

CHAPTER 14

The roles of people in conservation

C. Anne Claus, Kai M. A. Chan, and Terre Satterfield

The study of human beings in conservation is often eclipsed by the study of threatened species and their environments. This is surprising given that conservation activities are human activities, and that the very need for conservation arises out of human actions. In this chapter, we begin with the premise that understanding human activities and human roles in conservation is fundamental to effective conservation. Specifically, we address the following:

- Conservation history: how has conservation changed since its inception?
- Common conservation perceptions: how do conservationists characterize the relationship between human beings and the environment, and how have these perceptions influenced the trajectory of conservation?
- Organizational institutions: What factors mediate the relationship between human beings and their environments? What implications do these have for conservation?
- Biodiversity conservation and local resource use: in what ways do we conserve our environments?
- Equity, rights, and resources: how do we understand conservation-induced change?
- Social research in conservation: how do social science and humanities studies inform conservation practice?

14.1 A brief history of humanity's influence on ecosystems

Human beings have influenced Earth's ecosystems for many millennia (see Chapter 13). Since *Homo sapiens* migrated out of East Africa in the late Pleistocene, we have subsequently fanned out to inhabit virtually every terrestrial environ-

ment on this planet. From high altitudes to high latitudes, people have adapted culturally, technologically, and biologically to diverse landscapes. Just as coevolution and coadaptation occur among plants and animals in ecosystems, so too do they occur between humans and other components of ecosystems around the world. We are crucial elements of ecosystems, and for better or worse, we help shape the environment of which we are a part.

14.2 A brief history of conservation

Indigenous and local people have practiced conservation possibly for hundreds of thousands of years (see Box 1.1). The Western conservation movement, however, has arisen over the past 150 years. We briefly address the history of the modern conservation movement here (see also Chapter 1). In its earliest period, a concern for biodiversity was not a dominant motivating factor of this movement. Rather most historians link modern conservation to writings of romantic and transcendentalist philosophers, and to the often violent colonizing of indigenous peoples in the Americas (White and Findley 1999), Africa (Neumann 2004), and worldwide (Grove 1996).

Environmental historians in the United States locate the origins of conservation with the writings of early ecologists and the advocacy of key thinkers in the latter half of the nineteenth century. As early as 1864, George Perkins Marsh published a remarkable book, *Man and Nature*, based in part on his observations of the depletion of the woods near his American home. Criticizing the cultivated gardens idealized by the Jeffersonian tradition, and deeming them an agent of

destruction, he outlined the impact of logging on watersheds, water supply, salmon runs, and flooding (Robbins 1985). At the same time, John Muir, Ralph Waldo Emerson, and Henry David Thoreau came to be known for their highly influential transcendentalist philosophy, which contemplated nature's capacity for spiritual healing. This philosophy in particular is closely associated with early efforts at wilderness preservation. Vast tracks of land were integral to this view of nature, and this idea sparked the establishment of preservationist nature parks worldwide.

Several key policy initiatives ensured both a large legacy of public lands and a national park system in the United States and elsewhere. That so much "public" land was available for national parks was the product of two often ignored facts in the history of conservation. The first was the reservation system or the forced removal of aboriginal populations onto vastly reduced and parceled "reservation" lands, and the second was the rise in sedentary settlements. Much of this forced removal from what would become public and park land was made possible by the epidemics of disease amongst aboriginal populations that followed contact with Europeans (Stevens 1997). In the Americas, virtually all groups succumbed to successive waves of disease outbreaks, especially measles and small pox, introduced by "discoverers" (possibly as early as the Vikings and certainly by Western European explorers of Christopher Columbus' time) and by early settlers. Where disease did not decimate populations, people were forcibly removed from conservation areas in the Americas, Australia, Africa, and Asia. The conservation movement became more complex in the early 1900s with the advocacy of forester Gifford Pinchot, who insisted that conservation shift from primarily preservationist to that of resource management, or "sustained yield".

In 1960, the first of a set of legislative acts meant to represent both conservation and industrial interests was introduced. Under pressure from environmentalists and recreationists, the US federal government came out with a new mission statement: The Multiple Use Sustained Yield Act, 1960. Multiple uses incorporated outdoor recreation, range, timber, watershed,

wildlife, and fishing interests. This early inscription of multiple uses for multiple people followed two events singularly important to modern environmentalism: Aldo Leopold's promotion of his "land ethic", which emphasized the biota's role in ethics (e.g. "A thing is right when it tends to preserve the integrity, stability and beauty of the biotic community. It is wrong when it tends otherwise"; from the *Sand County Almanac*, 1949); and the work of Rachel Carson (1962). A marine biologist, Carson published what has been called the basic book of North America's environmental revolution—*Silent Spring*. Its stirring argument exposed the actual and potential consequences of using the insecticide DDT (dichloro-diphenyl-trichloroethane), although even with DDT the social, environmental, and medical landscape is a complicated one. Regardless, Carson's work continues to be highly relevant to our understanding of biological processes, is cited in the inspirational biographies of environmentalists, and has spurred dozens of environmental groups into action. In retrospect, it is evident that what are today called "environmentalist ideas" coalesced around this time. While we have used the US as an example, it is the case that environmentalist ideas appeared independently but nonetheless concurrently in many parts of the world (see Box 1.2). This has led in part to the establishment of international conservation organizations, some of which originated in the developed world but all of which act in conjunction with partners worldwide. Examples of the larger and more well known such organizations include the World Wide Fund for Nature (WWF), The Nature Conservancy, and the International Union for Conservation of Nature (IUCN).

International conservation organizations have thus become particularly active in the advocacy for and the establishment and management of conservation areas worldwide. All of these philosophies of conservation are now evident in the multitude of conservation interventions across the planet. Box 14.1 illustrates how customary management and Western conservation are integrated to achieve conservation goals in the Pacific.

Box 14.1 Customary management and marine conservation C. Anne Claus, Kai M. A. Chan, and Terre Satterfield

Can traditional management strategies and marine conservation be integrated? Cinner and Aswani (2007) set out to uncover the commensurability of these divergent resource management strategies in the Pacific.

Customary management in marine systems refers to a generational, culturally embedded, dynamic system for regulating natural resource use. Cinner and Aswani first review studies on the ecological impacts of customary management. While more research is clearly needed on this topic, the available literature points to species-specific benefits, often on a small spatial scale. Viewing the smaller scale of customary practices in light of current social and economic threats, Cinner and Aswani suggest that customary management must be paired with marine conservation in order to produce ecological successes.

There are similarities in customary and marine conservation traditions. Cinner and Aswani define six types of restrictions present in both systems:

- Spatial (such as temporary ritualistic reef closures, or marine protected areas).
- Temporal (fishing bans on the Sabbath, or closed seasons).
- Gear (bans on harvesting technologies, or gear prohibitions).
- Effort (gender restriction on access to specific areas, or licensing).
- Species (class restrictions on particular species consumption, or species-specific bans).
- Catch (avoidance of waste, or quotas).

