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Commentary on Gordon Baskerville's Perspective

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I find much that I can agree with in Gordon Baskerville's commentary, and also some omissions that I think are important in understanding the relation of ecological science to resource management.

First, the notion of management plans and prescriptions as working hypotheses is very appropriate. Unfortunately, resource managers have not been trained to consciously view them in that way, nor have they been consistently described to stakeholders and the public in those terms.

Second, academics have pursued (and often still pursue) esoteric topics and detailed models, invariably for special cases. Relevant ecological science has been, and is being, carried out, however. One need only examine the science base of such large−scale policy analyses and plans as the Northwest Forest Plan for federal lands in Oregon, Washington, and California. Ecosystem−oriented research programs involving interdisciplinary groups and collaborations between academic and government scientists, as exemplified in many of the Long−Term Ecological Research programs, have been most productive of relevant information.

There is a major missing piece in Baskerville's analysis of science and resource management, however. Inadequate knowledge, much of it of a very fundamental nature, has been and remains a major problem in resource management. This is further exacerbated by managers' unwillingness to accept and incorporate major new knowledge when it does emerge from scientific efforts. We simply do not know nearly as much about forest ecosystems as we, and especially foresters, thought that we did. And resource managers are not happy when new knowledge challenges fundamental assumptions, threatens on−going programs, and runs counter to professional values.

To illustrate how inadequate existing knowledge has been, consider the important discoveries of the last 25 years with regard to: (1) the extraordinary dynamics of the belowground subsystem and its high energy requirements; (2) the importance of the dead tree and its derivatives in the long−term functioning and habitat diversity of forests, streams, and rivers; (3) the scale and complexity of edge influences that can be created through forest harvest practices; and (4) the importance of biological legacies, living and dead, in ecosystem recovery following catastrophic disturbances, and the poor match in conditions and processes between most natural disturbances and clearcutting.

This is just a small sample of recent scientific insights into forest ecosystems. In fundamental ways, each of these findings alters our view of these forests and how they work . We simply did not understand some very basic aspects of forest structure and function. Consequently, traditional forestry approaches, based on a very simple view of a forest, have proven very inadequate. Resource managers thought that they could grossly simplify forests without consequence. They have done so on a grand scale, and often react energetically against adoption of alternative models of how forest ecosystems work.

There is no question that recognizing the potential ecological value of a dead tree makes life much more difficult (or, put another way, more interesting) for the silviculturalist. Perhaps as important, it challenges the basic value set for foresters, many of whom share a strongly utilitarian view of the forest.

Finally, it is my view that scientists are learning how to synthesize and present relevant scientific information for resource managers, decision makers, and the involved public. One of the most important arenas for mutual learning is found during the development of policy analyses and plans for various regions. Some examples are the Northwest Forest Plan (already mentioned), the Clayoquot Sound scientific panel (coastal Vancouver Island,

British Columbia), the Sierra Nevada Ecosystem Project (California), and the Trillium Forestal project in Chile.

These are mutual learning processes. For example, many important questions in conservation biology are emerging from these efforts, and they are very different from the kinds of topics that have been the focus of many academic conservation biologists. In effect, efforts to practice conservation biology are identifying important areas where we lack basic knowledge.

An additional important aspect has been the development of approaches in which scientists, often in collaboration with others, identify a variety of alternative approaches and then provide environmental, economic, and social evaluations of each. Rather than provide "a" solution, society is provided with choices and with an evaluation of the costs and benefits of each.

Unlike Baskerville, I do "expect a 'scientist' to think/work/write in the temporal and spatial domains in which a manager of a forest must work." Scientists have demonstrated that they can do this and, indeed, it is essential that many do so if we are to develop relevant science and the best management practices or "working hypotheses" possible. It does mean being open to and operating in some very different modes than have been traditional for the academic scientist.

The challenges to adaptive behavior are just as great and fundamental for the resource manager.

What implications are there for a young scientist in training? For at least the near term, I feel that the future for trained ecologists is primarily in the interface between science and application. If we look at what has happened in the last decade and the tasks that are already on the table, if we consider the notion of Schrader−Frechette that most of ecology is natural history and case studie, and accept that it has even moderate validity, then ecological science will be largely defined by its application in the real world. If academic ecology pursues directions irrelevant to currently recognized problems, its practitioners will have limited futures (much the same as with resource managers who persist in denying the reality and implications of new scientific insights).

The most useful and employable graduates are going to be those who know how to work with other disciplines on complex problems. Theses and publications are going to have to demonstrate that ability. Employers will look for evidence of collaborative abilities in resumes; multiple−authored publications will be (indeed, already are) viewed as a positive rather than a negative. Employers will also look for theses and other products demonstrating that the emerging student recognizes the truly important scientific black boxes. Problems will remain for those ecologists who seek a traditional academic position, since evaluative processes have been, and will probably continue to be, slow in recognizing the reality of where ecological science has been and is going. Unfortunately, as is often the case, some elements of academia will be on the trailing, rather than the cutting, edge of change!

RESPONSES TO THIS ARTICLE

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