Protecting Ohio’s Water Resources

Impact Statement

Investigators
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SUMMARY
From the Ohio River to Lake Erie, Ohio is blessed with abundant water resources. However, alarming losses in water quality threaten human health and well-being, community engagement, and environmental integrity. To address this challenge the School of Environment and Natural Resources (SENR) has a team of professionals with expertise in the natural and social sciences, education, and outreach. This work has led to improvements in water quality through reducing nutrient loads, restoring aquatic ecosystems, and protecting biodiversity.

SITUATION
Ohio’s water resources provide a wide range of important services, including drinking water and irrigation, power, fisheries, scenic value and recreation, and ecosystem function. Changes in population, land use, and climate have exerted increasing stress on water quality, often with serious effects on environmental condition and human health. For example, the frequency and severity of harmful algal blooms (HABs) in Lake Erie have increased, resulting in the loss of Toledo’s water supply in 2014 and continued impacts on the lake’s fishery and recreation industries. A legacy of dam construction and urban runoff, the spread of invasive species, and riparian degradation have impacted the health and function of streams, rivers and wetlands. Aging septic systems in rural areas are an increasing source of groundwater contamination. Sustaining and improving water quality – including the chemical (e.g., nutrients, pollutants), biological (e.g., aquatic biodiversity, ecological processes), and physical (e.g., hydrology, stream geomorphology) components of aquatic ecosystems – is vital to Ohio’s quality of life, economy, and environment.

RESPONSE
The School of Environment and Natural Resources is a leader in safeguarding Ohio’s water quality. Highlights of these multidisciplinary efforts include:

Reducing Nutrient Loads: We conducted farmer surveys and instrumented fields to identify strategies to reduce phosphorus loading and HABs in Lake Erie.
Restoring Impaired Ecosystems: We monitored water quality before and after dam removals in the Olentangy and Scioto Rivers to quantify ecosystem impacts. Our “PRO Peat Bog” and “Bog HELPR” projects assessed historical changes in peat bogs to understand the effects of degradation and guide restoration.

Protecting Biodiversity: Rare and threatened fishes have been raised in captivity and reintroduced into the wild, helping to repopulate extirpated/endangered populations.

Our efforts also have teaching and extension components, including the Ohio Watershed Academy (OWA) and Aquatic Ecosystems Extension Program. Multi-mission water-related activities are integrated at OSU’s Wilma H. Schiermeier Olentangy River Wetland Research Park (ORWRP).

IMPACT
Our efforts have led to innovative solutions to water-quality challenges and directly shape policy and management decisions. Results from our Lake Erie nutrient research indicates that changing the behavior of the 30-40% of famers who are motivated to adopt new practices should be sufficient to achieve the target 40% reduction in phosphorus. Our work provides the basis for a new ‘phosphorus index’ used by producers and policymakers to target practices on fields with the greatest impact on nutrient runoff. Our studies of bridges and dam removal are informing river restoration efforts, and directly led ODOT to reconstruct six bridges based on our designs. Our work helps managers set priorities for management of Ohio’s remaining peat bogs, and secured funding for the purchase, protection, and restoration of a rare peat-forming wetland. To date, we have propagated 225 Blacknose Shiners and 140 Lake Chubsuckers in captivity, which were released as juvenile fish into central Ohio aquatic ecosystems in coordination with USFWS and Columbus Metroparks. The ORWRP hosted 150 activities in 2016, engaging 1,700 Ohio State students and staff and 600 participants from outside Ohio State in trainings, service projects, and retreats, including water-quality programming for underrepresented groups in STEM. Educational programs about aquatic invasive species reached almost 13,000 individuals, with 90% of participants reporting significant gains in awareness, knowledge, and intent to change behaviors.