TAKING STOCK OF CONSERVATION BIOLOGY: OLD PROBLEMS AND NEW DIRECTIONS

Conservation Biology Research Priorities for the Next Decade. Michael Soulé and Gordon Orians, eds. Island Press, Washington, DC, 2001. 288 pp., $25.00 (ISBN 1559638699 paper).

Designing Field Studies for Biodiversity Conservation. Peter Feinsinger. Island Press, Washington, DC, 2001. 224 pp., $27.50 (ISBN 1559638788 paper).

As scientists in a maturing discipline, conservation biologists are still formulating methodologies, identifying and prioritizing the problems they must solve, and forging and understanding their relation to other disciplines such as ecology, geography, and sociology. These two books make valuable contributions to conservation biology and document some of its progress, both theoretical and empirical. They display some of the challenges the new discipline faces and mark some of the crucial issues it has so far failed to address adequately. They also provide glimpses into the unique nature of conservation biology as a young science with a characteristically normative agenda.

Conservation Biology: Research Priorities for the Next Decade has two objectives: to summarize the knowledge gathered in the principal fields of conservation biology and to propose agendas to guide research. It is the culmination of the April 2000 meeting of the Society for Conservation Biology, which focused on updating the research priorities set forth over a decade earlier (Soulé and Kohm 1989). Soulé, one of the founders of the society, and Orians, a distinguished behavioral and community ecologist, spearheaded the development of 10 focus topics. Prominent conservation biologists, almost exclusively from the United States, contributed essays, based on these topics, that constitute the anthology's core chapters.

The project is ambitious. The proposed agendas should "provide a meter stick to measure progress" (p. x) that "inspire[s] conservation biologists addressing new as well as long-established problems" (p. xi). Surprisingly, in approximately 300 pages, the volume does a remarkable job of fulfilling its goals.

The chapters canvass many traditional conservation concerns in thorough detail: viability analysis, anthropogenic alteration of food webs, management of exotic species, habitat fragmentation, global climate change, and restoration ecology. Topics that receive less attention in the literature, such as conserving soil and sediment invertebrates, marine conservation biology, the relation of conservation biology to the health sciences, and conservation decisionmaking strategies are also thoroughly discussed. Each chapter includes a clear presentation of the main facets of the topic, a helpful summary of what is theoretically and empirically known about the topic, and a list of research priorities. A comprehensive bibliography, which refers to classic papers as well as recent publications, makes this volume an asset to any aspiring or veteran conservation biologist.

Some important controversies, however, receive insufficient attention. For example, corridors are often invoked as a possible solution to many conservation problems, from how best to cope with global climate change to how best to utilize conservation funds. Yet, doubt has been cast on some of the evidence presented to support the claim that corridors are effective; it remains uncertain whether and how often organisms use them (Nicholls and Margules 1991). The problem is that theoretical arguments, observation, and experimental evidence do not yield unequivocal conclusions (Simberloff et al. 1992). Recent studies suggest that the effectiveness of corridors can only be determined for specific organisms in specific landscapes (Haddad et al. 2000). Soulé and Orians' anthology is silent on this contentious issue.

Most of Soulé and Orians' research priorities require extensive data collection and a wide variety of field experiments, not further elaboration of ecological theory. Feinsinger's book, which is intended to provide conservationists with a guide to field study design, complements and addresses their priorities.

Feinsinger, a hummingbird ecologist and recipient of the Eugene P. Odum Award for Excellence in Ecology Education, based *Designing Field Studies for Biodiversity Conservation* on a series of talks to Latin American conservation professionals given May 1995 in Quito, Ecuador. His book focuses on field studies designed specifically for conservation purposes, which distinguishes it from other field ecology manuals.

Most scientifically oriented readers of Feinsinger's book will find the first three chapters rather lean on substance. For example, his first figure (1.1) is captioned "Why scientific inquiry should play a role in conservation and management," which belabors the obvious. His warnings about using rigid models of scientific method, such as the hypothetico-deductive method, are correct, but few will find this surprising given the well-known complexity and intractability of most ecological systems.

The remaining chapters are replete with astute observations that should be heeded by conservation biologists and more than compensate for the weak beginning. For instance, Feinsinger's chapters 4 and 5 discuss in detail one worry found in Soulé and Orians' book (2001): "The task of stipulating an appropriate level of statistical power and an acceptable effect size is not simply a statistical decision. It entails judgments about the biological importance of an effect.... The risk of false optimism may be com-

pounded by experimental designs that fail to account for the independence of replicates" (p. 238). For example, to demonstrate the potential pitfalls of field study design, Feinsinger describes a hypothetical reserve and considers 16 different designs that attempt to assess whether "selective logging significantly alters the abundance and diversity of forest birds, frogs, and small mammals within a reserve." Feinsinger points out what can and cannot be justifiably concluded from different designs and why. He also notes when a question should be changed to accommodate the resource constraints of the study.

An interesting and problematic issue addressed in chapters 8 and 9 is that the goals of conserving biodiversity and of ensuring the integrity of ecosystems can conflict. According to Feinsinger, a common assumption in the use of diversity indices is that "diversity decreases when ecological integrity is compromised" (p. 131). Yet, with a realistic example, Feinsinger demonstrates that diversity, when measured by the Simpson or the Shannon-Weaver indices, often increases when invasive species are encroaching into an area. Feinsinger never defines "ecological integrity" explicitly, but he emphasizes that biodiversity indicators are often poor integrity indicators and vice versa. Consequently, designing field studies to answer questions about either requires different considerations.

