2 Humans as a Forest-Dependent Species

Products and services from ecosystems are inherent to sustaining life on this planet. Forest ecosystems, in particular, provide a suite of products and services that sustain life for humans and other species. In addition to the obvious products such as wood for building houses, and firewood for heating homes, nontimber forest products are also an economic commodity that benefits many communities. Mushrooms, greens, biochemicals, charcoal, fruits, roots, and tree bark (e.g., cork) all contribute to local economies. In addition, most metropolitan areas of the world receive their drinking water from watersheds that have forested headwaters. Carbon sequestration, shade, and game species harvested for subsistence food are also derived from forests by communities around the world. And the intrinsic beauty of forests attracts hikers, artists, musicians, philosophers, and many others to seek inspiration and solace in forests. And, of course, habitat for many species of biodiversity, including humans, can be found in forested ecosystems.

All of these ecosystem services are valued and are reasons why many people in our societies wish to ensure that forests are protected or managed sustainably. But sustainability is a tricky thing to define. It reflects a suite of societal values such as those listed earlier, and it necessarily implies a time frame. For how long will we be able to sustain these values? Species go extinct. Climate changes. Forests burn and regrow. And throughout these disturbances and other changes that occur in forests, habitat for species is destroyed and regrows, or it may be eliminated or appear in a place where it never occurred before. The one thing that is constant about our environment is change, and the way that species, including humans, have persisted in the face of those changes is through maintaining the genetic diversity and behavioral flexibility to allow some members of each species to persist.

ECOLOGICAL RESTORATION AND ECOSYSTEM SERVICES

Because of the concern on the part of some people in our societies that humans have degraded some ecosystems in their effort to secure resources, there is a growing interest in ecological restoration. Ecological restoration is the process of managing a system to allow it to provide a certain suite of ecosystem services and products that may have been lost as a result of human use or activities. Degradation is a process that leads to a condition that is less productive relative to a reference or desirable condition. Oftentimes restoration can mean addressing reestablishment of desired plant or animal species and the processes that support them. Restoration can be a difficult if not impossible task in some systems if the inherent potential of the site has been altered markedly, such as the desertification of forest lands in sub-Saharan Africa. Restoration of other sites such as reclamation of surface mines or restoration of urban brownfields can take considerable time, effort, and money and still not fully reflect the ecosystem that was present prior to the impacts of mountaintop removal or urban development. Benayas et al. (2009) analyzed 89 restoration sites from around the world and reported that ecological restoration efforts had increased provision of biodiversity and ecosystem services by 44% and 25%, respectively. Nonetheless, Benayas et al. (2009) found that ecosystem services and biodiversity indicators were both lower in restored ecosystems than in intact reference conditions, and that indicators of biodiversity protection and ecosystem services were positively associated with one another. On the basis of their work, efforts at restoring ecosystems will not

only benefit conservation of biodiversity but also improve the suite of ecosystem services available to humans. The Millennium Ecosystem Assessment Report (2005) provides compelling evidence for the linkage between functional ecosystems and human well-being. Indeed, Butler and Oluoch-Kosura (2006) indicated that functioning societies have the capability to protect or enhance ecosystem services, but societies with impaired well-being are often related to a decline in ecosystem services. They hasten to point out that the socio-political structure of the human population inhabiting an ecosystem is a key to realizing both a healthy ecosystem and a healthy human population.

Enhancing the suite of ecosystems services through acquisition of reserves or through active ecological restoration may be initiated by some societies simply as a way of improving human well-being, but in so doing they also may benefit conservation of biodiversity. Focusing on restoration of ecosystem services may be a more financially viable approach to conserving biodiversity than seeking funding for biodiversity conservation alone. Goldman et al. (2008) reported that ecosystem services projects attract, on average, more than four times as much funding as biodiversity conservation projects. Projects to enhance or maintain ecosystems services also are more likely to include actively managed forests and farms and the people who live there. They demonstrated that projects to maintain or enhance ecosystem services also increase opportunities for conservation of biodiversity while meeting the needs of a diverse set of funders. The success of such projects is often poorly known however because results are rarely monitored. Consequently, at least some biodiversity conservation goals may be met by focusing on ecosystems services. Examples of ecosystem services include but are not limited to (Binning et al. 2001):

