

Workshop on the Role of Geographic Information Systems (GIS) and Remote Sensing (RS) in Integrated Lake Basin Management (ILBM)

Dates: 28 July – 2 August 2008

Venue: ILEC, Kusatsu, Japan

Attendees

Masahisa Nakamura, Shiga University, Japan

Thomas Ballatore, Daiichi University, Japan

Shane Bradt, University of New Hampshire, USA

Andreas Gyllenhammar, Swedish University of Agricultural Sciences, Sweden

Neil Varcas, Laguna Lake Development Authority, Philippines

Victor Muhandiki, Ritsumeikan University, Japan

Summary

This workshop brought together a small working group of experts to discuss the current and potential roles of GIS and RS for ILBM. The group discussed what technologies can accomplish what tasks. We have since adopted the term Geospatial Technologies (GST) because it is broader and includes things like GPS and Google Earth.

Overall, the meeting addressed two main questions:

1. What contributions can GSTs make to ILBM?
2. What are the low-cost, easily implementable options for developing countries?

We spent the first few days brainstorming about the specific types of information that current GSTs could provide to the lake basin management process (if funds and data are sufficient). In no particular order, these include:

- Delineation of shoreline
- Change in shoreline
- Calculation of lake area
- Calculation of change in lake area
- Bathymetry
- Delineation of drainage basin
- Calculation of basin area
- Calculation of slope
- Soil types
- Land Cover/Use
- Climate variables such as precipitation and temperature
- Population density
- Population distribution with the basin
- Distribution of languages/ethnic groups/indigenous peoples in the basin
- Extent of protected areas

- Administrative boundaries
- Location of cities/urban extents
- Names of places
- Location of roads
- Location of pollution sources
- and other in-lake, water quality related parameters (given in table below)

Table 1. Remote sensing options to measure various in-lake parameters

In-lake Parameter	Satellite Platform							
	Landsat	MODIS	MERIS	SeaWiFS	ERS-2	Envisat	Jason	GFO
<i>Chl a</i>		Yes	Yes	Yes				
<i>Transparency</i>	Yes	Yes	Yes	Yes				
<i>Cyanobacteria</i>			Yes					
<i>TSS/DOM</i>		Yes	Yes	Yes				
<i>Lake Level</i>					Yes	Yes	Yes	Yes
<i>Lake Surface Temperature</i>		Yes	Yes	Yes	Yes			
<i>Lake Area</i>	Yes	Yes	Yes	Yes				

The above list and table are by no means comprehensive. In theory, anything that exists and has a location (latitude and longitude values) can be incorporated into some geographic information system. The most insightful uses are often the product of curiosity and inventiveness of the local lake basin managers.

Another important aspect of the meeting was to discuss what exactly can be done with various GST in a resource-limited environment. We discussed the minimum computer requirements to run most GSTs (nowadays, even in developing countries, computers are usually not the limiting constraint), necessary internet connection speeds and reliability (this is often a huge problem but can be overcome through partnership between the end-user and someone who can send data on DVDs through the post), and finally free or very low-cost software options.

Related to this third point, we spent the bulk of the last few days manually testing a series of free GIS programs to see which ones could reliably do which tasks. A summary of these software programs is attached. We did not include full-cost GIS programs such as ArcGIS or MapInfo because they generally can do all required tasks (hence their high cost!).

We wrapped up the meeting with a discussion on future steps that could take as a group to promote these realistically implementable GSTs in developing countries. We did a self-evaluation in the group of our relative strengths, weaknesses and interests in areas including: GIS, RS, Modeling, Publishing in Academic Journals, Experience Training, Ability to Travel to Training Sites, and On-the-ground Experience. Overall, we have a good balance among ourselves but are eager for others to join the cause. Please send an e-mail to me at tom@lakebasin.info if you are interested. In particular, if anyone has some good stories about the use of GSTs for ILBM in developing countries, we would very much like to hear these.