NIMBioS
National Institute for Mathematical and Biological Synthesis

NIMBioS Interdisciplinary Seminar

3:30 p.m.*, Tuesday, April 1, 2014

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Getting the Most Out of Rivers: Sustainable Hydropower Development

What is the best way to arrange dams within river basins to benefit society? Recent interest in this question has grown in response to the world-wide trend toward developing hydropower as a source of renewable energy in Asia and South America and with the movement toward removing unnecessary dams in the US. Hydropower development has rarely been planned with the goal of providing society with a portfolio of ecosystem services into the future. I synthesized a review of river basin design around four questions related to spatial decisions: Is it better to build fewer main stem dams or more tributary dams? Should dams be clustered or distributed among distant subbasins? Where should dams be placed along a river? And at what spatial scale should decisions be made? The following design principles emerged from our review: 1) concentrate dams within a sub-set of tributary watersheds and avoid downstream main stems, 2) disperse freshwater reserves among the remaining tributary catchments, 3) ensure that habitat provided between dams will support and retain production, and 4) formulate spatial decision problems at the scale of large river basins. To illustrate this, I developed a simple model for the American eel (*Anguilla rostrata*). For a randomly generated river network, I produced a Pareto-optimal frontier of solutions demonstrating where power dams should be located to maximize two objectives: power generation and eel survival.

Location: Tom Hallam Auditorium, Room 206 at NIMBioS, Claxton Education Bldg, 1122 Volunteer Blvd.

**Join us for refreshments at 3 p.m. in the Auditorium.*

The National Institute for Mathematical and Biological Synthesis (NIMBioS) brings together researchers from around the world to collaborate across disciplinary boundaries to investigate solutions to basic and applied problems in the life sciences. NIMBioS is sponsored by the National Science Foundation, the U.S. Department of Homeland Security, and the U.S. Department of Agriculture with additional support from The University of Tennessee, Knoxville.

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