Environmental Science Graduate Program Student Seminar Series

Best management practices could combat nutrient loadings to Lake Erie in a changing climate

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Smith 3150 | 11/8/19 | 2:00 - 3:00 pm

Abstract:

Climate change is a concern for Lake Erie, where changes in temperature and precipitation have potential to worsen the annual harmful algal bloom. In this study, we used a watershed model ensemble and climate model ensemble to quantify the certainty in mid-century discharge and nutrients from two scenarios: "business-as-usual" management and increased adoption of best management practices. Five models for the Maumee River Watershed, Lake Erie's largest watershed located mainly in northwest Ohio and partially in Indiana and Michigan, were created by independent research groups using the Soil and Water Assessment Tool (SWAT). Each group was allowed freedom to retain differences in model structure, management, and parameterizations, and was calibrated to a gauge near the outlet. The SWAT ensemble was drove with daily temperature and precipitation predictions from six general circulation models (GCMs). Discharge predictions were not statistically different between the two scenarios, and in both scenarios discharge was correlated with changes in precipitation. For nutrients, the uncertainty is greater in directionality for the business-as-usual scenario and is is uncertain which direction phosphorus and nitrogen will change; however, many of these changes were not statistically significant. The increased adoption of BMPs still has mixed results for nitrogen, but the ensemble shows agreement for decreasing total phosphorus (average = -41%) and dissolved reactive phosphorus (-18%) annually and total phosphorus (-34%) and nitrogen (-25%) during the March-July period. These results suggest targeting the increased adoption scenario could combat nutrient loadings in the mid-century.