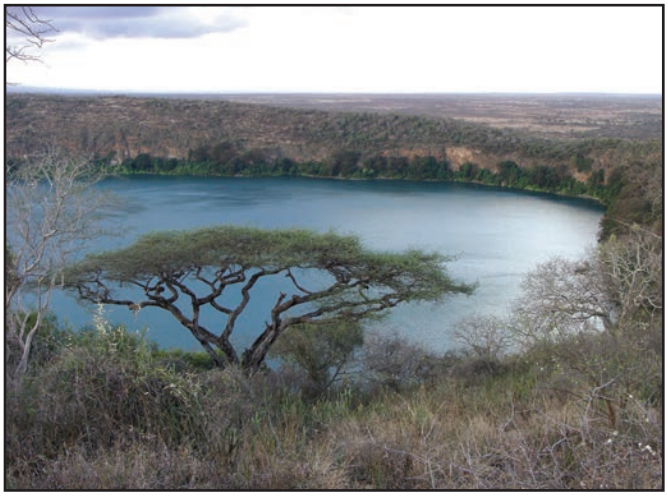
St. Croix Watershed Research Station
Highlights of 2012 - 2013

Science Museum of Minnesota

Mining and mercury

Elizabeth Droessler samples a mining-impacted wetland

Northern Minnesota has been home to iron mining for more than a century and is poised for a new controversial phase involving metal-sulfide extraction. One legacy of these activities is a landscape of large pits, tailings basins, and waste rock piles that are high in sulfates. These sulfates make their way into the waters of area wetlands and lakes, and eventually the St. Louis River system. Previous work by Research Station scientists, Jill Coleman Wasik and Dan Engstrom, has shown that experimental addition of sulfate to low-sulfur wetlands increases the production of highly toxic methylmercury. In a new collaborative effort with the University of Minnesota-Duluth, scientists are evaluating whether this would also occur in systems already impacted by high sulfate. Coleman Wasik, Engstrom, and water-resource interns Erin Mittag and Elizabeth Droessler collected sediment and water samples from a set of contrasting wetlands and lakes over the summer and fall of 2012. Now, analyses in Research Station and UMD labs will help determine whether mining poses a previously unexpected threat to Minnesota's aquatic environs.



Lake Challa: 2 km across, 100 m deep, with 200 m crater walls

Climate change on the slopes of Kilimanjaro

Mt. Kilimanjaro is a long way from the St. Croix Research Station but still within reach of its scientific expertise. On the slopes of this fabled mountain and straddling the Kenyan/Tanzanian border is a remarkable lake-filled volcanic crater, Lake Challa, containing in its sediments an estimated 300,000 years of Earth climate history. This fall, Station Director, Dan Engstrom, was invited to participate in a scientific workshop in Nairobi and Taveta, Kenya, to help plan a drilling expedition to collect some 300 meters of sediment core from the lake. The workshop was organized by a team of European, American, and Kenyan scientists and funded by the International Continental Drilling Program (ICDP). A pilot study of Lake Challa, which recovered a 25,000-year record, has offered up some stunning results. The sediments were found to be annually laminated (like tree rings), not only for this shorter sequence, but based on seismic measurements, for the entire 300,000-year record. The lake, which has virtually no surface watershed and is fed by groundwater from Kilimanjaro's upper slopes, faithfully records the long-term strength of the Indian Ocean monsoon, a major driver of East African climate. It is this unique combination of geography, hydrology, and sedimentary conditions that make Challa a critical target for paleoclimatologists and the ICDP. The challenge now is to assemble the substantial funding needed to execute the drilling and subsequent studies from the participating national research councils (including the US National Science Foundation).