- Pollination
- Fulfillment of people's cultural, spiritual, and intellectual needs
- Regulation of climate
- Insect pest control
- Carbon sequestration
- Maintenance and provision of genetic resources
- Maintenance and regeneration of habitat
- Provision of shade and shelter
- Prevention of soil erosion
- Maintenance of soil fertility
- Maintenance of soil health
- Maintenance of healthy waterways
- Water filtration
- Regulation of river flows and groundwater levels
- Waste absorption and breakdown

Because people value services such as these, Costanza et al. (1997) estimated the current economic value of 17 ecosystem services for 16 biomes to be between $16 and $54 trillion/year (the average was $33 trillion/year). The global GNP is approximately $18 trillion/year. Clearly, ecosystem services are significant contributors to the global economy though they are undervalued on the global market. De Groot et al. (2002) provided a framework for valuing ecosystem services, and recently markets have developed for these services. The most common market available for ecosystem services to date are mitigation approaches whereby impacts (usually development) are mitigated by purchasing and protecting the ecosystems services that would have been present on the impacted site prior to development. Wetlands are a common focus of such efforts. Yet there have been attempts to develop markets for other services. Kroeger and Casey (2007) provided an analysis of ecosystem services markets as they pertain largely to agricultural lands, but the concepts are also applicable to many forest lands. Indeed carbon markets have developed in response to one type of ecosystem service that has been identified as an approach to slowing the rate of climate change (Sedjo and Marland 2003). New markets for these and other ecosystem services are being developed

and, if successful, could provide an economic incentive for private landowners to continue to provide, or indeed enhance, the ecosystem services that many in society have long accepted for free.

SOCIAL VALUES ASSOCIATED WITH FORESTS AND WILDLIFE

Shindler and Cramer (1999) described the changes in social values associated with forests over the past century or so, limiting their discussion largely to values associated with cultures derived from European societies. The evolution of values from utilitarian and more often rural to protectionist and more often urban is one that we have seen creep across the continents of North and South America and Australia following colonization by European cultures. Changes such as these can often produce conflict that can result in a stalemate in the decision-making process, or worse. But the changes that we have seen in European-dominated cultures are only a portion of the full spectrum of values people associate with our environment. Native Americans, First Nations Peoples, and Aboriginals possess traditional ecological knowledge (TEK), previously dismissed or ignored by most western societies, that has only recently been accepted and embraced by western-dominated cultures. By including TEK in our ecological value system the spectrum of values and philosophies is expanded and as a result so are our approaches to management, protection, and restoration of natural resources. And as nations change in their cultures, with growing ethnic and cultural diversity (e.g., Hispanic, African American, Asian and other populations in the United States), new values are incorporated into our current cultures and the spectrum of values increase further.

But incorporation of new values into our societies may oftentimes result in conflict that, without careful consultation and introspection, can leave some groups of individuals feeling threatened and marginalized. Trust can be eroded and resolution to conflict can seem difficult if not impossible. Such circumstances are the "wicked problems" described by Shindler and Cramer (1999). Wicked problems are those where conflicting values result in a lack of trust between or among competing values. There are many examples: Timber vs. Spotted owls, to drill for oil or not in the Arctic National Wildlife Refuge, clearing Amazonian rain forests for agriculture, to name a few. Resolution of these conflicts can take years and require rebuilding of trust—trust is something easily lost in a conflict scenario and something that is difficult to regain. Rebuilding trust will require those involved in disagreement to listen to each other's view points, respect that there are differences and work together to find an acceptable resolution for all involved, if indeed that is even possible. An impartial mediator is often required to initiate the process of resolving these wicked problems.

Environmental Ethics

Ethics reflect our values and they guide our behavior. Ethics guide interactions among us and reflect our mutual respect for one another. Ethics can also guide our use of ecosystems and reflect our respect for nature (Taylor 1981). Brennan (2002) provides an excellent overview of the growth of environmental ethics as a discipline that addresses a number of facets of human philosophies toward nature and the natural world. People in different cultures treat the resources on which they rely in a variety of ways. Historically in the United States and much of Europe, we adopted a utilitarian approach to natural systems in which exploitation of resources was common and there was an inherent belief that humans are superior to other organisms. In other cultures and in more recently developed philosophies such as Deep Ecology, humans are viewed as coequal with other organisms and are part of a system in which the various parts and processes have intrinsic value in their own right. Hence, environmental ethics as a discipline has grown to address some of the ethical dilemmas that managers, consumers, and those who appreciate nature find themselves facing as individuals and cultures use resources. A person can be remarkably adept at rationalizing individual decisions because he or she is only one individual in a very large population (e.g., what difference does it make if I turn off my lights if no one else does?) or because the scale of the problem is so huge as to seem incomprehensible to any one individual (e.g., climate change).

