

## Spatial Modeling of Geographic Patterns in Biodiversity and Biofuel Production

### How can the US develop sustainable biomass energy?

An important future challenge currently facing the U.S. will be to ensure that bioenergy supplies meet sustainable production standards that include consideration of biodiversity. The future of the biofuel industry will depend on public investment and trust that industry practices and regulatory standards will improve energy security without causing environment damage. Plans for increasing biofuel production have already come under fire because of real and perceived threats to the environment.

This project seeks to define conditions that promote the long-term economic viability of bioenergy feedstock production while protecting biodiversity. We are developing quantitative, science-based approaches to meet this challenge. The methods developed will quantify changes in aquatic biodiversity in response to projected land-use changes associated with expanding production of bioenergy feedstocks and use of agricultural residues.

### Integrated analysis

The ecological health of rivers is an integrated measure of the landscapes that they drain. Consequently, this study will focus on biodiversity in riverine fish communities. Predictive models have been developed based on stream order, flow, and habitat area. However, research is needed to identify causal linkages between fish diversity and land-use changes associated with bioenergy.

### Ecological valuation

Beyond this research, our long-term goals for this program are to bring biodiversity into the equations and used to make spatial decisions guiding the biofuel industry, such as where to site biorefineries and where to grow which crops. To advance this goal, we will develop and apply spatial valuation methods that facilitate comparisons between energy and ecological objectives. These methods will identify places where bioenergy can be produced using suitable crops or residues that enhance or protect biodiversity.

#### *Point of Contact:*

Henriette Jager, Oak Ridge National Laboratory, Oak Ridge, TN 37831-6036, jagerhi@ornl.gov