In memorium: Robert C. "Bob" Binger

Bob Binger was a founding member of the Research Station's Steering Committee and a major supporter of the Station's early development and facility construction. Bob stayed on to advise Directors Ron Lawrenz and Dan Engstrom as a member of the Steering Committee through 2008. He attended many St. Croix River Research Rendezvous events and programs of the Friends group, and even presented to a special Friends event at Warner Nature Center about his Arctic explorations. Bob passed away August 14, 2012; his counsel and support will be missed.

UMD graduate student Devin Hougardy and Station intern Aaron DeRusha prepare to deploy the CHIRP seismic profile transducer in Lake of the Woods.

Unexplained changes in Lake of the Woods

Lake of the Woods is an iconic water body along the U.S.-Canadian border. Over 70 miles long and wide, its waters drain north through Lake Winnipeg and eventually feed into Hudson Bay. Concerns over excess phosphorus (P) and an observed increase in the frequency and extent of blue-green algae (cyanobacteria) blooms are spurring a new research initiative led by Senior Scientist, Mark Edlund, in cooperation with the Minnesota Pollution Control Agency, the University of Minnesota-Duluth, the Ontario Ministry of the Environment, and the Lake of the Woods Sustainability Foundation. While monitored inputs of phosphorus from the lake's major tributary, the Rainy River, have decreased in the last 30 years, and other point sources have declined, this has not lessened blue-green algae problems. To help understand why, the scientific team is using seismic mapping and the analysis of lake-sediment cores to determine the sources, cycling, and biological consequences of phosphorus inputs over the last century. Results will help answer critical management questions, including: (1) How have phosphorus inputs to the lake changed relative to background or pre-European levels? (2) How have algal communities and abundance responded? (3) Is the internal recycling of past P inputs driving recent trends in blue-green algal abundance? (4) Are other changes to the lake, such as warming and decreased length of ice cover also responsible for changes in algal communities? This project began in 2011 and will continue through 2014.

Student interns probe St. Croix sediments

Interns sampling sediment from Long Pond

The STARS (Science Training and Research Skills) program continued in 2012 with two summer interns researching the effects of stormwater management practices on Long Pond, a small embayment of Lake St. Croix just south of the I-94 bridge in Hudson, Wisconsin. Residents living along the shoreline of Long Pond had expressed concern about sediment deltas growing below stormwater outfalls that discharge into the pond. Water-quality managers in St. Croix County contacted Research Station scientists for guidance about sediment accumulation within the basin, and through the generous support of Long Pond residents, the Pentair Foundation, North Star STEM Alliance, and the National Park Service, a research opportunity for students was born. Alex Blel (St. Thomas University) and Fanny Okaikue (Minneapolis Community and Technical College) spent three months studying the sediment record in Long Pond with the help of scientific mentors Jim Almendinger, Joy Ramstack Hobbs, and Jill Coleman Wasik. The students discovered that Long Pond was historically a small, sedge wetland separated from Lake St. Croix by an isthmus, and that sediment accumulation rates had been relatively modest since the basin was inundated in 1938 by rising water levels of Lake St. Croix.

Artist events reach along the River Valley

The Artist at Pine Needles residency program welcomed its first potter, Sally Gierke, from Bettendorf, Iowa. Sally, an art educator, offered a unique public program: a multi-session, hands-on pottery class that was enjoyed by over 20 area residents. Class sessions took place at the picturesque barn and pottery studio of the late Richard Abnet in May Township, through the generosity of his wife, Edie Abnet. ◊ Photographer Ryan Rodgers of Osceola, Wisconsin, in residence in September, gave a presentation at the Marine Community Library. The library will showcase his images of the river in February and March, 2013. ◊ Twenty-five works of art that had been donated to the Research Station by Pine Needles resident artists were loaned to the National Park Service and displayed at the St. Croix Falls Visitor Center for the month of September. The pieces, regularly displayed in the Harmon Research Center, represent an intriguing body of work – varying artistic interpretations of the St. Croix River, the Research Station's science, and the Pine Needles cabin. We like to think that James Taylor Dunn, who donated the property, would be pleased.

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