American team of scientists help protect Guatemala's Lake Atitlan

June 22 2010

Researchers and students examine a sediment core sample from the bottom of Guatemala's high-mountain tropical Lake Atitlan to help trace the history of impacts on the lake's ecosystem. The lake's water is contaminated with watershed runoff and waste water, which contributes to increased algae growth and suitable conditions for bacteria and pathogens that can proliferate and enter untreated drinking water Credit: Photo by Ellen Levy.

A team of scientists from the University of Nevada, Reno, DRI, Arizona State University and University of California, Davis has returned from a two-week expedition to Guatemala's tropical high-mountain Lake Atitlan, where they are working to find solutions to the algae blooms that have assailed the ecosystem and the drinking water source for local residents.

The lake's water is contaminated with watershed runoff and waste water, which contributes to increased algae growth and suitable conditions for bacteria and pathogens such as, Escherichia coli and Giardia that can proliferate and enter untreated drinking water.

In 2009, the Global Nature Fund designated Guatemala's Lake Atitlan as its "Threatened Lake of the Year."

"It was super-productive working with Guatemalan officials, scientists and universities in our capacity building project," Sudeep Chandra, co-team leader from the University of Nevada's Department of Natural Resources said. "It's important to develop a relationship with the locals to coordinate conservation work and build their capacity to find solutions."

Eliska Rejmankova, a professor in the Department of Environmental Science and Policy from U.C. Davis, initiated the collaborative project.

"We want to work with these groups and help train Guatemalan students to develop local capacity to conserve one of the most beautiful highland tropical lakes in the world," Rejmankova said. "We want to work with local scientists to develop alternative strategies, based around the idea that the solution to the algae problem is to address the sources of nutrient loading into the lake, so water going into the lake will be as clean as possible."

Chandra, a professor of limnology and resource conservation, said that about 18 months ago the high-elevation lake turned a yellowish brown, a combination of years of raw sewage and inorganic fertilizers entering the lake and then natural processes with the lake's thermal layers mixing the warm surface and cold deep waters.

"Lake Atitlan is very similar to Lake Tahoe, on the border of Nevada

and California, in size and character, but without the environmental protections, Atitlan declined in water quality over the years from the impacts of increased population," Chandra said. "The algae made a spectacular explosion of color on the surface of the 50-square-mile lake, as seen from space in satellite photos, drawing attention to its dramatic decline."

"Our collaboration can help move the management forward by decades by adding to their work the lessons learned at Tahoe since water quality management of Tahoe began 40 years ago," Chandra said. "Atitlan is at a crossroads for management, and it needs it sooner rather than later."

The American team of fisheries ecologists, limnologists, water quality experts and wetlands scientists teamed with about 20 scientists, engineers and students from Guatemala to set up a lab and monitoring infrastructure for the lake, to build on the research that began and has continued intermittently since the 1970s.

"The trip was quite successful," Alan Heyvaert, scientist from the Desert Research Institute (DRI) in Nevada said. "Lots of data and samples were collected and we've begun a promising collaboration with the researchers there. They are very knowledgeable and together we can interpret the data and study both natural and human-caused events to flesh out the causes of the algae blooms."

Heyvaert brought sampling equipment from Lake Tahoe to Guatemala and took sediment core samples from the lake bottom, as deep as 1,000 feet from the surface.

"The sediment record will help us get a historical perspective on events, such as the 2005 hurricane, to analyze the impacts on the lake," he said.

The U.C. Davis members of the team, lead by Rejmankova, conducted

near-shore sampling of invertebrates, algae, water, sediments, and plants.

Similar to Lake Tahoe, Lake Atitlan is a tourist destination nestled in the mountains with 10,000-foot elevation peaks surrounding it. Lake Atitlan is 5,100 feet in elevation, 11 miles long, 1,150 feet at the deepest, about 50 square miles of surface with about 60 feet of clarity. Atitlan's population is about 200,000 people living in 12 towns around the lake, with no sewage treatment plants and little control over fertilizers and inorganic products that run into the lake.

"We've been studying Tahoe for years and using the data. The local, state and federal governments have implemented policies and regulations to protect the lake's water quality and clarity," Chandra said.

Sewage is exported out of the Tahoe basin to water treatment plants, and controls on growth and construction practices have been implemented to protect the lake from sediment and other products from entering the lake.

"The solutions for Atitlan may not mirror those at Tahoe, but we hope to use the knowledge we've gained from studying Lake Tahoe to help clean and protect Lake Atitlan," Chandra said.

Provided by University of Nevada, Reno