

# ASSESSING POLICIES TO IMPROVE WATER QUALITY IN AGRICULTURAL LANDSCAPES

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## WHY DID WE DO THIS RESEARCH?

Agricultural activities depend on applications of nitrogen, phosphorous and potassium to soils. However, these nutrients may leach into groundwater or run off into surface water, with a detrimental effect on water quality in the watershed. Location-specific knowledge about the costs of beneficial management practices (BMPs) and how farmers make nutrient management decisions are needed to develop and implement effective water quality policies, programs and incentives.

This information is important for federal and provincial governments, conservation authorities, environmental non-governmental organizations, farmers and others concerned with nutrient loading to surface waters.



## WHAT DID WE DO?

1. An economic-hydrologic optimization model was used to estimate the cost of abating nitrate leaching into groundwater using non-traditional BMPs on potato farms in Prince Edward Island. By varying the targets for nitrate abatement for hypothetical farmers on both low and high quality land, the model determined which BMPs were least-cost for each farmer.
2. A case study was conducted in the Great Lakes to better understand how farmers make decisions about nutrient management. Farmers' actual nutrient application behaviour (based on decision-making criteria such as crop and fertilizer type) was compared to recommended application rates.

## WHAT DID WE FIND?

Farmers' land quality affects their costs to adopt BMPs. The optimization model found that in Prince Edward Island, growing the Prospect potato variety (vs. Russet Burbank) is the most cost-effective way to reduce nitrate leaching. It is estimated that farmers will adopt BMPs ascending by least-cost: 1) crop rotation, 2) Prospect potato, 3) nutrient management plan fertilizer rates, and 4) spring tillage. The model also estimated that sensitive land retirement would not be adopted due to its high cost.

Actual nitrogen fertilizer application rates were found to be the same as recommended rates in corn production in the Great Lakes case study, but the aggregate analysis failed to account for the high levels of variability of nutrient application rates between individual farmers.

## WHAT ARE THE IMPLICATIONS FOR POLICY MAKERS?

- Variability between farmers' nutrient applications and BMP adoption costs highlights that there is value in tailoring policies and programs to recognize these differences.
- Nutrient abatement targets must consider economic as well as hydrogeological and agronomic factors. Some targets may be economically unattainable given the expense of BMPs.

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