In spite of these resemblances, there are differences in the scale, concept, and intent of these two types of marine resource management. For example, in customary management, fishing bans may regularly be lifted to provide food for feasts. Therefore fish may be conserved but they are also harvested at regular intervals, pointing to a difference in concept between the two systems (in marine conservation fishing bans are generally considered permanent). Additionally, customary management in the Pacific is often embedded in ceremonies and traditions.

“Although resources may be consciously improved by these practices, conservation in the Western sense may be simply a by-product of other economic, spiritual, or social needs” (Ruttan in Cinner and Aswani).

Cinner and Aswani point out how hybrid systems have been socially successful in Vanuatu and the Western Solomon Islands. They summarize some principles for hybrid customary and marine conservation management systems:

- Approaches should echo local socioeconomic and cultural conditions.
- Planning and implementation should integrate both scientific and local knowledge systems.
- Strategies should be appropriate for varying social and ecological processes
- Management should provide flexible legal capacity.
- Planners and implementers should recognize that hybrid systems may not always be appropriate.
- Hybrid management should embrace the utilitarian nature of customary systems as well as its ecosystem benefits.

Finally, Cinner and Aswani caution that socioeconomic transformations such as population increase, technological change, urbanization, and the adoption of new legal systems can drastically and rapidly change customary management systems. How these systems are impacted by such changes varies depending on the heterogeneity of customary institutions and the scale of socioeconomic change. Cinner and Aswani conclude by endorsing hybrid management systems for their potential to encourage compliance amongst communities involved in creating them.

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14.3 Common conservation perceptions

Observe Figure 14.1. You may see either a young woman or an old woman (hint: the chin of the young woman is the nose of the old woman). The lines remain the same, but their meaning changes based on your perception, the process by which you translate information into organized understanding. People construct meaning based on perceptions arising through their experiences. Since human beings have a broad range of experience, perception is also highly variable, and it is based on these perceptions that people act. In conservation, people comport themselves in accordance with observations they make about the state of a given ecosystem (for example, by hunting species they perceive as abundant and avoiding species that seem scarce). Similarly, conservationists base resource management strategies on their perceptions of local resource use. This whirlwind of perceptions can often lead to misperceptions. These misperceptions can also be enhanced by unequal relations of power within and between international organizations and local people. This can result, for instance, in such things as unnecessary burdens placed on local peoples. Box 14.2 contains a case study showing how such burdens can be placed on livelihoods as a result of both misperceptions and inequities.



Figure 14.1 An optical illusion illustrates how the human brain perceives objects differently.

That is, the necessity for conservation often arises out of a misperception about the abundance of resources, which leads to excessive extraction. For conservationists who seek to alter

Box 14.2 Historical ecology and conservation effectiveness in West Africa C. Anne Claus, Kai M. A. Chan, and Terre Satterfield

How does faulty perception lead to misguided conservation policies? Fairhead and Leach (1996) explore this question in the forest-savanna transition zone of Guinea. This landscape is unique because amidst the open woodland savanna exist patches of dense semi-deciduous rain forest. Conservationists and policy makers viewed these forest patches as either relics of a more extensive original forest or as a relatively stable pattern of vegetation. Regardless of the viewpoint taken on the forest patches, policy makers agreed that local people were contributing to their destruction. This

supposed deforestation encouraged strict fire restrictions. At one point the punishment for setting a fire was the death penalty!

By using new historical data sets combined with oral histories of vegetation use, remote sensing data, archival research, and ethnographic fieldwork, Fairhead and Leach demonstrate that local human activities actually encouraged the formation of forest patches. Originally created around villages to provide fire and wind protection, the forest patches also provided resources for consumption and use. People enriched the

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Box 14.2 (Continued)

forest patches by managing soil fertility and fire. While the focus of local interest in the forest patches has changed since the nineteenth century from village defense to coffee production to timber for logging, they have been cultivated consciously and unconsciously by local resource users. And, contrary to the commonly accepted perception, remote sensing and photo analysis demonstrate that forest cover actually increased during the past century.

So what were the consequences of the misguided forest policy? Because they assumed that locals were deforesting the landscape, policy makers excluded local resource users from resource management. Policies curbed early season grass burning, creating the potential for destructive natural fires in the dry season. The perception that locals were to blame for deforestation ultimately impacted

their livelihoods and created an acrimonious conservation climate.

Fairhead and Leach point out that the policy makers, due to their initial assumptions about the role of local resource users in deforestation, did not question the accuracy of historical vegetation records. The authors therefore advocate mixed historical and satellite data collection methods for reconstructing historically accurate pictures of vegetation patterns on which to base conservation policy. Their study illustrates how perceptions can negatively impact society and the environment.

REFERENCE

Fairhead, J. and Leach, M. (1996). Enriching the landscape: social history and the management of transition ecology in the forest-savanna mosaic of the Republic of Guinea. *Africa*, **66**, 14–36.

human action, understanding that perceptions and power differ is critical.

Here we discuss conservation in the sense of conservation biology, the science of understanding Earth's biological diversity for the sake of its protection. We refer to conservationists as people who identify themselves as practitioners or advocates of wild living resource conservation. Local resource users are people who live in close proximity to, and derive their livelihoods from, natural resources. Local resource users may be indigenous people, long-standing immigrant communities, or new residents. Like conservationists, they may represent homogeneous communities or encompass diverse ethnic groups. It is of course possible that conservationists may also be local resource users and vice-versa. As conservationists interact with local resource users around the world, they make considered judgments, as well as erroneous assumptions, about the relationship that human beings have with their environment (e.g. Sundberg 1998). In the past, conservationists have broadly characterized local resource users alternately as both

enemies of and saviors of the environment – and the complexity of those ethical relationships are explored in Box 14.3.

Fundamental to these binary depictions are ideas of nature as a pristine wilderness. Images of this sort helped spur the modern conservation movement, and are still pervasive in conservation marketing. Wilderness is imagined “as a remnant of the world as it was before man appeared, as it was when water was fit to drink and air was fit to breathe” (Caufield 1990). These ideas rest on a perceived separation between humans and nature, a sentiment that appeals to many North Americans (Cronon 1995). Some conservationists assume that in order to conserve a system it should be restored to this idealized human-free state. Anthropologists, archaeologists, and historical ecologists have increasingly found that even landscapes that were once considered pristine have had considerable human influence (see Chapter 13). North America at the time of European contact, for example, has been depicted in literature and films as a vast wilderness. In reality, archaeological evidence and historical

