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Globally Dispersed Local Challenges in Conservation Biology

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Introduction

Contemporary challenges in conservation biology seem more formidable than 20 years ago, when the founding of the journal *Conservation Biology* more or less coincided with the emergence of conservation biology as a distinct scientific discipline. Several years ago, David Ehrenfeld, the founding editor of the journal, and one of the cofounders of the discipline, likened conservation biologists to practitioners of medicine and urged that we evaluate the success or development of our discipline by the condition of our patient (Ehrenfeld 2000). Of course, our patient—biodiversity—is not well, particularly in the tropics where most biodiversity is found. Although deforestation rates have slowed in some parts of the world, forest degradation has accelerated in other parts (Jha & Bawa, 2006). Moreover, improved monitoring methods indicate that previous rates of biodiversity loss may have been gross underestimates (Laurance et al. 2004). Some might argue that were it not for the contributions made by conservation biologists, biodiversity loss may have been much higher, but for most parts of the world we lack the evidence to validate such an argument.

The challenges we face, as Ehrenfeld also pointed out, are not primarily biological. In that sense, the term *conservation biology* may itself be misdirected. However, whatever name one chooses to more accurately describe the field, biologists do have a great deal to contribute to the resolution of contemporary challenges. Suppose we posit a goal of curtailing or eliminating further biodiversity losses over the next 20 years. To achieve that goal, we will have to fundamentally transform many of the interactions between society and biodiversity. In particular, we must recognize that in the developing world, poverty and disenfranchisement pose severe constraints to conservation of biodiversity over vast areas (Adams et al. 2004). Unless we develop a new conceptual framework for action,

create the necessary institutional and policy frameworks, and build human capacity, our successes will be limited and ephemeral. To pursue such goals we must meet five interrelated challenges: economic sustainability, institutional development, interdisciplinarity, capacity building, and large-scale action.

Five Challenges

Economic Sustainability

Millions of people in biodiversity hotspots rely on natural ecosystems to sustain their livelihoods, and in many areas these people live on less than US\$1/day. Subsistence economies such as these present challenges and opportunities for conservation biologists. They are challenges because unless direct reliance on biodiversity resources is reduced, ecosystems in most cases will continue to degrade. This, however, does not imply that local communities are the primary agents of biodiversity change. There are multiple levels of pressure on biodiversity (Bawa & Dayanandan 1997; Geist & Lambin 2002), and among these the relative effects of local communities on biodiversity are probably the least understood and the most variable. Furthermore, although the excessive use of biodiversity has an undoubted impact on natural ecosystems, it is not the use per se that is the primary driver of change. In many cases, local communities have been marginalized or pushed to subsist on marginal lands, where they are expected to pay huge opportunity costs for maintaining biodiversity levels for the benefit of the entire global community.

The interactions between poverty and biodiversity are complex and raise difficult questions. What roles do access inequities and conflict over resources play in biodiversity changes? How do changes in biodiversity influence the activities and behavior of local communities, and

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how do their activities in turn affect biodiversity? How do people respond to persistent insecurities of livelihood and tenure? What is the impact of wider social trends on biodiversity and on the interactions between local communities and biodiversity? In this era of economic globalization and impending climate change, how can resilience be built into the interactions between biodiversity and local communities? What policy interventions can help diversify the livelihoods of local communities, reduce their reliance on ecosystem products, increase their basic economic security, and compensate them for protecting the ecosystem services that benefit all of humanity?

Resolution of such questions offers unparalleled opportunities to enhance the conservation of biodiversity. Millions of rural people can be made partners in conservation if their direct dependence on ecosystem products can be reduced through the diversification of livelihoods and amelioration of extreme poverty. The same interventions can, in principle, minimize conflicts over resource use, increase equity in access, and provide compensation for ecosystem services.

Partnerships with people living close to protected areas also offer opportunities to extend the effective boundaries of wildlands. Areas adjoining protected habitats are being converted to intensive agriculture, reducing biodiversity and degrading ecosystem services (Jackson et al. 2005; Perrings et al. 2006). In these habitats, traditional agriculture and agroforestry systems, reinforced with modern scientific knowledge, can enhance biodiversity and support ecosystem services while extending habitats for wild species. "Reconciliation ecology" that fosters biodiversity-rich agricultural systems and the use of such habitats by wild species (Rosenzweig 2003) offers the potential to further the goals of conservation, sustainability, and poverty alleviation.

