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CHAPTER 28

THINKING CREATIVELY ABOUT CONSERVATION BIOLOGY IN ASIA

By

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ABSTRACT

Conservation biologists in Asia have tended to focus on the species or ecosystems of greatest concern to them, and given much less attention to the practical implications of their studies. This is quite understandable, but one result has been that policy makers have been only modestly affected by the views of conservation biology. In order to have the necessary policy impact, conservation biologists need to better understand the concerns of policy-makers, and address the kinds of issues that are of greatest concern to the people and institutions that are determining how budgets are spent, and where resources are put to action. Such issues as human health, trade, economics, energy, agriculture, extreme natural events, national security, invasive alien species, biotechnology, climate change and the private sector are all issues where conservation biologists can make much greater contributions than they have to date. This paper encourages conservation biologists to reach out into the corridors of power by seeking to use their insights into the functioning of natural systems to provide practical guidance to policy makers.

Keywords: conservation biology, framework, political issues

INTRODUCTION

In responding to immediate threats to biodiversity, the development of conservation biology in Asia has been dominated by concerns about threatened species and measures to conserve them, such as protected areas, anti-poaching, and control of illegal trade (e.g. Primack and Lovejoy 1995; Wikramanayake *et al*. 2001). More recently, issues of traditional knowledge and the role of local communities, often involving indigenous or tribal peoples, have received more attention as more conservation biologists are now working with social scientists to find better ways of enabling people to live in balance with their living natural resources (Dang 1991; Kothari *et al.* 1998; Guangwei 2002).

Despite the significant efforts of thousands of conservation biologists in all parts of Asia, along with contributions from hundreds of additional conservation biologists from abroad working in Asia, the political impact of conservation biology remains depressingly minimal. The findings of the recently-released Millennium Ecosystem Assessment (MEA, 2005; Hassan *et al.*, 2005) demonstrated that most ecosystems are increasingly threatened by human activities, and that governments are investing far too little in conservation. Evidence presented at the first meeting of the Asia Section of the Society for Conservation Biology (SCB) in Kathmandu, Nepal, in November 2005, provided numerous examples of the decline of biodiversity in the face of increasing human pressures.

Most conservation biologists work in various aspects of research, seeking to better understand the workings of nature. But if we want our research to be relevant, we need to ensure that our research findings actually reach decision makers. Thinking creatively about conservation biology in Asia means finding ways to make our research meaningful to the politicians and policy makers who are running the governments of the region, from the local village to the national capital. This chapter will suggest some ways for doing so, and in doing so will draw on discussions held at the Kathmandu meeting of the SCB.

POLITICAL ISSUES AND CONSERVATION BIOLOGY

We first need to consider what issues are of greatest concern to decision makers. Examples might include human health, trade, energy, economics, agriculture, extreme natural events, and national security. We need to demonstrate that all of these are relevant to conservation biology; or rather, conservation biology is relevant to all of these.

Decision makers are not omniscient, but they *should* be deeply concerned about other issues such as the impact of invasive alien species, the implications for biodiversity of introducing genetically modified organisms, the implications of climate change for biodiversity (Flannery 2005), and how biodiversity and the private sector relate to each other. Conservation biology perhaps has even more to contribute to such issues.

Each of these topics could be the subject of an entire paper, or even a book, but to support the discussion, it is sufficient to introduce them briefly:

- **Human Health and Biodiversity**
  Throughout Asia, people depend on medicinal plants and animals to meet many of their health needs; yet many of these plants and animals of medicinal importance are being seriously over-exploited as demand continues to increase and management measures tend to be woefully inadequate (Akerele *et al.* 1991, Arnason *et al.* 2005; Mahindapala 2005). A second aspect of biodiversity and human health is that many emerging infectious diseases, such as avian influenza, Nipah virus, and SARS, have a wildlife reservoir (Hunter *et al*. 2000). These diseases may be passed to humans through a chain that begins with a species like a fruit bat or a water fowl, which then infects a domestic species, which in turn infects humans (McNeill 1977). Conservation biologists are giving increasing attention to such relationships, enhancing understanding about how to address the threats posed by such emerging infectious diseases (Osofsky *et al.* 2005). And third, many wild species offer important insights into human health. For example, bears that

hibernate for long periods of time but do not lose bone mass could offer insights into human arthritis or osteoporosis, and the gastric brooding frogs of Australia may offer insights into gastric ulcers in humans (though unfortunately, the gastric-brooding frogs have apparently become extinct) (Chivian 2002).

