The Economics of Great Lakes Aquatic Nuisance Species
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Invasive species management is both an ecological and economic problem. Last October, economists, ecologists, and policymakers met at Michigan State University to discuss how to better integrate economics into invasive species research, policy, and management, emphasizing aquatic invasive species in the Great Lakes. The workshop was funded by the Great Lakes Fishery Trust and Michigan State University’s Environmental Research Initiative (www.msu.edu/~lupi/IAS_Economics_Conference.htm).

The workshop participants agreed that more research and better integration and communication of the limited existing research on the economics of invasive species is necessary. Participants expressed hope that an explicit invasive species economics research agenda could help transition from policies that react to established invasive species toward proactive management regimes that blend prevention, control, and adaptation. Three main themes emerged from workshop:

- The need to improve communication among economists, ecologists, and policymakers,
- The need to empirically estimate how invasive species affect human well-being, including effects on the economy and on people more generally,
- The need to enhance and clearly communicate ecological-economic modeling.

Communication among economists, ecologists, and policymakers
All participants agreed that economist and ecologist tend to speak different languages. However, participants who had more transdisciplinary experience found the similarity between economics and ecology remarkable. David Lodge, an ecologist, and Stephen Polasky, an economist, agreed that, “Economists and ecologists think similarly about feedbacks and webs,” and “the underling concepts [in ecology and economics] are amazingly similar.” Each discipline has a lot to offer the other. Several participants noted that economists are not accountants, and there is a need to avoid asking for a number after decisions have been made. Economics can be better integrated into Great Lakes management in general and invasive species management specifically, if economists are included early on in policy discussions.

The value of value estimates
Policymakers expressed a strong desire for “hard numbers” on the impact of invasive species. John Dettmers, a senior fisheries biologist for the Great Lakes Fishery Commission, emphasized that the Lacy Act empowers the U.S. Office of Management and Budget (OMB) to prohibit injurious species from import to the U.S. The OMB requires “hard economic numbers,” and fisheries managers are “woefully prepared.” Empirical research to estimate the net benefits from various invasive species management policies is imperative. This research must properly consider the policy alternatives. What happens if we did nothing? Credible estimates from methods that meet professional standards and withstand scrutiny are needed.

Research should focus on the marginal net benefits from implementing a given policy. In considering these net benefits, or net costs from invaders, it is important to consider i) direct control costs, ii) residual costs, and iii) loss of ecosystem services and nonmarket costs. Most
estimates of invasive species damages focus on direct control costs. Two complications merit consideration. First, people take actions to avoid damages, thereby incurring costs but similarly mitigating damages. Second, not all non-native species are decidedly bad. Some cause net damages, but provide some offsetting services. Zebra mussels cause many damages, but may provide some offsetting services in terms of water clarity. The net damages should be considered.

It can also be important to consider non-marginal policy shifts, e.g., the recent study by Taylor and Roach on removing ocean going shipping from the Great Lakes. For such studies to be useful it is important to map ecosystem functions and structures to services that ecosystems provide to society. Invasions, too, may cause non-marginal ecosystem shifts. The important question is what happens with and without a potential policy?

Invading a new science-policy realm: Integrating ecology and economics
Participants also discussed the benefits of integrating economic and ecological models. Although ecological and economic systems are complex, transdisciplinary integration requires simplification. While this simplification may sacrifice precision in some areas, the integration of ecology and economics enables increased accuracy and a clearer picture of the system as whole.

The goal of many modeling efforts is to help predict future trends in ecosystem change and how alternative policies will alter those changes. It is critical to consider how changes in the ecosystem and or changes in policy alter human behaviors. Economists can help understand how the state of the ecosystem and the state of the social system, i.e., institutions, affect peoples’ behavior, e.g., compliance with regulations.

Institutional and disciplinary biases can make doing this policy relevant work costly for researchers. Yet, a number of researchers in the Great Lakes region are leaders in the emerging field of integrated ecological-economic modeling. Policymakers should nurture these collaborative transdisciplinary efforts and provide support for such non-traditional collaborations. The outputs of such collaborations are likely to be i) more efficient use of recourses addressing invasive species, e.g., balancing resources among prevention, detection, and control, and better predictions of socio-economic implications of new invasions.

Economics help inform invasive species policy and management, but good economics relies on good ecological science. Likewise, humans have a large impact on ecosystems and invasions. Therefore, good ecological science also benefits from the inclusion of economics. Both are necessary to craft effective invasive species policy and management.