Neither book adequately speaks to one of the shortcomings conservation biology has only recently begun to address: nondetrimental or even *positive* impacts of human disturbance regimes on ecosystems, for instance, on their biodiversity. As is typical, and often justifiable, in conservation biology, Soulé and Orians devote attention to the destructive activities of humans. Discussion is focused on the evidence of negative human impacts on ecosystems and framing research agendas that will help formulate counteractive strategies. A prevailing focus on the negative, however, does not justify an exclusive one.

Studies of the possible neutral or positive role of humans should be at the top of any list of conservation research priorities. Humans are, and will continue to be, an integral component of the ecosystems of the world. Such studies require the development of field study designs that are sensitive to the needs of local people and that can accurately assess which activities have positive influences and which ones do not. Although not at the center of Feinsinger's concerns, this subject deserves more attention than it is given.

In an ethical context, Feinsinger duly focuses on issues regarding local peoples' use of lands. He is especially sensitive to the needs of local people when designing field studies. For instance, he emphasizes the importance of including and encouraging local participation in achieving conservation goals: in motivation of conservation action, in study design, and in management. As Feinsinger rightly remarks, "conservation isn't by any means just a top-down policy of setting aside protected areas and restricting their use. Rather it's a means of ensuring that the landscape and its natural resources are available to future generations" (p. 147).

This statement seems to stand in stark contrast to Soulé and Orians' claim that

> there is a tendency for discussions of the human dimension of biodiversity to be politicized by creeping anthropocentrism—to shift from discussion of what is best for nature to what is best for indigenous people. In a world where human beings receive more than 99 percent of the development aid and charity, it is increasingly difficult to find resources to help the other species with whom we share the earth (p. 281).

As the history of failed conservation actions makes clear, however, without local support, conservation efforts are doomed to fail (Alcorn 1993; cf. Redford and Stearman 1993).

One reason for this neglect to consider local needs and issues may be an unscrutinized assumption that characterized much of the origins of conservation biology: The influences of human activities on ecosystems are almost always deleterious. Since this assumption was rarely made explicit, it was seldom tested. Thus, in comparison to negative anthropogenic effects, there is scant scientific information on positive ones. Of course, humans exert an overwhelmingly detrimental pressure on ecosystems and most of the collected evidence, therefore, is of this nature. Yet there are instances, sometimes only anecdotal but sometimes rigorously documented, in which anthropogenic disturbance regimes have a positive influence on ecosystems (Perevolotsky and Seligman 1998).

As is noted in Soulé and Orians' anthology, conservation biology emerged in response to the dramatic, human-caused environmental destruction during the second half of the 20th century (pp. ix, xvi). In a thoroughly normative discipline, especially a perceived "crisis" discipline (Soulé 1985), that is formed to achieve goals that are emotionally charged, factual claims that hold in a multitude of cases are often taken to be universal truths. It was therefore facile, though unjustified, to conclude that humans always have a detrimental influence on ecosystems. Unfortunately, this assumption can and probably has led to disastrous results. For example, Thomas (1983) found that the Adonis Blue Butterfly *(Lysandra bellargus)* depends upon grazing pressure that is being eliminated by modern agricultural techniques. Thus, a reserve that was designed to preserve this species but that did not incorporate a grazing disturbance regime would fail.

Fortunately, conservation biologists are reconsidering this assumption, and evidence is gathering of civilizations that have (and have had) a significant positive impact on ecosystems. Recent data, for instance, have shown that humans may have had a hand in creating 12 percent of the nonflooded Amazon rainforest (Balée 1994) and the large swaths of terra preta—remarkably fertile soil for the tropical region (Woods 2002). Other studies are showing that some agroforestry practices enhance, rather than diminish, biodiversity (Balée 1994). More detailed knowledge of these types of human activities and how they can be incorporated into conservation plans

should be at the forefront of conservation research priorities.

Each book also highlights a challenging feature of conservation biology: how to balance the virtues of generalization at the core of the traditional scientific enterprise with the ineluctable particularity of different conservation contexts (Sarkar 1996). Feinsinger encounters this problem in formulating guidelines for designing field studies. The difficulty lies in providing helpful guidelines to conservationists that are general enough to apply to a variety of contexts while recognizing that field study design depends essentially on the nature of the target system. Favoring the latter, Feinsinger stresses that the desire to uncover sweeping generalizations may hinder the design of field studies in conservation biology.

Feinsinger's methodological suggestion underlies many of Soulé and Orians' research priorities. Conservation biologists, they point out, "urgently need much better information on distributions of species, the composition of ecological communities, and the ecological requirements of the species they attempt to preserve" (p. 3). Acquiring this information is the best way to answer questions in specific conservation contexts, and it should take precedence over strategies that rely significantly on generalization. As Soulé and Orians put it, "[t]he complexity of nature severely limits the types and scopes of useful generalizations that are likely to be generated by conservation biology research in the near future" (p. 278).

Although these books do not consider some important issues, they make a valuable contribution to the conservation biology literature. Soulé and Orians's and Feinsinger's books provide a clear picture of where conservation biology stands and where its research is heading and serve as a guide to the complexity of designing field studies. Besides acquainting the reader with the methodologies and results of the field, they also provide a glimpse into the challenges it faces.

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