- **Trade**

  The most obvious link between trade and biodiversity is the trans-boundary trade in threatened species, which is covered under CITES (the Convention on International Trade in Endangered Species -- www.cites.org). Recent losses of tiger populations in many of India's most famous protected areas are due primarily to this problem, as their skins and bones illegally enter markets in China (Wildlife Protection Society of India 2005). However, expanding international trade also has other implications for conservation biology. Loosening restrictions on the trade in forest products, fish, and other goods from nature inevitably will increase the pressure on these species. Yet the voice of conservation biologists is not even a whisper at the negotiations of the World Trade Organization. One useful place to start is at the national level, seeking to provide useful information and perspectives to ministries of trade and foreign affairs, and the delegations they send to trade negotiations.

- **Economics**

  Decision makers often are driven by economic factors (Barbier *et al*. 1994). One of the important insights of the Millennium Ecosystem Assessment was its strong support of the concept of ecosystem services, the benefits people derive from the functions provided by ecosystems (Daily 1997). The concept of services implies that people may well be willing to pay for these; and alternatively, people who are providing ecosystem services (such as watershed protection or carbon sequestration) should be appropriately compensated for the service they are providing. The idea of payment for ecosystem services is now gaining more traction in Asia; China's latest five-year plan incorporates a section on "eco-compensation measures"; and India already has a series of such measures in place, from local to river basin level (Sengupta *et al*. 2003). Conservation biologists can make important contributions by working with economists to help determine and quantify the functions that are provided by ecosystems and the biodiversity that enables the ecosystems to function (Ferraro and Kiss 2002; Pagiola *et al*. 2002). Conservation action in Asia is chronically short of funding, and many efforts are underway to find sustainable sources of funds to enable protected areas to function and other conservation activities to be undertaken; conservation biologists have much to contribute to the design and implementation of such efforts (Quintela *et al*. 2004; Emerton *et al.* 2006). Economists are also asking important questions about sustainable use of the species we all care about, and conservation biologists have much to contribute to this discussion (Freese 1998).

- **Energy**

  As supplies of oil decline, exploration for new sources is increasingly reaching into remote areas that are important for their biodiversity values (EBI 2003; Simmons 2005). Oil and gas developments can have a wide range of impacts on biodiversity, leading to growing tensions between energy needs and biodiversity conservation. Conservation biologists can contribute to finding an appropriate balance between these competing demands. But even if all oil can be discovered and exploited without permanent damage to biodiversity, the time for a transition from petroleum to a post-petroleum future has

already begun, and many energy companies are actively seeking alternative forms of energy, such as biomass, hydroelectricity, wind energy, and so forth (Geller 2002). These alternatives all have implications for biodiversity, so conservation biologists can also help to inform decisions made about these alternatives. What will be the impact on wildlife habitats if biofuels become the driving force of society over the next few decades?

- **Agriculture**

  Most conservation biologists would prefer to work in habitats that are as pristine as possible, where the consternating factor of human influence is minimized. Yet agriculture is ubiquitous, and the Millennium Ecosystem Assessment has revealed that the Indian sub-continent, the eastern part of China, and south-east Asia are all dominated by agriculture, covering at least 30% of the land (Hassan *et al.* 2005). The number one threat to biodiversity is habitat degradation or alteration, invariably due to various forms of agriculture. Nor is this pressure likely to decline, as the demand for food and other crops (such as rubber and palm oil) continues to increase. It is therefore incumbent on conservation biologists to give much more attention to the relationship between agriculture and biodiversity. For example, biodiversity includes wild relatives of domestic plants and animals of potential value in developing new cultivars, and research on these could be rewarding to both conservation biologists and farmers (Acharya 2006). Another exciting new frontier is in below-ground biodiversity where new technology enables us to see smaller creatures, even bacteria, that previously were ignored by most conservation biologists (Wall 2004; Ramakrishnan *et al.* 2005). Perhaps we can also bring more soil scientists into our field, by helping them to understand the relationship between soil biodiversity and various forms of land use. Finally, we can also help to find ways to enable farmers to manage their lands in ways that are more supportive to biodiversity rather than destructive of it (e.g. Breckwoldt 1983; Collins and Qualsett 1999; Imhoff 2003; Jackson and Jackson 2002; McNeely and Scherr 2003).

