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**A Model of Phosphorus Emissions in NW Ohio:
Estimates and Policy Implications**

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Research from: "The implications of environmental policy on nutrient outputs in agricultural watersheds" authored by Brent Sohngen, OSU AEDE; Sei Jim Kim, OSU AEDE; Abdoul Sam, OSU AEDE; and Kevin King, USDA Agricultural Research Service. Read the full paper: <http://go.osu.edu/YUn>.

Abstract: This paper assesses the implications of agricultural conservation programs on water quality outcomes in agricultural watersheds. Since the mid-1990s, the US government has more than doubled subsidy payments to farmers to reduce pollution output on farms. In addition, new regulations have been implemented on livestock operations in an attempt to reduce the effect of their manure on water quality. In this paper, we test whether these new conservation programs and livestock regulations have improved water quality. Specifically, we assess whether the programs have reduced nutrient concentrations. To test this, we use data on daily observations of the concentration of phosphorus over a nearly 40 year period in two Midwestern watersheds that are predominately agricultural. We model phosphorus concentration as a function of water flow, temperature, precipitation, phosphorus prices, crop prices, and a series of annual and monthly fixed effects. Water flow, temperature and precipitation control for environmental variables that influence phosphorus outputs, while the economic variables control for phosphorus inputs by farmers. The fixed effects capture the response of nutrient concentrations to policy. We find that the price elasticity of phosphorus is negative and inelastic, indicating that increases in phosphorus prices reduce phosphorus concentrations in agricultural watersheds. We show that a 25% increase in phosphorus taxes would reduce soluble phosphorus concentrations by around 8%. We are unable to detect a significant effect of current agricultural policies on water quality.