Institutional Development

The institutional challenge arises directly from the economic sustainability challenge. Institutions, formal and informal, are the keys to meeting the sustainability challenge and governing the commons (Dietz et al. 2003). Integrated conservation and development projects (ICDPs) have often failed because, among other things, insufficient attention has been paid to the institutional framework necessary to conserve biodiversity. Multiple institutions at different scales with overlapping functions must network to generate and apply knowledge to resolve issues related to society-biodiversity interactions. Institutions are needed to create integrated knowledge systems focused on the interactions between society and biodiversity. Where such knowledge institutions lack the capacity to communicate successfully with policy and decision makers and to link knowledge to action, border institutions or individuals may be required to play an

intermediary role (Cash et al. 2003). At the same time, community-level institutions must have the capacity to translate awareness into action, reduce conflicts, and promote equity. Above all, such institutions must represent a range of stakeholders in the community. Even in countries such as India, with strong grassroots democratic traditions, village-level institutions remain the weak link in the success of participatory management systems seeking to improve human well-being and protect biodiversity (Lele 2004).

A related institutional challenge is that of maintaining a long-term supportive presence at a site. Many well-intentioned conservation efforts have lost their effectiveness because of grant-limited time horizons. The project concept itself may need to be revised or supplemented by other models for supporting conservation-oriented activity, and for compensating communities for their long-term opportunity costs (Kiss 2004). The assumption that conservation-friendly enterprises should become self-supporting is unrealistic in most cases, and unethical because wider communities stand to benefit from conservation. We must develop institutions capable of converting these relationships into permanent, reciprocal, legally or contractually supported frameworks.

Interdisciplinarity

The goals of economic sustainability and institutional development cannot be met by following traditional, discipline-bound paths; they will require a fundamentally different approach. It is already a cliché to say that concepts from the natural and social sciences ought to be integrated to address social and ecological systems. But there are important constraints in bringing together various disciplines (Winder 2004). Natural and social scientists must not only work together but must develop new concepts and approaches to address the issues arising from interactions between human societies and biodiversity. It will not be enough to simply continue using the paradigms developed separately by various disciplines because the problems themselves are changing in important ways. Conservation biologists may benefit from a new science focused on integration of multiple concepts and tools and with emphasis on implementation of results (Bammer 2005).

Furthermore, modern scientific knowledge must do better at incorporating traditional knowledge whenever possible. Interdisciplinary groups can enrich their toolkits by working with community-based organizations to advance the participatory resource management that is so critical to conservation of biodiversity. Working with local communities, conservation biologists can develop a coherent approach to generating new knowledge to address critical issues in sustainability. Overall, the integration of natural and social science techniques, the combination

of modern scientific with traditional knowledge, and the incorporation of local communities into the practice of modern science should result in a new set of questions and approaches.

Capacity Building

Capacity building to promote interdisciplinary research and action, particularly in regions rich in biodiversity, is a fourth major challenge. Obviously, the biggest constraint on interdisciplinarity is that discipline-based training still remains prevalent, even after years of rhetoric about the need to reduce disciplinary isolation. This is particularly true in much of the developing world, where even the traditional disciplines are poorly developed and where academic institutions are often bound by tradition. Human capacity of course needs to be developed, but international donor agencies and conservation organizations can also benefit by reviewing their goals and strategies for capacity building. I see three important subchallenges in this area. (1) Too few people are being trained. The dominant trend is to send people to train in the North at huge cost, meaning that only a few people can be trained. (2) Academic institutions, nongovernmental organizations, and community-based organizations in developing countries need to be strengthened. In many cases, they are the groups implementing conservation projects. (3) Training needs to be relevant. Even in the North, institutions have a limited capacity to train professionals capable of following interdisciplinary approaches (Niesenbaum & Lewis 2003), and the challenge is more severe in the tropics. New initiatives will be required in the academic arena, in the North and in the South, to address contemporary challenges.

Large-Scale Action

Conservation biologists must focus on questions that are relevant to policy and society and that can result in action at a large scale. Large-scale action requires working together with government agencies because they, in most regions, are the only institutions with the authority to launch projects on a massive scale. Only such actions can link our science more closely with policies that affect conservation, sustainability, and human well-being.

A New Paradigm

Our most important conservation challenges thus relate to working out a conservation paradigm that goes well beyond the conservation of biodiversity in protected areas by state agencies—although that too will remain an important part of the picture. Present and expected future circumstances compel us to devise a paradigm that

takes into account the well-being of local communities in and around protected areas, incorporates partnerships with such communities in conservation as a central tenet, and seeks to extend the boundaries of wildlands into areas adjoining protected areas and farther into agricultural lands. We have no viable alternative to the “gardenification” of nature, in the sense articulated by Janzen (1999). Our challenge is to develop and to realize this paradigm by improving the institutional framework for its implementation, fostering interdisciplinarity, building the capacity needed to address new and emerging issues, and developing the means to apply the paradigm at the large scale.

The challenges I have outlined here are personal reflections and do not minimize the importance of the other challenges posed in this issue. Not everyone will agree with every suggestion made, and some of these suggestions may be especially applicable to the species-rich and densely populated tropics. Different approaches may work in different areas. Conservation biologists have a vast and complex canvas. A multiplicity of approaches not only enriches our science but also is necessary for success in our mission-oriented discipline (Bawa et al. 2004).

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