PennState

AGRICULTURAL AND BIOLOGICAL ENGINEERING

"Using Hydrologic Modeling to Mitigate Eutrophication in Agricultural Watersheds"

Excessive phosphorus and nitrogen runoff from agricultural and urban sources is a major cause of eutrophication in streams and lakes. These nutrients stimulate algal blooms which degrade water quality by depleting oxygen, reducing water clarity, producing toxins, and in extreme cases fish kills. Such problems are particularly pronounced in the Midwest, where extensive tile drained agriculture delivers excessive amounts nutrients and sediment to streams which leads to water eutrophication as far as the Gulf of Mexico and the Great Lakes. Lake Macatawa drains into Lake Michigan and has been listed with the U.S. Environmental Protection Agency as one of the most hypereutrophic lakes in Michigan for more than 40 years due to its frequent high phosphorus concentrations (greater than 100 µg/L). This initiated the issue of a Total Maximum Daily Load (TMDL) for phosphorus in 2000 that has not been met. To help guide land management and water pollution control in the Lake Macatawa watershed, a Soil and Water Assessment Tool (SWAT) hydrologic computer model was developed. This model will evaluate how land-use decisions (such as different agricultural practices or stream and wetland restoration projects) can influence stream and lake water quality, and identify which of these practices are the most effective for meeting the TMDL target. The modeling results will be used as a decision support tool by a local public-private partnership 'Project Clarity'. This project works with communities in the watershed to improve water quality by implementing best management practices aimed at reducing the amounts of phosphorous and sediments that are delivered from the land to the water.

Presented By
Lidiia Iavorivska, Ph.D.

Dr. Iavorivska joined the ABE Department in August 2018 as a Postdoctoral Research Associate with Dr. Heather Gall's Lab. Lidiia's research focuses on exploring how water quality and quantity are shaped by land-use, climatic variability, and atmospheric inputs, as well as incorporating this quantitative knowledge into sustainable management of water resources. She received a Master's degree in Environmental Economics from the Ukrainian National Forestry University in Lviv, and then came to Penn State as a Fulbright Scholar to achieve Master's and Ph.D. degrees in Forest Resources. Her doctoral research characterized the magnitude and patterns of variation of organic carbon inputs from precipitation to terrestrial and aquatic ecosystems, bringing attention to atmospheric deposition of carbon as an underreported but quantitatively important piece of the carbon cycle on both global and regional scales. Lidiia's most recent position at the Annis Water Resources Institute of Grand Valley State University in Michigan entailed using geospatial and hydrologic modeling tools to assist with management decisions in agricultural watersheds.

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3:45 – 4:45 PM
312 Agricultural Engineering Building