Mapping Aquatic Vegetation on Lake Victoria
Mobile County Health Department
Earthzine/DEVELOP Virtual Poster Session, Summer 2011
Video Transcript

"DEVELOP is a NASA sponsored student research program which is part of NASA's division applied sciences program. Earth science research projects are led by students and mentored by science advisors from NASA and partner agencies. The results of their research are then extended to local communities. DEVELOP helps to bridge the gap between resources and people's need."

Background changes to the Health Dept snapshots (Pictures of the entrance of the dept, people getting in the building and the students at the office)

"There are nine DEVELOP locations across the United States, Mobile County Health Department being one of them. Students worked on two projects during the summer of 2011, one of which addresses an international environmental issue of invasive aquatic vegetation in Lake Victoria, Africa."

Change slide going from the base map of the world to Lake Victoria.

HUNTER

"Freshwater is one of the Earth's most valuable resources. Across the globe, freshwater lakes provide drinking water (Picture of people using water), fisheries (local fisherman pictures) and medium of transportation (picture here). This is true of the world's second largest freshwater lake. Lake Victoria is located in East Africa between Kenya, Tanzania and Uganda. This lake serves as a major source of drinking water, transportation and fisheries. 800,000 to 1,000,000 tons of fish worth roughly $590 million are caught each year. This market provides jobs for roughly two million people and food for over 22 million locals as well as millions internationally. Each of these markets is impacted by invasive aquatic vegetation (Picture of water hyacinth-aquatic vegetation)."

"Throughout the past decade this issue has drawn international attention. In 1994, the Lake Victoria Fisheries Organization (LVFO) was formed by an agreement between Kenya, Tanzania and Uganda. Throughout the years the fisheries organization has dealt with the effects of the invasive aquatic vegetation, however one limitation to their efforts has been a lack of historical and current aquatic vegetation spatial extent maps for the lake."

NARESH

"Through this project, students worked on providing the spatial extent of aquatic vegetation in Lake Victoria. This will be delivered to our partners SERVIR and Lake Victoria Basin Commission. SERVIR, is an organization that is located in Huntsville, Alabama which is supported by NASA and the United States Agency of International Development (USAID). SERVIR integrates remote sensing, GIS, and ground-based observations to address environmental concerns across the globe. The Lake Victoria Basic Commission will use the results to address the local concerns. A systematic methodology was followed to produce the desired results."

"Satellite data was acquired from NASA's MODIS sensor, Landsat 5 and Landsat 7. For the purposes of this study MOD09 and MOD13 MODIS products were used. MOD09 and MOD13 images were acquired one for each year from 2000 to 2009, 2011 and one for each month for the year 2010. Images were collected separately for the northern and southern portion of Lake Victoria. These images were mosaicked together to produce a single image encompassing the entire lake. Lake Victoria was then clipped out of the mosaicked image. NDVI classifications were run to determine the area of aquatic vegetation on the surface of the lake. Landsat 4-5TM and Landsat 7+ETM images were also analyzed using the same methodology for Winam Gulf, which is located in the northeastern portion of Lake Victoria."

"Before we discuss the results, it is important to discuss each MODIS product."

THARINI

"MOD09 is a surface reflectance product. It can be either downloaded in the form of a one-day or an eight-day product. The one-day product is one image taken daily, and the eight-day product is a composite of 8 days of imagery. MOD13 is a 16-day composite data product. Both products have a spatial resolution of 250 meters and a swath width of 2,330 km. The Landsat satellites have a spatial resolution of 30 meters, a temporal resolution of 16 days, and a swath width of 183 km."

"The results include graphs showing the area covered by aquatic vegetation in the lake. Mean area of aquatic vegetation measured in MOD09 data product on the surface of Lake Victoria within the period of study was 857.13 square kilometers. The year with the least amount of aquatic vegetation was 2007 when its area was observed at 543.12 square kilometers. The year with the highest amount was 2010 when the mean area was 1,350 square kilometers. In 2010, the highest value was observed in April at 3,084.53 square kilometers and the lowest values were measured in January at 791.2 square kilometers."

"MOD13 showed a mean area of 3,252.5 square kilometers throughout the study period. The year with the least amount of aquatic vegetation was 2000 with an area of 1,158.31 square kilometers, and the year with the highest amount of aquatic vegetation was 2009 with an area of 5,023.43 square kilometers. The year 2010 had a monthly average of 3,929.1 square kilometers. April was the month when greatest area was observed at 6,357.31 square kilometers, and November was the month when least area was observed at 2,228.31 square kilometers of aquatic vegetation."

"MOD13 shows larger area compared to MOD09 because it is a 16 day composite. These results show how fast the location and amount of aquatic vegetation can change on the surface of Lake Victoria."

"Landsat imagery was observed between 2000 and 2003, 2009, and 2010. The lowest values were observed in 2003 at 11.57 square kilometers. That amount increased dramatically in 2010, when 118 square kilometers of aquatic vegetation were observed in Winam Gulf."

MOARA

"The results showed that both MODIS products show that aquatic vegetation on the surface of Lake Victoria can grow and change in location in a very short period of time."

"Both MODIS products show an increase in the area of aquatic vegetation in Lake Victoria since 2000. The growth is substantially higher near the coastal areas versus the open waters of the Lake."

"It was also possible to identify a period of reduced biomass on the surface of the Lake that could be ideal for applying control methods."

"The results of this study will be handled to our partners SERVIR and the Lake Victoria Fisheries Organization in the format of visualization products and a detailed methodology. SERVIR will be able to use the data and methodology to conduct operational surveillance."

"These results will be beneficial to help protecting the local communities from invasive aquatic vegetation."

"The following video is one of the products generated and shows the changes in aquatic vegetation area from to 2000 to 2011."