- **Extreme Natural Events**

  Sadly, the Asian region has been especially victimized by extreme natural events over the past few years. The 2004 tsunami in the Bay of Bengal devastated Indonesia, the Maldives, Sri Lanka, India and Thailand. Earthquakes in 2005 caused enormous loss of life in Kashmir, and extreme weather events have affected Mumbai, Chiangmai, and various parts of China and Bangladesh. Some have called these “natural disasters”, but it probably is better to consider them as “extreme natural events” that were made disasters by the way that humans managed their ecosystems. This is certainly not to blame the victims, but rather to recommend carrying out dispassionate research as conservation biologists into the ways that conserving natural ecosystems can lessen the impacts of such events. For example, places where coral reefs and mangroves were intact suffered far less damage from the tsunami than did areas where mangroves had been cleared for shrimp ponds and coral reefs had been destroyed, often through inappropriate fishing methods (Barbier 2006; Danielsen *et al.* 2005; Harakunarak and Akornk 2005; Kathiresan and Ragendran 2005). In Kashmir, the worst landslides were in places where the hillsides had been deforested, and had thus lost the soil retention capacity of tree root systems. Conservation biologists need to drive home the message about the relationship between human mismanagement of ecosystems and the increased likelihood of human disasters resulting from inevitable extreme natural events.

- **National Security**

  The demand on ecosystem services is increasing rapidly, because of the human population and increasing wealth in many countries, notably India and China (Brown 2004). Many parts of Asia already are suffering from water shortages or poor quality water even when the supply is sufficient (as in Bangladesh). The timber supply throughout the region is under increasing pressure, and many landscapes are already deforested while wood demand is expected to double over the next 40 or 50 years. As the supply of oil becomes a greater limiting factor to support development, the search for alternative sources of energy and competition over the last remaining supplies of oil are likely to involve security issues. While the relationship between natural resources and environmental conflict remains controversial, numerous indications suggest a close link that can be better understood if conservation biologists are able to give such issues greater attention (Diehl and Gleditsch 2001; Klare 2001; Suliman 1999).

- **Invasive Alien Species**

  As an inevitable "externality" of global trade, invasive alien species are becoming an increasingly troublesome problem for many ecosystems throughout the region (Matthew and Brand 2004; Mooney *et al.* 2005; Xie *et al.* 2000). For many protected area managers, invasive species are their most challenging management problem. The spread of water hyacinth is rendering many Asian water bodies much less productive for fisheries and water transport more difficult. Invasive species of moths and fungi are threatening the productivity of forests. Many, perhaps most, of Asia's estuaries are undergoing fundamental ecological change through the introduction of invasive marine species carried in ballast water. The list of damages from invasive alien species is long and growing, but awareness of the threat remains modest, and relatively few conservation biologists are yet giving the issue sufficient attention. Even some leading conservation organizations seem to ignore the issue, perhaps concerned that their supporters will be confused by a message that says some species need to be eradicated in areas where they are invasive, and are causing ecological and economic damage. The Golden Apple Snail, for example, is devastating rice fields in many parts of south-east Asia (Carlsson *et al.* 2004). It was introduced in the hope of increasing human food supply, but this clearly did not work as expected. Perhaps conservation biologists could help understand what went wrong, and prevent such introductions in the future.

- **Biotechnology**

  Conservation biologists are not yet paying much attention to biotechnology. But many governments in Asia (India, China, Malaysia, Thailand, Philippines, and Indonesia among them) are making major investments in agricultural biotechnology, developing new varieties of crops, trees and fish. While reasonable biosafety standards have been established under the Cartagena Protocol on Biosafety under the Convention on Biological Diversity, the ecological impacts of these genetically new species remain under-studied (Chaturvedy and Rao 2004; Oksman-Caldentey 2002; Rifkin 1998;). Conservation biologists could find a productive new niche in helping governments to better understand the ecological impacts of these genetically new species.

- **Climate Change**

  Many of the discussions about climate change focus on reduction of greenhouse gas emissions. Far less attention is given to the impacts of climate change on biodiversity (but see Lovejoy and Hannah 2005; Peters and Lovejoy 1992; Schneider and Root 2002).

As conservation biologists we know very well that the distribution of plants and animals depends to a significant extent on the distribution of climate patterns, particularly rainfall which influences vegetation patterns and thus affects the distribution of the species that depend on those patterns. These relationships are highly complex and in many ways difficult to predict. Nevertheless, conservation biologists can contribute greatly to an improved understanding of how changes in the distribution of ecosystems might affect species of conservation concern, or the boundaries of protected areas, or the viability of new agricultural or agroforestry crops. If protected areas become simply islands in a sea of competing land use, adaptation to climate change will become much more difficult.

- **The Private Sector**

  Many conservation biologists might view the private sector as the enemy, seeking profit while externalizing the environmental implications of their activities. On the other hand, an increasing number of companies are accepting the principles of corporate social and environmental responsibility, recognizing that a significant proportion of customers already now expect them to behave more responsibly (IFC 2006). Conservation biologists can help them to carry out their activities in a more environmentally appropriate manner, or help them to propose tradeoffs to offset some of their inevitable impacts on natural ecosystems. Throughout Asia, private sector companies are becoming a more dominant element of national economies, so it makes sense to find ways of channeling their energies in ways that support biodiversity rather than undermining it.