Box 14.3 Elephants, animal rights, and *Campfire*
Paul R. Ehrlich

A conservation success story is that elephant populations have recently rebounded over much of Africa. That has fueled a heated debate over whether or not it is ethical to cull the herds (<http://news.bbc.co.uk/2/hi/africa/7262951.stm>). On one hand the giant beasts can be serious agricultural pests; on the other, animal rights activists and many other nature lovers are offended by the killing of these charismatic and intelligent animals. Like many of today's ecoethical dilemmas, this one is not easy to resolve (I do not wish to get into the animal rights debate here. For intelligent discussion of these issues, see Singer 1975; Midgley 1983; Jamieson 1999. Although I sometimes disagree with Peter Singer's conclusions on a variety of issues, sometimes emotionally rather than intellectually, I always find him a clear thinker). There are ways to attain needed population reductions other than culling, including relocation and contraception. But suitable areas into which to introduce elephants are growing scarce, and using contraceptives is difficult except in small parks and is more complicated and expensive than shooting. Animal rights groups are properly (in my view) concerned about cruelty to elephants, and the plight of young elephants orphaned when their mothers are killed is especially heart-rending. Furthermore immature elephants who have witnessed culling seem to suffer from something resembling Post-Traumatic Stress Disorder that frequently causes them to become very violent. But overpopulation of elephants can lead both to problems of sustainability for them and to collisions with another overpopulated species that has the capability of destroying them.

A similar elephant controversy took place in the 1990s – one demonstrating the extreme complexity of the ecoethical issues in conservation – centered around the Zimbabwean *Campfire* (Communal Areas Management Program for Indigenous Resources) program, partially funded by USAID (United States Agency for International Development) (Smith and Duffy 2003). The

Campfire program was designed to build the capacity of local populations to manage natural resources, including game for hides, meat, sport hunting, and photographic tourism. The situation can be briefly summarized. Elephant herds outside of parks and reserves were capable of decimating a family's livelihood in an hour by destroying its garden plot. That led to defensive killing of marauding animals by local people. Rogue elephants were also responsible for hundreds of human deaths each year (http://findarticles.com/p/articles/mi_m1594/is_n4_v9/ai_20942049/pg_1). Defensive killing was accelerating a decline already under way in elephant herds because of poaching.

Campfire supported the return of elephant herds to the control of local communities and the issuing of some 100–150 elephant hunting licenses per year for community lands. The licenses to shoot an elephant were sold to sport hunters for US\$12 000–15 000 each. Rural District Councils determined how the funds were spent. Herds grew dramatically in the hunting areas because poaching was suppressed by the elephants' new "owners," local people got more money and suffered less damage because marauders were targeted, and it seemed to many that it was a win-win situation. But the Humane Society of the U.S. (HSUS) objected, saying that the intelligent and charismatic elephants should never be killed by hunters, and animal rights groups lobbied to get funding stopped (<http://digital.library.unt.edu/govdocs/crs/permalink/meta-crs-388:1>).

The issue was further clouded by arguments over how much of *Campfire's* motivation was centered on reopening the ivory trade (partly sanctioned by CITES) and its impact on elephants outside of Zimbabwe, and on whether a switch to entirely photographic safaris (a trend then well under way) would not be equally effective in protecting herds.

More recently, despite the shocks of a cessation of international funding and the deterioration of the political situation in Zimbabwe, the conservation benefits of

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Box 14.3 (Continued)

Campfire remained remarkably robust (Balint and Mashinya 2008) – although their present status is in doubt. The situation emphasizes the need to keep the ethics of the “big picture” always in mind, and to pay attention to factors such as “political endemism” – organisms found in only a single nation which, if poor, may not be able to adequately protect them (Ceballos and Ehrlich 2002).

The *Campfire* controversy highlights the ethical conflict between those who believe the key conservation issue is maintaining healthy wildlife populations and those concerned primarily about the rights of individual animals and who decry the “utilization” or “commodification” of nature – “wise use” or “multiple use” as discussed in the text. Much as I personally hate to see elephants hunted, in this case I tend to come down on the side of the *Campfire* program. It seems more ethical to give local people a beneficial stake in maintaining the herds instead of permitting their extermination than it does to avoid the “unethical” killing of individuals by rich hunting enthusiasts. I also think it is more ethical to consider the non-charismatic animals and plants that, as I have seen in the field, can

be laid waste by elephant overpopulation, even while some organisms can be dependent on normal elephant activities (e.g. Pringle 2008). Others may, of course, have a different ethical compass.

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accounts reveal that the Americas were extensively populated by millions of indigenous peoples who extensively altered their surroundings (Denevan 1993; Ruddiman 2005). In fact, “scientific findings indicate that virtually every part of the globe, from the boreal forests to the humid tropics, has been inhabited, modified, or managed throughout our human past... Although they may appear untouched, many of the last refuges of wilderness our society wishes to protect are inhabited and have been so for millennia” (Gomez-Pompa and Kaus 1992). And historical ecologists have demonstrated how these changes have had profound and lasting effects on populations and ecosystems, which should influence our current conservation strategies (e.g. Janzen and Martin 1982; Jackson *et al.* 2001). In short, there is no such thing as wilderness.

Did the activities of indigenous people threaten the environment? Conservationists' perception of people has long been that they are largely threats to biodiversity. Mitigating those threats is viewed as important to maintaining and recovering biodiversity. Often conservation organizations systematically identify threats long before their social causes are identified. Many social scientists see environmentally destructive behavior as symptomatic of broader societal issues, which can be obscured by the hasty labeling of local resource users as threats to biodiversity. While human activities can indeed threaten biodiversity, an exaggerated emphasis on curbing behaviors that are harmful can stand in the way of promoting those that are beneficial to conservation. Ultimately, local resource users are also conservation agents.

An opposing view suggests that local or indigenous people live in harmony with nature. As Redford (1991) points out, some researchers and conservationists have idealized the relationship indigenous people have with their environments. They have subscribed to the myth of the “ecologically noble savage”, which asserts that indigenous people naturally live in harmony with the environment and have developed superior systems of resource management (or “traditional ecological knowledge”) that should be adopted by conservationists.

“Indians walked softly and hurt the landscape hardly more than the birds and squirrels, and their brush and bark huts last hardly longer than those of wood rats, while their enduring monuments, excepting those wrought on the forests by fires they made to improve their hunting grounds, vanish in a few centuries”.

This quote by John Muir, an American naturalist, exemplifies this attitude. In reality, the relationship of local or indigenous people with their environments is variable. The Miwok whom Muir refers to above burned, pruned, and selectively harvested their lands to create the highly managed Yosemite landscapes that Muir saw (Anderson in Nabhan 1998:160). Another example comes from a closed tropical forest zone in South Asia. For centuries, the practice of swidden cultivation (alternately known as shifting, or slash and burn) brought about ideal habitat conditions for herbivores that do not typically inhabit this forest zone. Deer, elephants, and rhinos were drawn to grasslands and edge habitats created by swidden fallows. More generally, by altering terrestrial vegetation, human activity has changed soil structure, water availability, wildlife, and possibly the global climate system for hundreds of millennia (Westbroek *et al.* 1993; see Chapter 8). Critiques of the ecologically noble savage myth point out that some indigenous cultures have reverent environmental behaviors, and others have eroded their resource base. Such “good user/bad user” judgment is often counter-productive, especially as standards are more a product of popular imaginations than

they are true to the human and ecological histories involved (cf. Fairhead and Leach 1996). But this is not to say that there are not practices we might learn from as well as those that have turned out to be destructive. Swidden agriculture, for example, *can* be environmentally destructive if practiced partially (Conklin 1975). It would also be a mistake to assume that all indigenous people are naturally stewards of their environments, any more than are any peoples. Primarily, then, it is important to remember that the ecologically-noble savage myth is, more often than not, reductionist and potentially misleads conservation activities (Buege 1996).

