

Study: More Ethanol Production Bad for Gulf of Mexico

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The rush in the United States to produce corn-based ethanol as an alternative fuel will likely worsen pollution in the Gulf of Mexico and expand the annual "dead zone" that kills fish and other aquatic life, according to new research.

In the first study of its kind, lead author Simon Donner of the University of British Columbia and Chris Kucharik of the University of Wisconsin-Madison modeled the effects of biofuel production on nutrient pollution in an aquatic system. Their findings are online in the Proceedings of the National Academy of Sciences.

The researchers looked at the estimated amounts of land and fertilizer needed to meet future production goals for corn-based ethanol. The U.S. Senate recently announced a production target of 36 billion gallons annually by the year 2022, which is more than three times the amount of ethanol produced in 2006.

If the United States were to meet this target, Donner and Kucharik's findings suggest that nitrogen loading from the Mississippi River into the Gulf of Mexico would increase by 10 percent to 19 percent. As a result, they predict nitrogen levels would rise to twice their recommended levels, leading to an expansion of the Gulf's dead zone, a region of oxygen-starved waters that is unable to support aquatic life.

"This result confirms our suspicion that there's a significant tradeoff to the expanded production of ethanol from corn grain," says Kucharik, a scientist with the UW-Madison Nelson Institute for Environmental Studies. "It also shows that we need to continue considering our options for other biofuel feedstocks. And when we do, we need to keep the greater impacts on ecosystems in mind."

Nitrogen and phosphorus from agricultural fertilizers have been found to promote excessive growth of algae in waterbodies. In some cases, the decomposition of algae consumes much of the oxygen in the water.

Fertilizer applied to cornfields in the central U.S. -- including states such as Illinois, Iowa, Nebraska, and Wisconsin -- is the primary source of nitrogen pollution in the Mississippi River system, which drains into the Gulf of Mexico. Each summer, the export of nitrogen creates a large dead zone in the Gulf that has expanded in recent years to more than 20,000 square kilometers.

Donner and Kucharik arrived at their figures by combining the agricultural land use scenarios required to meet future demand for corn-based ethanol with models of terrestrial and aquatic nitrogen cycling. Their results call into question the assumption that enough land exists to fulfill the current demand for feed crops, while at the same time allowing an expansion of corn production for fuel.

Instead, the scientists conclude that boosting ethanol production from U.S. croplands without endangering water quality and aquatic ecosystems will require a substantial reduction in the amount of corn that is grown for animal feed and meat production.