Ecological and Social Issues at Lake Atitlan, Guatemala

June 26 – July 24, 2014

Ecology, Nature and Society, ESP 101, 3 credits; Aquatic and Wetland Ecology Lab, ESP 155L, 3 credits

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Program Description and Syllabus – The situation at Lake Atitlan and its watershed in the highlands of Guatemala is highly conducive to teaching an interdisciplinary course combining the principles of ecology and social sciences. The program is suitable for students from majors oriented towards environmental sciences, ecology, conservation biology, conservation policy, anthropology, etc. Besides a better understanding of principles of general and human ecology and aquatic sciences, the participants should obtain a real life experience of intricacies in solving important environmental problems in socially and economically diverse communities. Lake Atitlan watershed has traditionally been inhabited by Maya Indian groups whose activities exerted a relatively minor impact on the environment. Last several decades have witnessed a rapid increase in population density, growth of tourism, increase in logging and agricultural activities, and the erosion of traditional, Mayan civic and religious institutions. All this has greatly contributed to accelerated lake eutrophication. Preventing the eutrophication is very difficult even under ideal situation (see Lake Tahoe example), but in Guatemala, the situation is extremely complicated due to social problems of deep distrust of native communities of the government and its institutions, and conflicting interests and activities of rich hotel and chalet owners and numerous NGOs.

Format – Teaching ESP/ANT 101 Ecology, Nature and Society in this setting will provide ample real life examples of the majority for most of the lecture topics. The course will consist of lectures, field trips and meetings with local organizations. Students will be provided reading materials and based on the field experience, reading and discussion they will be expected to prepare several small write-ups providing their interpretation and suggested solution to different scenarios.
For ESP 155L, Aquatic and Wetland Ecology Labs, we will follow the existing model which consists of field trips and laboratory/outdoor experiments that provide hands-on experience with various topics related to wetland/aquatic ecology. The station has a large outdoor space, where we have already some pilot studies on water quality, as well as a chemistry lab; this provides an ideal setting for setting up, conducting and analyzing experiment.

Requirements and Grades – Grades will be based on the following:
ESP 101 - participation/discussion (20%), write-ups for scenarios (40%), and the final project, which will be in the form of a teaching module for a K-12 classroom activity (40%) (pending final agreement, these will be used by Spanish Immersion classes in Cesar Chavez Elementary school in Davis).
ESP 155L - project reports (55%), participation in all field trips and lab activities (30%), and final presentation (15%) that is done as a science mini-conference.

Readings - The text for ESP 101: Richerson PJ, Borgerhoff-Mulder M, Vila BJ 2001. PRINCIPLES OF HUMAN ECOLOGY will be available on Smartsite. In addition to the book, there will be selected scientific papers posted on Smartsite for individual topics and discussion. For ESP 155L we will use the Wetland Laboratory and Field Manual as well as Wetland Ecology powerpoint lectures also available on Smartsite. UCD Summer Abroad provides students with the Lonely Planet Guide for Guatemala. Students should start reading the
required materials already before traveling to Guatemala. Internet connection at the house will be available, but is not as reliable as in the US.

Schedule

(Ecology, Nature and Society = ENS; Aquatic and Wetland Ecology = AWE)
Breakfasts prepared in the kitchen at the station; basic stuff (milk, tea, coffee, cereal, fruits, eggs, bread) will be available. Lunches and dinners will be in a nearby hotel; for field trip days we will have lunch boxes. **Note: timing of boat trips on the lake may change depending on weather**

Th June 26  Individual arrivals to Guatemala City; overnight at the Hostel Villa Toscana.

Fr June 27  Leaving Villa Toscana by Atitrans Shuttle. Arrival to the station; Explanation of rules and expectations, logistics and courses organization.

Sa June 28  am: boat trip around the lake
AWE: Introduction to Principles of aquatic and wetland

Su June 29  Visit of the community town of Santiago de Atitlan – (not mandatory, but recommended)

Mo June 30  am: 3h ENS: Human natural history; Basic ecosystem processes (combined lecture and discussion)
pm: 3h AWE: Wetland sediment biogeochemistry; Set up the redox experiment

Tu July 1  am: AWE: lake trip to Bahia del Silencio; demonstration and collection of wetland macrophytes
pm: ENS: Processes of Human Evolution; Basic Ecosystem Processes – cont. (combined lecture and discussion); after dinner a lecture by a representative from AMSCLAE (governmental organization charged with taking care of the lake)

