

Global Perspectives Project Report: Watershed and Community Assessment in the Lake Atitlán region of Guatemala: Model Verification

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This project brought a small group from the University of Wyoming, 2 faculty and 1 graduate student to Lake Atitlán, in the State of Sololá, Guatemala to survey site specific environmental and community factors with respect to watershed and lake management and validate erosion risk and farm scale economic models. Lake Atitlán is located in the highlands of Guatemala, and is considered one of the Great Lakes of the World (GLOW 2010). The endorheic lake sits in an old caldera in the Guatemalan Highlands. The elevation at lake level is approximately 5,100 ft above sea level, and the surrounding watershed rises to over 12,000 ft in some areas. Over 400,000 people live in the watershed and the region provides important economic resources for the local communities from forestry, subsistence agriculture and cash crops (e.g. coffee, vegetables), as well as household water, fishery resources, and reeds from the lake. Urban centers make up 1% of the landscape but play an important role in the economy through recreational opportunities at the lake.

To address the environmental and land use issues associated with Lake Atitlan requires an integrated and collaborative (long-term) research approach. This project, lead by Dr. Roger Coupal and Ginger Paige, brought together faculty and graduate students from the University of Wyoming and faculty at Universidad del Valle in Guatemala (UVG) to develop a framework for long-term collaborations among faculty and students at both institutions. Faculty in the departments of Ecosystem Science and Management and Agricultural and Applied Economics at UW bring necessary research and modeling skills to the research project. However, we will need to collaborate closely with local colleagues due to the complexities of the mix of cultures in the State of Sololá, Guatemala and the complexities of the water quality issues with Lake Atitlán. The local expertise cannot be replaced from faculty here.

This specific project followed directly on results from a 2013 project, funded by Global Perspectives and International Travel Grant, to survey environmental and community factors with respect to watershed and lake management. In 2013, we were able to: 1) further research collaborations between University of Wyoming and UVG; 2) directly involve students from UW and UVG in the data collection process; and 3) produce baseline data and methods to facilitate development of a large scale proposal. In addition, we developed a suite of long-term objectives for collaborations between UVG and UW to meet identified needs in the Lake Atitlán Region. As a direct result of last years project, we have been able to develop two models, a watershed erosion risk model and a small farm economic model, using the baseline data that were collected.

The objectives of the 2014 proposal were to: 1) identify validation sites and available data for the two models and 2) conduct site-specific validation of the models. A smaller research group from UW traveled to Guatemala from July 12-19, 2014. The team included: Drs. Roger Coupal (Ag Econ), Ginger Paige (ESM) and graduate students Dale Novotny (Ag Econ). Over the five days in Guatemala, we were

able to successfully address our project objectives. We spent significant time with faculty and staff at the UVG Sololá campus and were able to visit agricultural cooperatives and field sites within the 2 key sub-watersheds in which we have focused our modeling efforts. Through these direct visits we were able to address the remaining questions in the development of the prototype models. We presented the results of the farm scale economic model at a research symposium hosted by UVG at the Sololá campus in September 2014 (Novatny et al. 2014. Económicas y Análisis Preliminares de Riesgo de los Pequeños Agricultores y las Decisiones de los Niveles de Salida y Entrada de Producción en Sololá).



Dale Novatny (Graduate Student in AG Econ) interviewing a farmer about crop choices and fertilizer use.



Field scale erosion observed in the field.

Through these combined efforts, meetings and field visits, we were able to develop stronger collaborative relationships with UVG and collect the relevant and necessary data to move forward with our larger modeling efforts. We have been using these data to build 1) a watershed assessment model and 2) a small farm economic model for the Lake Atitlan Watershed. These two models when coupled with dynamic community models and a multi-objective decision support tool, will ultimately form the framework for a long-term collaborative project with UVG and other identified researchers to develop tools and processes to meet environmental and social-economic needs for the Lake Atitlán region.

In addition, successful collaborative meetings were held with key faculty at UVG including:

- Dra. Margaret Dix, Biologist, Universidad del Valle
- Dr. Rolando Cifuentes, Agronomist, Universidad del Valle
- Dr. Edwin J. Castellanos & Dra. Margarita Vides Irving, GIS Laboratory, Universidad del Valle

Through these meetings, we were able to identify ways to move forward with the larger proposal and identify key collaborators.

Finally we presented an overview of our project and preliminary analysis to the Global and Area Studies Brown Bag Seminar in January of this year titled "**Modeling Sustainable Agricultural Practices in Guatemala**".



View of Lake Atitlan from the shoreline.



View of landscape surrounding Lake Atitlan, steep volcanic hillsides dominate the landscape.