The final important point is to recognize and understand practices on the ground, in their historical context. To critique the ecologically noble savage myth is not to say that long-term indigenous or local residents do not develop an extensive body of knowledge related to species and ecosystem relationships. They certainly do. Knowledge borne of sustained practice and trial and error is often instructive to conservation. Not all indigenous or local people have developed or retained these bodies of knowledge, but where this knowledge does exist it can be critical to, and in effect be, the conservation effort most needed.

14.4 Factors mediating human-environment relations

Perceptions also arise from, and concurrently shape, our worldviews. Often, institutions direct or mediate those worldviews. Cultural, political, and economic institutions are powerful social forces that dynamically impact the environment, as coevolution of social institutions and ecological systems occurs in interesting and often unpredictable ways. For example, agriculture in North America traditionally involved cultivation of many crops. The advent of mechanical agriculture made monoculture agriculture more efficient. This *social change* led to increased use of pesticides, since fewer natural predators visit single variety crop fields. Monoculture fields produced less fertile soil and increased soil erosion. These *ecosystem changes* required specialized

upkeep and changes in the organization of human labor on large, consolidated farms. This ecosystem change led to further social changes in economic institutions. Subsistence-based agriculture increasingly gave way to a surplus market-based system. These social and ecological changes also impacted worldviews as agriculturalists believed that technological advances would continue to increase crop yields and make food production more efficient.

Social institutions operate at multiple scales. They are dynamic and mutually reinforcing, as the discussion of one agricultural ecosystem illustrates. A general understanding of the following three institutions provides a framework for understanding human behavior.

14.4.1 Cultural

Culture is a dynamic system of collectively shared symbols, meanings, and norms – the nongenetic information possessed by a society. People are born into cultural settings, which help shape their perceptions of the world around them. For example, societies that believe guardian spirits reside in forests will often take measures to protect those forests; likewise societies that believe that ecosystems are naturally held in balance might do little to actively conserve their resources. These

belief systems are often called “worldviews”. Societies share some worldviews, or systems through which they interpret information and then consequently act. Within societies many interpretations of reality coexist, depending on an individual’s gender, age, occupation, or education level. Understanding these perceptions helps to explain why individuals act in particular ways in their environments (Marten 2001).

Many traditional societies and human ecologists share a common perception of nature, that everything on earth is connected (for example, the Nuu Chah Nulth of Vancouver Island say “Hishuk ish tswalk,” which means, “Everything is one and all is interconnected”). This worldview asserts that the actions humans take have consequences in nature. Human ecologists are inclined to focus on the details of these consequences. Another common worldview sees nature as benign, and presumes that as long as people do not alter the environment too much, she will not harm them (Marten 2001). It is not uncommon to hold contradictory worldviews at the same time. For example, one’s religious beliefs may encourage human domination over nature, while one’s academic field may view humans as just one part of a broader environment (Box 14.4 further explicates the role of religion in conservation biology). Together with values and norms, worldviews

Box 14.4 Conservation, biology, and religion Kyle S. Van Houtan

Conservation is said to be a worthy cause for a variety of reasons. The great wilderness evangelist John Muir advocated nature preservation by describing its majesty. Forests were “sparkling and shimmering, covering hills and swamps, rocky headlands and domes, ever bravely aspiring and seeking the sky” (Muir and Cronon 1997). When she warned of the threats of pesticide pollution, Rachel Carson invoked peaceableness. Her landmark *Silent Spring* (1962) opens with: “There was once a town... where all life seemed to live in harmony with its surroundings.” And in describing the perils of human overpopulation Paul Ehrlich pleads for

justice. His *The Population Bomb* (1968) asserts that enjoying nature and breathing clean air are “inalienable rights.” Often, however, such arguments forget their deep roots in religious traditions. For centuries, religious practices carried the torch of virtue and moral guidance. So it seems appropriate that science and religion might partner in the work of conservation (see Clements *et al.* 2009). Yet today both religion and science face a number of complaints from conservation.

Some Christians, for example, rationalize environmental destruction based on their interpretation of human dominion. Their view

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Box 14.4 (Continued)

holds humans to be superior above all the Earth's creatures and therefore baptizes industrial development and economic growth. Any environmental regulation that limits human enterprise then becomes the enemy of divine order. Other religious beliefs maintain that the path of history culminates in apocalyptic fury. Such sects do not regard ecological preservation because they believe the planet is destined for destruction.

But science is not safe from ecological criticism either. The scientific revolution, some argue, institutionalized ecological destruction by linking experimentation, knowledge, and political power. Scientists then claimed their craft to be the new means to master human limits. It was the great empiricist Francis Bacon, after all, who dreamed a society where nature's secrets were tortured from her. Critics contend that modern science has inherited an insatiable curiosity and lacks the capacity to restrain itself, working alongside government agencies and economic corporations in a united program to exploit the biosphere. Mountains become "natural resources," ancient forests are seen as "agriculture," rivers of fish are "stocks," and human communities become the "labor force."

The question then should not be how religion and conservation biology can combine forces (Box 14.4 Figure). This might forget the ecological complaints against science and religion, which are very real and must be taken seriously. A different approach would be to cultivate the virtues conservation requires. The wisdom to know the virtues from the counterfeits that have been passed down to us requires the practical intelligence and witness of those who practice them. It is the scientists who know science best. And it is from within religious traditions where religions are most faithfully judged. Knowledge in both traditions is social and must be vigorously encouraged. People who have a foot in both a scientific and a religious tradition might be especially important here. They may see more clearly the transgressions that produce the ecological crisis. They may know more than most the virtues that conservation requires.



Box 14.4 Figure Nature is the context for virtue in many religious traditions. Saint Jerome, a father of the early Christian Church, is commonly depicted as a desert ascetic, pulling a thorn from a lion's paw. The upper left image in the painting suggests Jerome is drawn to the wilderness for healing and renewal, the same reason the lion is drawn to him. (Saint Jerome and the Lion. Roger van der Weyden. Reprinted with permission from The Detroit Institute of Arts).

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Box 14.4 (Continued)

Tucker, M. E. and Grim J., eds (1997–2003). *Religions of the world and ecology* (Vols. I–IX). Harvard University Press, Cambridge, MA.