We July 2  am: ENS: Processes of Human Evolution – cont.; Basic Ecosystem processes – cont. (combined lecture and discussion)
pm: AWE: ID of wetland macrophytes; biomass production, growth characteristics, correlations

Th July 3  am and pm: Field trip to San Lucas Toliman; visiting “pilas” (place built for local women to do their laundry at a controlled place rather than directly in the lake) – explaining the problems of the impact of phosphorus from detergents on lake eutrophication, pointing out problems with the local water treatment design for the pilas; visiting the Meso-American Institute of Permaculture (IMAP [http://www.comuntierra.org/](http://www.comuntierra.org/))

Fr July 4  am: ENS: Processes of Human Evolution – cont.; Basic Ecosystem processes – cont. (combined lecture and discussion)
pm: AWE: Introduction to the methods of water analyses
**later afternoon barbecue for celebration of 4th of July**
Sa July 5  am: ENS: Population Regulation in Human Societies; Plant/Animal Population ecology (combined lecture and discussion)  
         pm: AWE: Wetland sediment biogeochemistry - cont.; set up of the nitrogen mineralization experiment

Su July 6  The whole day trip to Antigua

Mo July 7  am: Population Regulation in Human Societies; Plant/Animal Population ecology (combined lecture and discussion)  
         pm: AWE: wetland sediment characteristics; measurements of soil water content, LOI, pH, conductivity

Tu July 8  am: AWE: boat trip to the center of the lake; demonstration of water clarity measurements and water and phytoplankton sampling along the depth profile  
         pm: ENS: lecture and discussion with the local NGO Vivamos Mejor representative; ANW water sample filtration

We July 9  am: ENS: Human Commerce and Trade; Plant/Animal Community Ecology (combined lecture and discussion)  
         AWE: phytoplankton ID; phosphorus analysis

Th July 10 am: AWE: boat trip to San Lucas Bay; snail egg collection; meeting with fisheries organizer representative in San Lucas; discussion about the impact of eutrophication on fisheries  
           pm: ENS: The role and impact of warfare (with examples of recent Guatemalan history)

Fr July 11 am: ENS: continuation: The role and impact of warfare (with examples of recent Guatemalan history)  
           pm: AWE: The role of animals in wetlands (lecture and discussion); setting up the snail hatching experiment

Sa July 12 am: visit of a market in Santiago Atitlan;  
               Pm; meeting with the representatives of Cocoderia (local governing body) of San Pedro; demonstrating of the household filtering project; meeting with the organization Ninos del Lago

Su July 13  resting, reading, hiking, eating

Mo July 14  am: ENS & AWE Field trip to Universidad del Vale satellite campus in Solola, meeting with their outreach director to talk about challenges of reaching out to the Maya communities; stop at the wastewater treatment plant in Solola, one of the very few well designed and functioning WWTP in the region.  
           pm: AWE: The role of wetlands in wastewater treatment; demonstration of the Santa Catarina pilot project
Tu July 15  Field trip to Volcan San Pedro: hike to the top (weather permitting) with a guide from the San Pedro Ecological Park, during the hike we will demonstrate different elevational vegetation zones. After the hike visit the FEDEPMA (Federacion de pueblos Mayas) in San Pedro where we will demonstrate good practices of treating water used in coffee processing, vermiculture system and an apiculture.

We July 16  am: AWE: Participation in the regular UVG monitoring of the lake (Dr. Dix, the UVG program director in charge)
   pm: ENS: Role of Disease in human interactions; Ecology of Infectious Diseases (combined lecture and discussion)

Th July 17  am: ENS: Role of Disease in human interactions; Ecology of Infectious Diseases (combined lecture and discussion)
   pm: AWE: End of the Redox project; data entry and data analyses

Fr July 18  am: AWE & ENS Boat trip to San Juan Laguna; visit of the Atit’Ala NGO and their various community projects; visit of water hyacinth project in Santiago de Atitlan
   pm: ENS: Technology – Environment Interactions; Invasion Species Ecology (combined lecture and discussion)

Sa July 19  The whole day trip to Fuentes Georginas (hot springs)

Su July 20  am: ENS: Evolutionary Transformations of Human Ecological Patterns (combined lecture and discussion)
   pm: trip to La Reserva Natural in San Buenaventura Bay, Panajachel

   pm: AWE: Tests for various water-borne pathogens (E. coli, Girardia, Cryptosporidium); N-mineralization experiment end.

Tu July 22  am: ENS: summary and review
   pm: AWE: end of the snail hatching experiment

We July 23  am: Written teaching modules due
   pm: Science mini-conference to present results of AWE experiments

Th July 24  Departure for Guatemala City