A FRAMEWORK FOR COMMUNICATING WITH DECISION MAKERS

The Millennium Ecosystem Assessment offered a productive framework for enabling conservation biologists to communicate more effectively with decision makers, through a broader consideration of the benefits of ecosystems for people. These so-called "ecosystem services" include:

- Provisioning services: goods produced or provided by ecosystems, such as food, freshwater, fuel wood, and genetic resources.

- Regulating services: the benefits obtained from regulation of ecosystem processes, such as the regulation of climate, diseases, floods and extreme natural events.

- Cultural services: the non-material benefits from ecosystems, including spiritual, recreational, esthetic, inspirational, and educational benefits. In many ways, these cultural services help to define who we are as citizens of our respective countries.

- Supporting services: the services necessary for the production of the other ecosystem services, such as soil formation, nutrient cycling, primary production, carbon sequestration, and so forth.

All of these ecosystem services are supported by biodiversity, which includes genes, populations, species, communities, and ecosystems. The exact relationship between biodiversity and ecosystem services remains poorly understood, offering a fertile ground for additional research by conservation biologists.

Together the ecosystem services contribute to the constituents of human well-being, which include security, basic material for a good life, health, good social relations, and freedoms and the ability to make choices on how to live one's life. The importance of this model for decision makers is that it demonstrates how ecosystem services, and the biodiversity that supports them, are important for all aspects of human development. These ecosystem services also underlie virtually all of the Millennium Development Goals approved by the governments of the world.

THINKING CREATIVELY ABOUT CONSERVATION BIOLOGY IN ASIA

Thinking creatively about conservation biology in Asia means that we need to ask some new questions, or give more attention to questions that we are already asking. Here are some examples:

Biodiversity and human health

- What can conservation biologists contribute to addressing the problem of emerging infectious diseases?
- How can conservation biologists ensure that bioprospecting is productive, fair, and equitable?
- How can conservation biologists contribute to reducing health hazards from interactions between people and nature?

Biodiversity and trade

- What can conservation biologists do to address the illegal trade in wildlife?
- How can conservation biologists contribute to international trade negotiations?

Economics and conservation biology

- How can conservation biologists work with economists to determine values for the various ecosystem services?
- What kind of sustainable funding mechanisms can be developed for supporting conservation of biodiversity?
- How can the benefits of sustainably using biological resources be most equitably distributed?

Energy and conservation biology

- What can conservation biologists contribute to a post-petroleum future?
- How can conservation biologists help us reduce carbon emissions?
- How can conservation biologists contribute to adapting to possible future changes in climate?
- What can conservation biologists contribute to better understand the ecological impacts of alternative sources of energy?

Agriculture and conservation biology

- How can conservation biology work more productively with agriculture?
- Under what conditions should conservation biologists promote extensification as opposed intensification of agriculture?

Extreme natural events and conservation biology

- How can conservation biology help societies avoid the disastrous damage caused by extreme natural events?
- How can conservation biology accelerate recovery from such events?

National security and conservation biology

- How can conservation biology help contribute to ecological conditions that promote national security?
- What can conservation biologists do to conserve biodiversity in times of armed conflict?

Invasive alien species and conservation biology

- How can conservation biologists best contribute to reducing the flow and impact of invasive alien species?
- How can conservation biologists help to manage invasive alien species once they have become established?

GMOs and conservation biology

- How can conservation biology contribute to a better understanding of the potential impacts of GMOs on species and ecosystems?

Climate change and conservation biology

- How can conservation biology help ecosystems and species adapt to climate change?

The private sector and conservation biology

- What can conservation biology contribute to the private sector?
- What should conservation biology expect in return?
- Which segments of the private sector offer the best opportunities for cooperation?

And a few general points

- How can conservation biologists best influence policy making at local, provincial, national, regional, and international levels?
- What are the risks and benefits of getting involved in policy issues?
- How can conservation biologists best contribute to a future world that is at least as biologically productive as the one we now inhabit?

CONCLUSION

Conservation biologists understandably feel most comfortable in talking with our colleagues, as they share a common interest in nature, wild species, protected areas, and well-functioning ecosystems. But if we stay in our comfortable meeting rooms and give inadequate attention to what is happening in the larger world, we are both doing a disservice to conservation biology and missing a significant opportunity to make our world a better place. Perhaps even more important, finding ways to influence decision makers may also contribute significantly to the objectives of conservation biology that we hold so dear to our hearts. Conservation biologists need to ensure that our research reaches out beyond our circle of colleagues and peers, towards and into the corridors of power.

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