Van Houtan, K. S. (2006). Conservation as virtue: a scientific and social process for conservation ethics. *Conservation Biology*, **20**, 1367–1372.

underlie resource management systems, and form the basis for decision-making and action.

An example from Papua New Guinea illustrates how culture impacts conservation interventions (West 2006). Noticing the decline in birds of paradise, an international conservation organization set out to save these species from extinction. Since conservationists saw the importance of these birds for the ecosystem and local community, they believed the local resource users would readily comply with their project. Unbeknownst to the conservationists, when they asked the local villagers to engage in conservation actions, they were entering into a complex exchange relationship. Villagers expected not only medicine, technology, and tourism development, but an ongoing reciprocal relationship by which the villagers would continue to protect species in exchange for ongoing assistance in any number of areas that are usually the purview of government. Fundamental cultural misunderstandings such as this undermine conservation interventions, leading to disappointment and project disintegration.

14.4.2 Political

Political systems are a set of institutions that govern a particular territory or population. These systems are not to be confused with politics, or the maneuvering for power (though politics heavily influence whether conservation initiatives will be carried out). Political institutions can be distinguished by degree of power concentration, level of formality, global to local scale, and normative characteristics. Conservation interventions often require the reinforcement of policy by multiple political systems at different

scales. A small-scale conservation intervention, for example, may draw on traditional authority, the national environmental ministry, an international NGO (non-governmental organization), and global trade policies to achieve its goals. While there are a range of political systems that impact conservation efforts, we focus on political processes, or governance here. Governance refers to a set of regulatory processes and mechanisms through which the state, communities, businesses and NGOs act (Lemos and Agrawal 2006).

In addition to compensation and clarification on land tenure and access (see Equity, Resource Rights, and Conservation section below), participation in governance has been critical to establishing good relationships between conservationists and local resource users (Zerner 2003). This sharing of resource management, sometimes referred to as co-management, more equitably distributes authority between local people, stakeholders, state-level political systems, and conservation organizations involved (Brechin *et al.* 2002). There is considerable controversy over when, where, and to what extent co-management should be endorsed. Some worry that co-management and consideration of local concerns are dangerous, over-riding the maintenance of biodiversity, whereas others call for increased equity for indigenous and local communities. These debates should be contemplated in light of the fact that political and economic institutions are the products of a contestation for power between various sectors of a population, and that historically this struggle has resulted in entrenchment of institutions that favor the powerful. That is, conservation must often arise through institutions that are themselves considerably inequitable.

Further, the degree to which co-management is in fact shared management, with equitable distributions of positions of power and decision making across the governing body (e.g. a park's management board) is hotly debated. Generally, however, it is assumed that genuine or bona fide systems of co-management include multiple opportunities for participation; equitable control over decisions and outcomes; the existence of governing bodies that are truly representative of those with recognized rights and/or local populations more broadly; and capacity building for the realization of tasks and responsibilities (McKean 2000).

Where co-management is not desirable or feasible, political scientists and other social researchers have uncovered a number of principles for designing effective conservation governance (Ostrom 2008). These vary greatly depending on local circumstances. Governance processes that have been effective in a range of case studies include participatory decision-making, the presence of enforcement and conflict resolution mechanisms, and flexible management. Cultural variations in implementing these design principles lead to innumerable governance arrangements.

In the Comoros Islands, devolution of management rights to the local resource users increased participation in marine protected area (MPA) decision-making. Ultimately, the resource users decided to limit outside use of the MPA by restricting certain types of fishing gear (Granek and Brown 2005). Local resource users set limits on resource extraction through the regulatory process of governance.

14.4.3 Economic

In every society goods and services have values. These goods are distributed in networks that range from household to international scales. It would be difficult to find a society today that is not affected by the worldwide economy, however. The structure of the global economy impacts resource use in surprising ways. We illustrate this here via the "hamburger connection".

The 1980s brought worldwide consciousness of Amazonian deforestation. Clearing land for cattle was the main driver of local deforestation, yet

cattle ranches in this area were less lucrative, and less destructive, than cash cropping. So why did people engage in this labor-intensive activity? Researchers traced the political economy of Amazonian deforestation and found that international consumers were implicated in this destruction (Leduc 1985). The Brazilian government and the World Bank blamed deforestation on local swidden cultivators, yet Leduc illustrates how Brazilian and international development policy was actually at fault. These institutions encouraged the conversion of rainforest to pasture land by providing tax cuts and perverse incentives for cattle ranchers. Leduc finds that it was the *wealth* of European consumers and Brazilian cattle ranchers, not the *poverty* of local resource users, which drove Amazonian deforestation.

The global economy supplied goods to feed Europe's desire for hamburger, impacting environmental degradation thousands of miles away.

Increasing population, decreasing household size, and especially the associated rise in consumption, negatively impact resource use (see Introduction Box 1). Yet some researchers have highlighted how poorly executed global distribution networks are equally implicated in resource destruction. Awareness of these large-scale economic forces is important for unraveling local resource use patterns. Household economic characteristics are also significant in designing conservation interventions. Figure 14.2 relates household economic factors to conservation strategies.

Given the diversity of cultural, political, and economic institutions and their variable local manifestations, there can be no worldwide conservation program. However, there are similar conservation strategies that have been implemented around the world. We turn now to the role that local resource users play in these common conservation strategies.

14.5 Biodiversity conservation and local resource use

Conservation interventions that focus more exclusively on biodiversity are now pervasive, and most focus on ameliorating threats to species and

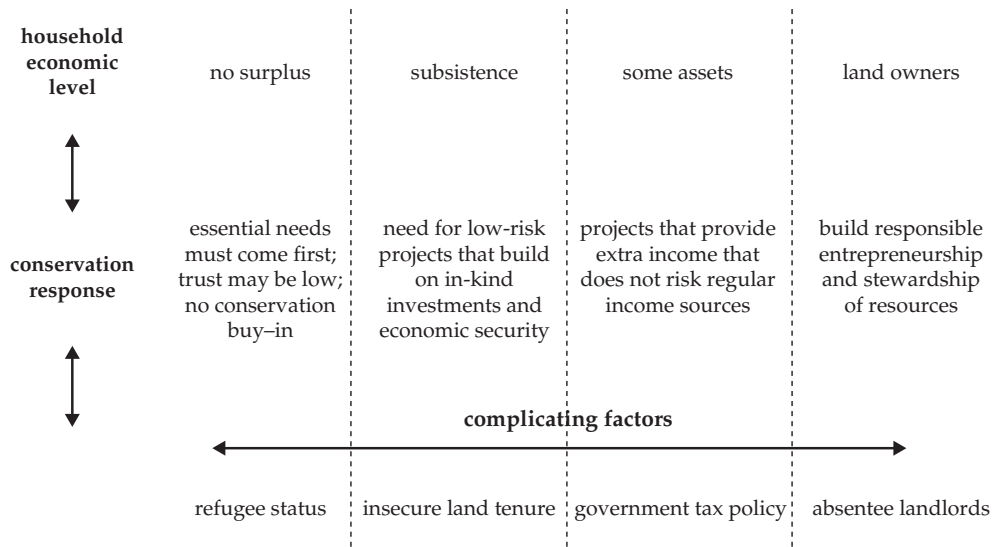


Figure 14.2 Economic site characteristics and conservation initiatives: points to take into consideration. Adapted from Russell and Harshbarger (2003). Teasing out relevant factors that determine one conservation intervention over another is challenging. This figure presents one element considered in conservation planning: income. Where income is a defining factor in conservation planning, the conservation response may derive from the household economic level. We also present a few factors that complicate this simplistic view of an appropriate conservation response.

