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Response to Walters 1997. "Challenges in adaptive management of riparian and coastal ecosystems"

Keystone Species and Academic-Agency Collaboration

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Each year, billions of dollars are spent on environmental management and monitoring. It is widely believed that science has a role to play in these activities. At the same time, academics are trying to bootstrap ecological science from shoestring budgets. There would seem to be enormous opportunities to develop ecological science by engaging academics in the practice of ecosystem management. Why is this opportunity not exploited?

Walters (1997) presents a thoughtful and sobering perspective on barriers to adaptive management. In this response, I point out additional barriers from academic culture, and note a keystone structure that could potentially overcome the barriers created by academic and management cultures. These ideas are explained more thoroughly in a review paper on large-scale ecological experiments (Carpenter 1998).

Academic culture significantly impedes participation of faculty and graduate students in experimental ecosystem management. Academic reward systems are biased in favor of research that is narrowly disciplinary. If academia were an ecological community, we might observe that intense competition for limited resources in a stable, sheltered environment has created tightly packed, narrow, and rigorously defended niches. In this environment, successful research exploits problems that are controlled and sharply focused. Standards for hiring, promotion, and tenure create pressure for fast publication (in comparison to slow ecosystem processes) and aversion to interdisciplinary, multiauthored publications. There is selection against research on complex, variable ecosystems that require long-term study and cross-disciplinary collaboration.

Some progress has been made in breaking down these barriers. For example, the international global change research program, the U.S. Long-Term Ecological Research Program, and various other ecosystem research teams are producing superb multidisciplinary, multiauthored publications that are slowly broadening the standards of academic ecology (Pace and Groffman 1998). Nevertheless, young scientists feel that they may be penalized for team research, and established ecologists must strive to ensure that their bright, younger colleagues are rewarded and recognized for their contributions to teams. For example, the leading ecological societies could establish awards that explicitly honor outstanding collaborations and interdisciplinary accomplishments of teams. There are many ways for leading academic ecologists to use their influence to reward research that is appropriately scaled, collaborative, interdisciplinary, and useful.

Large-scale, long-term ecological experiments are seriously limited by the institutional structures available to promote, fund, and sustain them. Several institutional challenges are discussed by Walters (1997). Successful management of an ecosystem experiment requires coordination of agency personnel and academics in ways that accomplish broad objectives while fostering, and using, the creativity of diverse individuals. Funding must be sustained long enough to determine the ecosystem response and interpret the results. The logistics of the experiment itself may be daunting and unprecedented. These are significant challenges, yet they have been overcome in some cases (Gunderson et al. 1995, Carpenter 1998). What can be done to increase the frequency of successful ecosystem experimentation?

In ecosystems, potentially destabilizing interactions can be held in check by keystone species (Paine 1969). Successful collaborations of academics and managers also involve keystones (Carpenter 1998), and they counter the tendencies that could break up agency-academic collaborations. The keystone may be a well-placed individual, as in the role played by Jim Addis in lake management experiments in Wisconsin (Kitchell 1992), or an institution, as in the role played by the Canadian Department of Fisheries and Oceans in resolving controversy over causes of lake eutrophication (Schindler 1977). The keystone promotes adaptive, experimental management by brokering collaborations between managers and scientists and dispersing power and resources in ways that sustain collaboration.

The fact that some large-scale field experiments on management issues have succeeded suggests that the approach can be applied more widely. We need to discover, and select for, the circumstances that foster success. Prior to the meteorite impact that triggered the Cretaceous extinctions, mammals were as rare as successful adaptive management projects now seem to be. The age of adaptive management is waiting for changes in institutional structures that will facilitate large-scale, long-term learning by doing.

RESPONSES TO THIS ARTICLE

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