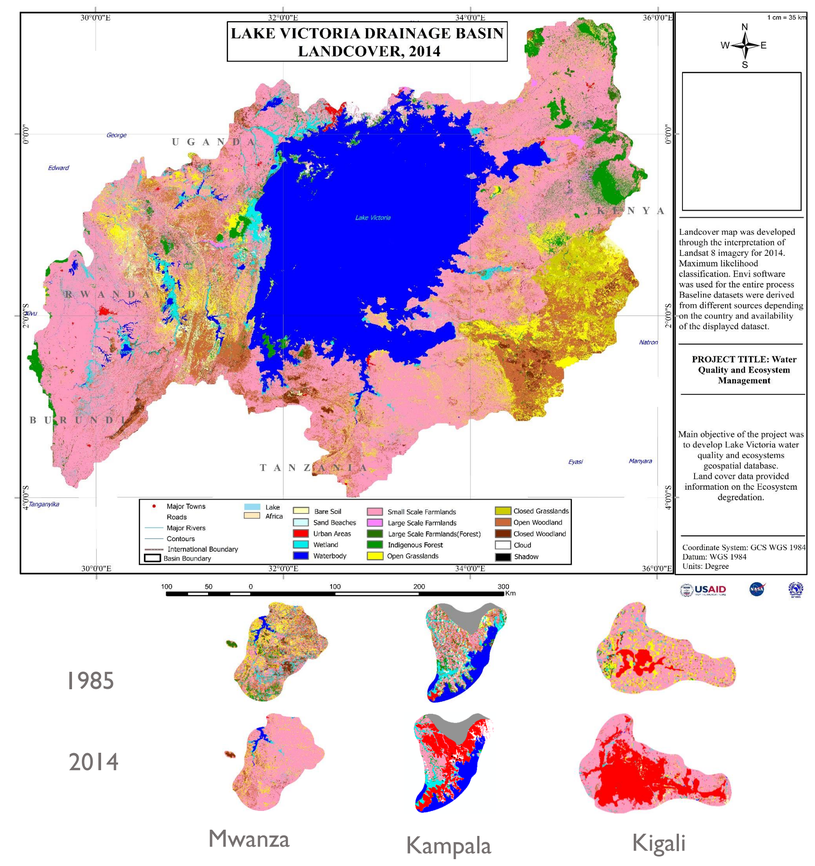

Figure 4: The Land Cover Classification was done using the Maximum Likelihood method. It followed IPCC's Schema II. 15 classes were analyzed including Small Scale Farmlands, urban areas, wetlands, and open grasslands, and were processed for 6 epochs i.e. 1985, 1990, 1995, 2000, 2010, & 2014

- Main Land cover change drivers:
  - Increase in acreage of Small Scale Farmlands
  - Growth in urban areas

6. Outcomes/Anticipated Impacts

- Conducted capacity building activities for participants from five countries
- Provided a participatory approach to address water quality issues for inland lakes
- Created a platform for data sharing to validate satellite derived water quality data for inland lakes

7. Project Partners

- Tanzania Fisheries Research Institute (TAFIRI)
- Kenya Marine and Fisheries Research Institute (KMFRI)
- National Fisheries Resources Research Institute (NAFIRRI)
- University of Makerere
- Kenya Meteorological Service (KMS)
- Lake Victoria Fisheries Organization (LVFO)

8. Project End Users

- Kenya Marine and Fisheries Research Institute (KMFRI)
- Lake Victoria Fisheries Organization (LVFO)
- Malawi Polytechnic
- National Fisheries Resources Research Institute (NAFIRRI)
- Tanzania Fisheries Research Institute (TAFIRI)
- Rwanda Natural Resources Authority (RNRA)
- Ministry of Agriculture, Water and Irrigation

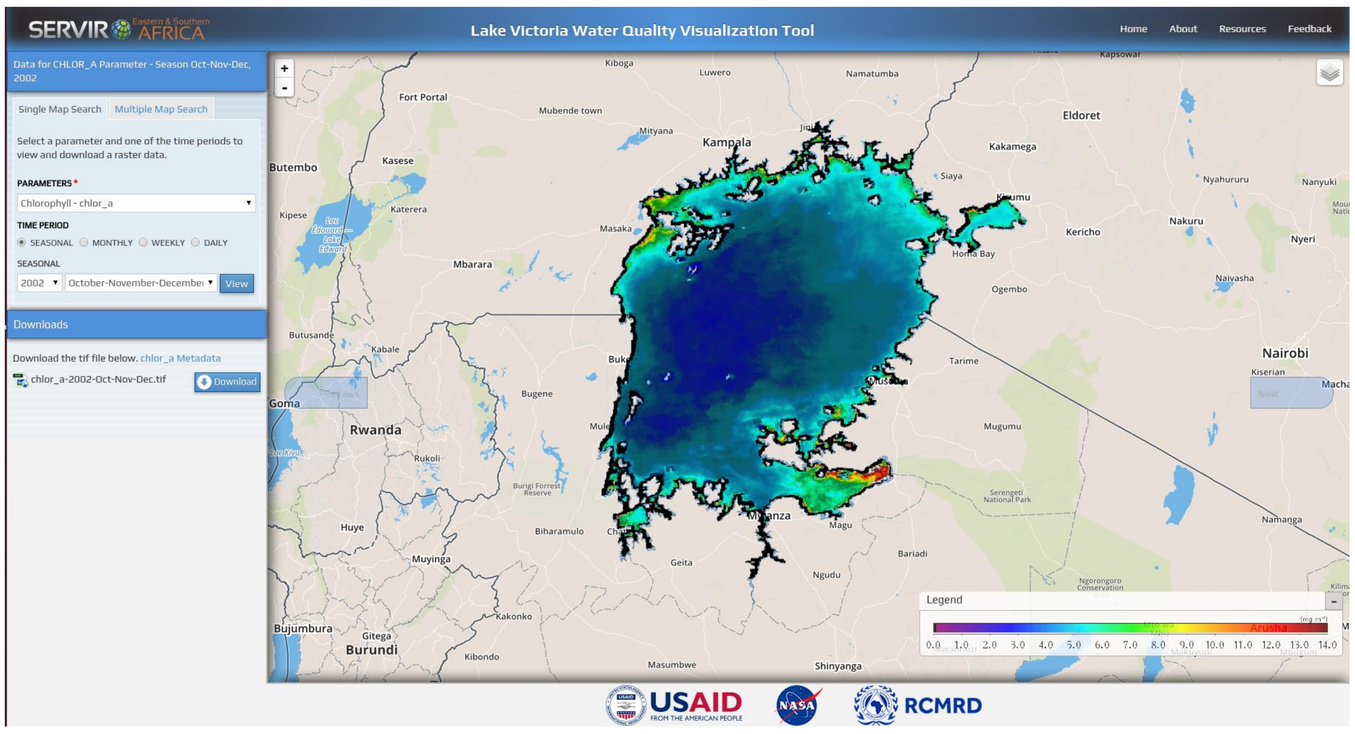

Figure 5: This application has been designed to host the processed L3 Aqua-MODIS data for Lake Victoria and Lake Malawi. It provides access to HDF, PNG, and TIFF data formats and has an archive of data spanning from 2002 June to present. The user can access daily data and weekly, monthly and seasonal averages data. Since individual WQ parameters may have a couple of processing algorithms, this variation has been put into consideration in the design. Links to the metadata for each WQ parameter and the landcover maps have been provided