systems (see Chapter 15). According to analyses based on identified threats for species listed as threatened or endangered, the five greatest threats to imperiled terrestrial species are habitat loss (Chapter 4), overexploitation (Chapter 6), pollution, non-native species (Chapter 7), and disease, with the order of importance varying greatly between USA and China (Wilcove *et al.* 1998; Li and Wilcove 2005). Marine, estuarine, and coastal species in the USA are threatened by many of the same and some additional threats, such as water diversion, increased human presence, vessel interaction, and climate change (Kappel 2005). Although climate change was missing from the threats to terrestrial species in the studies above, it is increasingly recognized as a rising direct and indirect threat in all systems (Chapter 8).

Local resource users may be positively and/or negatively impacted by conservation. They may see, for instance, an increase in income due to ecotourism, or a decrease in fish catch concurrent with the opening of a marine protected area. Their health may suffer with the decline of resource access, or the gazetting of a protected area may privilege their resource rights over

those of regional loggers. In short, there is no simple answer to the question of how local resource users are integrated into and impacted by conservation.

Conservation interventions, too, can be undertaken by a variety of actors from local to global scales. Some actors include governments and government agencies, NGOs, corporations, communities, and individual stakeholders. These actors address conservation from a diversity of angles, such as law, policy, management of wildlife and ecosystems, or individual actions [for example, through direct payments for conservation-friendly behavior (Ferarro and Kiss 2002)]. Table 14.1 outlines some conservation interventions that involve local resource users, and the potential positive and negative impacts of those interventions. Anticipating potential impacts of conservation interventions may also make them more robust and, ultimately, more sustainable (Chan *et al.* 2007).

Conservation that involves local resource users does not adopt a similar form worldwide. Table 14.2 compares protected area policies from Nepal, Brazil, and Australia to illustrate the

Table 14.1 This table presents the orthodox view of how local resource users impact their environments, and how they in turn are impacted by conservation interventions. A deeper analysis might ask questions such as; who is responsible for the degradation, overexploitation, etc. in column three? Does the conservation strategy disproportionately affect local resource users? Are the strategies in column one responsive to the threats presented in column three?

<i>Strategy</i>	<i>Impact on local resource users</i>	<i>Response to...</i>
Protected area	Limits entry, extraction, and use of designated area	Habitat loss and degradation, overexploitation
Zoning	Designates areas where local resources may be extracted	Habitat loss and degradation, overexploitation
Purchase of water/land rights	Transfers ownership or use rights to/from locals	Water diversions, overexploitation
Ecotourism	Brings outside investment to local businesses, employment in service industry	Multiple threats
Community-based natural resource management	Formal encoding of local monitoring and managing resource extraction	Multiple threats
Direct payments for ecosystem services	Payment received for successfully maintaining local resources	Overexploitation, habitat loss and degradation, pollution
Integrated conservation and development projects	Development of small-scale economic initiatives that incorporate sustainable resource use	Multiple threats

diversity of local involvement in one particular conservation strategy, protected areas. Local resource users may not want to be involved in all aspects of conservation management (as was the case in Kakadu National Park, Australia). Ethical imperatives direct the extent and manner of consulting local resource users. We turn to these now.

14.6 Equity, resource rights, and conservation

Questions of rights and equity have recently emerged as paramount to the practice of conservation and are in part the by-product of several years of debate between social scientists and

Table 14.2 Three examples of variations in local involvement in protected areas (from Claus, unpublished data). The three national parks presented here involve local resource users in conservation policy and implementation. As park policies are implemented in myriad ways, this empirical comparison accentuates the differing degree and nature of local conservation involvement.

Do policies allow...	Sagarmatha National Park, Nepal	Rio Ouro Preto Extractive Reserve, Brazil	Kakadu National Park, Australia
Continued subsistence use	✓	✓	✓
Formalized policy consultation			✓
Sharing of entrance fees	✓		✓
Co-management	✓		✓
Integration of local resource management regimes	✓	✓	✓
Local land ownership	✓via enclaves		✓
Training/integration into management structure	✓limited	✓in local organizations only	✓
Establishment of organizations with substantial local representation	✓	✓	✓
Power to determine land use			
Technical assistance regarding resource management	✓	✓	✓

conservation biologists (Chapin 2004). Critical to these debates is both a recognition that rights heretofore ignored need be recognized, addressed, and integrated into conservation (including those pertaining to access, use rights, and compensation in the event of their loss), and that justice and equity more broadly need to become a cornerstone principle in the advancement of conservation and the maintenance of biodiversity.

Rights refer to a bundle of entitlements or permissions assigned to or affiliated with a group or population. These rights may be individually or collectively held, and they include the right to

tenure and/or ownership, the maintenance of livelihood security and resource access (such as the ability, for instance, to reduce the impact of damage-causing animals on the periphery of protected areas), and the right to be involved in the governance of both these rights and the lands or waters with which they are associated. Box 14.5 provides an example of how asserting rights can lead to the protection of forests.

It is often difficult for conservation officials to understand the histories of peoples that may have preceded a park or protected area. It is nonetheless important to recognize that many rights-based systems are formalized in treaties; in titles

Box 14.5 Empowering women: the Chipko movement in India Priya Davidar

Rural societies depend on natural resources for fuel, fodder, food, medicine, and construction materials. Women play an important role in the collection, use and sale of forest products such as fuel-wood and fodder to meet household requirements, thereby enhancing the economic security of their households (Wickramasinghe 2005). Fuel-wood is an important source of domestic energy for rural households in tropical countries and women are often involved in the harvesting and sale of fuel-wood collected from the forest (Gera 2002). Commercialization of forestry operations and deforestation therefore adversely affect the livelihoods of poorer forest dependent households. The Chipko movement is one case in point, where rural women and children fought back against timber operations. Chipko means "to embrace" or "to hug" and the concept of saving trees from felling by embracing them is old in Indian culture. The first recorded instance of such action was in 1604 among the Bishnois community in Rajasthan when two Bishnoi women, Karma and Gora, sacrificed their lives in an effort to prevent the felling of Khejri (*Prosopis cineraria*) trees.

