Wetlands ecology studies the relationships between organisms and their wetland environment. It has grown from a basic science to an applied discipline, increasingly called on to help solve environmental problems. As a result, wetlands ecology combines a traditional biology approach with engineering, hydrology, geology, environmental chemistry and other disciplines. Students in the wetlands program, directed by Dr. Hans Gottgens, use this approach in their research projects. The lab is currently pursuing three research directions:

**Pulse Stability in Wetlands**

Succession in aquatic systems is often controlled by periodic perturbations, such as fluctuating water levels, drought, fire, grazing or tides. These perturbations remove organic matter and liberate nutrients. As such, they help maintain these ecosystems at an intermediate stage in their successional development. Water managers, however, generally aim to eliminate these disturbances, because they interfere with the use of aquatic habitat for water supply, navigation, recreation and aquaculture. Students test hypotheses relative to the long-term impact of eliminating or altering such a pattern of pulse stability in lakes and wetlands.

**Human impacts on Rivers and Streams**

Rivers and streams are among the most impacted ecosystems. They are used as conveyors of pollutants and have been dredged, dammed, ditched or diked. The majority of 1st and 2nd order streams, making up a stunning 75% of the total length of U.S. streams and rivers, have communities that no longer resemble their natural condition. Moreover, they have lost their ability to provide us with ecosystem services such as water quality protection and flood control. Students research stream management methods that incorporate environmental considerations, including dam removal to restore fish migration and ditch maintenance to promote conservation.

**Paleolimnological Approaches to Restoration**

To understand the response of lakes, rivers and wetlands to anthropogenic actions requires long-term records of environmental data. Because such historical data are usually absent, stratigraphic analysis of sedimentary records and the mechanisms that can modify those records (i.e., paleolimnology) may be used. The lab has published paleolimnological research on lake and wetland responses to water-level manipulations, development in the watershed, loading of agricultural non-point pollution, dam failures, and long-term contamination with toxics.

**Some current and recent projects**

- 2015. Effective wetland design for water quality improvement in the Maumee River basin, NW Ohio. *UT Incentive Fund*
- 2014. Impacts of urban river restoration on the fish community in the Ottawa River: Post-installation monitoring and analysis. *Lake Erie Protection Fund*
- 2013. Impacts of urban river restoration structures on fish community composition (Phase I). *U.S. Fish and Wildlife Service*
- 2013. Contrasting two different fish capturing methods used to evaluate fish communities. *UT Office of Undergraduate Research*
- 2011-2013. Lake Erie Basin Responses to Climate Change. *NOAA*
- 2010-2011. Impact of habitat variables on the distribution of unionid mussels, with emphasis on the rayed bean (*Villosa fabalis*). *Lake Erie Protection Fund*

**Recent publications**


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