The Chipko agitation began in 1971 in the Uttaranchal in the Himalayas, as a grass roots Gandhian movement to assert the rights of the local communities over forest produce (Berreman 1985; Joshi 1982). During British

rule, the Himalayan forests were heavily exploited for timber, particularly during the two world wars. Commercial exploitation continued with India's independence. Deforestation led to soil erosion and landslides, destroying crops and houses. Women had to walk longer distances to collect fuel-wood and fodder. Women's participation in the movement can be traced to a remote hill town called Reni where a contractor in 1973 was given a permit to fell about 3000 trees for a sporting goods store. When the woodcutters appeared, the men had been called away for other tasks. The alarm was sounded and a widow in her 50s, Gaura Devi, collected twenty-seven women and children and rushed into the forest to protect the trees. After threats and altercations from the woodcutters, the women would not back off, and then embraced the trees, as a consequence of which the woodcutters backed off (see Box 14.5 Figure). This movement spread to many areas in this region, and village women saved around 100 000 trees from being cut. The movement was characterized by de-centralized and locally autonomous activism by local communities, led mostly by village women. Following this, the government was forced to abolish the private contract system of felling and in 1975 the Uttar Pradesh Forest Corporation was set up to perform this function.

continues

Box 14.5 (Continued)



Box 14.5 Figure A demonstration of the Chipko movement. Photograph courtesy of The Right Livelihood Award.

The Chipko Movement had two elements: one section concentrated on protecting

existing forests from being logged and the other focused on promoting reforestation and developing sustainable village production systems based on forests and agroforestry. The latter were led by Shri Chand Prasad Bhatt, one of the original organizers of the Chipko movement who provided a unified vision and leadership to the movement. Bhatt worked closely with the village women and encouraged them to assert their environmental rights. In 1987 Chipko was chosen for a “Right Livelihood Award,” known as the “alternate Nobel” prize honor. The honor was rightly deserved for this small movement dominated by women that became a call to save forests.

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bought and exchanged in markets; or informal to the extent that they are based in traditional or indigenous systems wherein some flexibility of rules is to be expected. Treaties, however formal, may be recognized and intrinsic to rights or they may be largely ignored. Great variability of treaty or claim-based rights exists across nation states, and most of those with significant implications for protected areas follow recent court decisions in their “home” nation states such as those in Australia (the Mabo decision) and Canada (Delgamuukw; Haida-Taku; Tsilhqot’in). Conversely,

informal systems of rights tend to be oral (though not exclusively so) and tied to local systems of kinship, governance and decision-making. For instance, a group may distribute rights to traditional territories or specific fishing grounds to a lineage (rights passed through the matriline, patriline, or both), but that same system may allow for considerable room to negotiate temporary rights. Overall, it is crucial to understand formal and informal as well as long-standing and ephemeral systems of rights in any community with which conservation organizations engage.

Given the above-mentioned history of colonialisms closely linked to the establishment of many protected areas, in many cases peoples' rights have been lost or dispossessed. Recognition, restitution, equitable compensation, and the settling of land claims noted above, is necessary for the (re-) establishment of good relations between parks and people (Colchester 2004).

The principle of equity (fair distribution of benefits) permeates many of the above considerations regarding eviction or restrictions on resource use. Debates about compensation for the dispossession of lands or co-management suggest that a more equitable world is necessary for effective conservation. Further, the struggle to sustain biodiversity may involve justice (the principle or ideal of right action) or equity as assigned to extant peoples, future generations, and nonhuman organisms. In order to consider justice, one must also ask: justice for whom? Utilitarian approaches consider justice done when the greatest good is done, in the aggregate across a number of stakeholders, and many of these stakeholders might be very distant from the protected areas in question. Whereas much of the above discussion suggests that it is proximate peoples, with standing or legitimate claims to rights, whom are the appropriate focus for conservation. This is particularly so as those who enjoy the benefits of conservation may not be those who suffer its costs. Considering justice then requires us to ask the identities and condition of peoples most affected or impacted by a decision (Rawls 1999). For the purposes of conservation, rights, *and* justice, the point here is not to defend a particular approach, but to assert that justice should involve a fair distribution of rights, responsibilities, costs, and benefits. "And when actions have impacts with unfair distribution, justice requires appropriate restitution" (Chan and Satterfield 2007). At the heart of much of the controversy about justice and conservation is the incongruence amongst the intended stakeholders (those who are affected by a decision in a morally relevant way) (Chan *et al.* 2007). Whereas conservationists consider non-human organisms—and sometimes also species, ecosystems, and inanimate components of the environment—to have rights or to be

deserving of moral consideration, critics of conservation frequently focus first and foremost or exclusively on human beings. If we are to make headway in controversial settings for conservation, we will require an ethical framework that allows us to consider our obligations to the non-human world alongside those to fellow human beings (Sodhi *et al.* 2008). Such an applied "global" environmental ethic is elusive, however, and so *in-situ* ones can and should suffice.

Conservation often also requires changing local behavior, resource access or livelihoods. This social engineering serves biodiversity, yet biodiversity itself is not a value-neutral concept. The biodiversity concept is rooted in what a particular group of people view as "ideal nature", and places value on what cultural practices are good or bad. Where biodiversity conservation clashes with local environmental values, it is necessary to consider the implicit prescriptions of ideal conservation-oriented behavior that underlie the distribution of benefits from conservation projects. An extreme example is the complete exclusion of local people from protected areas, but subtler measures such as the acceptance of hunting with spears instead of guns displays underlying assumptions about how people should interact with their environments. Acting justly requires recognizing one's assumptions and the behavior judgments that arise from them. Only then is it possible to prescribe appropriate conservation behavior (Chan and Satterfield 2007). Biodiversity conservation depends on solutions that are socially just, and attentive to rights where they exist formally and informally. As a society, we should strive for sustainable economic development and socially as well as ecologically sustainable conservation—for its global and future benefits and for its own sake—in harmony with the cultural, social, and economic well-being of local peoples.

14.7 Social research and conservation

One of the anomalies of modern ecology is that it is the creation of two groups, each of which seems barely aware of the existence of the other. The one

studies the human community almost as if it were a separate entity, and calls its findings sociology, economics and history. The other studies the plant and animal community and comfortably relegates the hodge-podge of politics to the liberal arts. The inevitable fusion of the two lines of thought will, perhaps, constitute the outstanding advance of the present century

—Aldo Leopold (1935 in Meine and Knight 1999)

As Aldo Leopold suggests, integrating understanding of human and other natural systems is crucial for conservation success. Social disciplines like history, ethics, policy and business studies, and the social sciences provide insights into conservation implementation, from formulating plans to enacting them on the ground (see Figure 14.3 for a conceptual diagram of how these disciplines interact). Examples of social research in conservation include clarifying resource use patterns, mapping socio-political territories, and uncovering regional resource tenure institutions.

Yet, social research in conservation is undervalued. There are a number of reasons conservation fails to appreciate social research. Firstly, social research takes time, and conservation moves at a

rapid pace. Secondly, when funds are limited, as they nearly always are, biological research takes precedence. Thirdly, conservation organizations are most often staffed by natural scientists, who may feel that simply because they are human they understand human behavior. As Russell and Harshbarger (2003) point out, anyone with field experience can collect social data. However, it takes considerable training and practice to collect good social data and to interpret those data in meaningful ways. Finally, disciplinary tensions between natural and social scientists complicate cross-disciplinary work. They frequently differ in worldviews, with natural scientists more likely to see (other) people as threats to biodiversity and social researchers more likely to see (local) people as autonomous agents worthy of respect and sovereignty.

Given the serious consequences of failed conservation projects—for the environment as well as for future conservation initiatives—conservation organizations are increasingly turning to social researchers to answer social problems. Social researchers are well placed to answer questions surrounding lack of buy-in to conservation initiatives, why people engage in particular environmental behaviors, or what

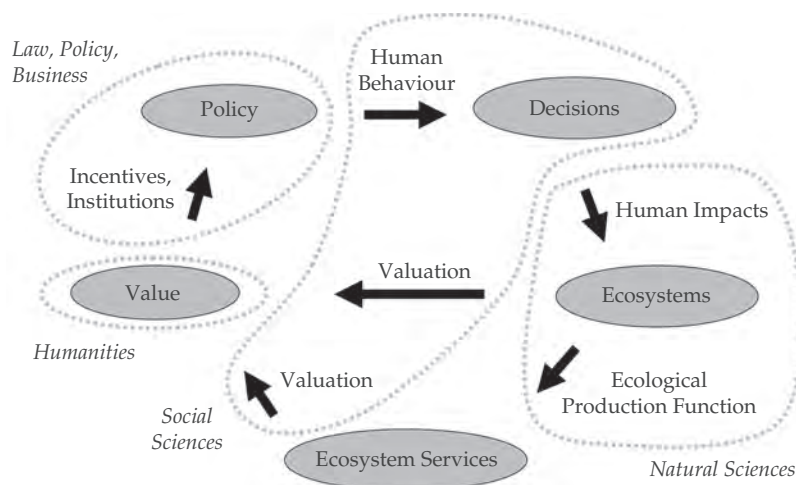


Figure 14.3 The study of conservation of biodiversity in functioning ecosystems has been largely pursued separately in diverse academic disciplines. Effective conservation requires an integrated understanding of how people’s decisions influence ecosystems, how ecosystems produce services for people, how those services are valued by people, how those values translate into policies, and how those policies result in human actions. This requires an integration of diverse fields, natural and social.

Table 14.3 Social research and conservation. This table draws on resources available on the Society for Conservation Biology's Social Science Working Group webpage (www.conbio.org/sswg).

<i>Discipline</i>	<i>Definition</i>	<i>Prevalent conservation-relevant methods</i>	<i>Traditional unit of analysis</i>	<i>Sample conservation contribution and case study</i>
Anthropology	The scientific and humanistic study of the human species: present and past biological, linguistic, and cultural variations.	Ethnography, discourse analysis, participant observation, excavation/paleological coring	Community	Analyzing cultural context of conservation intervention determines differences between local and outsider perceptions of conservation projects, and associated biodiversity implications (West 2006).
Business, Management	The study of corporate action and the effective operation of organizations.	Simulation and analytical modeling	Individual, Firm, NGO	Understanding how corporations and other organizations respond to circumstances fosters more effective conservation interventions; effective management approaches improve operation of conservation organizations (Stoneham <i>et al.</i> 2003).
Economics	The study of the allocation of resources under scarcity: how we behave when using resources (e.g. time, money) with insufficient quantity to satisfy all users.	Econometrics, simulation and analytical modeling	Individual, Firm & State	Incorporating conservation costs into strategy planning phase results in larger biological gains than when costs are ignored (Naidoo <i>et al.</i> 2006).
Ethics	The study of right and wrong actions based on normative premises and logical argument.	Inductive/deductive reasoning	Individual - Earth	Exploring the competing values underlying people's actions and potential policies can foster mutual understanding among stakeholders and agreement over appropriate decisions (Chan and Satterfield 2007).
Geography	The study of human activity, culture, politics and economics within its spatial and environmental context.	GIS, remote sensing, spatial analysis, geostatistics	Community - Earth	Using participatory GIS integrates diverse stakeholder knowledge to clarify spatial aspects of landscape level environmental change (Balram <i>et al.</i> 2004).
History	The reconstruction and analysis of past events of importance to the human race.	Text and media analysis	Individual - Earth	Understanding sequences of past events and their possible causes (both events and social contexts) suggests how present-day conservation actions may unfold and be received (Turner 2006).
Law	The study of laws and policies, their origins, implementation, judicial interpretation, and enforcement.	Policy and law analysis	Region, State, Nation, and between these	Understanding legal and judicial processes improves efforts to implement new legislation and regulations, and to use existing ones in court processes (e.g. lawsuits) (Thompson 2001).

Political Science	The study of governments, public policies, and political processes, systems, and behavior.	Text analysis, scenario modeling, comparative statistics	State	Presenting framework for understanding and designing compensation schemes for resource rights acquisition/loss due to protected area establishment (Mascia and Claus 2009).
Psychology	The study of human thought, feeling and behavior in order to understand behavior and promote human welfare.	Controlled experimentation, psychoanalysis, brain scanning, computational modeling	Individual - Small group	Researching the relationship between values and environmental behavior to inform environmental message framing in the USA (Schultz and Zelezny 2003).
Sociology	The study of societies, particularly social relations, stratification, and interaction.	Social network analysis, content analysis, longitudinal studies	Community - Nation	Researching a collaborative watershed planning effort that, through creating social capital, led to cooperative conservation amongst participants (Salamon <i>et al.</i> 1998).

social pressures encourage environmental degradation. As social research disciplines vary in methodology, scale, and scope of data collection, they have different contributions to the field of conservation. Table 14.3 details these disciplines and research they undertake that informs conservation action.

Summary

- Conservation is inherently a social process operating in a social context. As such, conservationists will benefit from a nuanced understanding of people's perceptions and behaviors as individuals and in organizations and institutions.
- While there is no easy recipe for how local resource users should participate in modern conservation initiatives, attentiveness to resource rights and equity are critical in every conservation project.
- A successful conservation movement will effectively integrate the natural sciences and diverse fields of social research.

Relevant websites

- Society for Conservation Biology's Social Science Working Group: <http://www.conbio.org/workinggroups/sswg/>.
- Advancing Conservation in a Social Context: <http://www.tradeoffs.org/static/index.php>.
- Conservation and Society Interdisciplinary Journal: <http://www.conservationandsociety.org/>.

Suggested reading

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