Indeed in issues of climate change, biodiversity conservation, spread of infectious diseases, and pollution all can seem unrelated to the day-to-day lives of any one individual. The issue does not seem immediate and it does not seem personal. Compare the U.S. societal response to Hurricane Katrina, the tornado in Joplin, Missouri, the earthquake in Haiti, the tsunami in Japan, or the 9/11 attacks in New York and Washington DC, where there was an immediate societal response to offer aid and assistance. Although you may not have been affected directly, the circumstance was immediate and people could easily empathize with those affected. The increase of 1°C over a decade is not immediate and barely noticeable to most people, neither is the loss of another species, nor the additional kilogram of nitrate fertilizer entering a river, nor the slow but steady spread of a disease such as HIV-AIDS in another country. Ethically all of these issues are ones that do affect human societies, but our reaction to these crises is slow and careful, if there is any at all. Why? Why should we not be as mobilized to save the next species slipping to the brink of extinction as we are to save the next person affected by a natural or human-caused disaster? Maybe you are motivated and do want to help immediately, but if you are and you are in a western civilization, then you are in a minority of society and can feel powerless to enact change. We can easily find ourselves in an ethical dilemma of wanting to take action but unwilling to challenge the social norms to realize the change that you would like to see.

For many people in our western societies, people who take immediate action to address these pressing environmental issues are seen as reactionaries, extremists, or activists. But it is exactly these people, taking more extreme actions on both sides of a polarized issue that pull or push the social agenda in one direction or another. While science and education have contributed significantly to providing the basis for protecting large areas of old-growth forest, tree sitters and peaceful demonstrators have done their part as well (Figure 2.1). Their actions are immediate, they are personal, and they cause a reaction in others. They often evoke a more significant reaction than would a list of the 1500 species of organisms known to be highly associated with old-growth forests. Others write books, essays, poems, and songs to raise awareness and make it personal: Rachel Carson's book *Silent Spring*, Kathleen Dean Moore's essays in *Moral Ground*, Mary Oliver's poem *Sleeping in the Forest*, Natalie Merchant's song *Where I Go*. Each of these works and others like them make the elements of the natural world personal and immediate. These writers, singers, and tree sitters are the "actors" in a social debate about how we treat our planet and the resources that it provides, and they do have an effect on public opinion, policies, and management actions. There are also "do-ers" in the debate. These are individuals who make decisions about how to manage their own lands, public lands, or vote on policies that affect all of us. They set examples for others to follow, make decisions that they feel is a correct action, and freely share their information and

FIGURE 2.1 A forest activist protects a tree from being cut. (Photo by Reed Wilson. With permission.)

approaches with others. The "actors" and the "do-ers" collectively push and pull social opinion in new directions that at times result in new policies, collective decisions, and social awareness that affects each of us.

Ecological Psychology

Psychology, the science of how organisms behave, is often cast in the realm of human behavior in terms of interpersonal interactions or a person's role within a group or relative to a social norm. But people have behaviors that reflect their interactions with the natural world as well. Koger and Winter (2010) addressed these issues in depth in their book, *The Psychology of Environmental Problems*. Because of the long evolutionary association that humans have had with other species, and because we indeed see aspects of ourselves in other organisms, issues that address the welfare of wildlife can elicit strong emotional responses among many people. Indeed, Koger and Winter (2010, p. 314) stated that the, "…connection with wildlife draws energy from the deepest core of human feeling." The degree to which people are passionate about an issue dealing with wildlife conservation or protection is often influenced by an individual's direct connection to nature. Louv (2008) coined the phrase "Nature Deficit Disorder" to reflect the potential implications of disconnecting individuals, especially people in their formative years, from the natural world. People who have intense experiences, or peak experiences, that ingrain an appreciation for the beauty of nature are those most likely to act on their feelings regarding use of or protection of nature. Whereas information is an important ingredient to individual and collective decision making, it may be necessary but not sufficient. Emotions, spirituality, and deeply held convictions are often more likely to cause an individual or group to act in a certain way than information alone. Indeed as Koger and Winter (2010) point out, the common ground shared by people with disparate views on an environmental issue is centered on each individual's connection with a place and how it is used. Having a group of people in conflict agree that each cares for a place can be the most important first step in building trust and truly listening to one another as they move on a path toward reconciliation.

PUBLIC RESOURCES ON PRIVATE LANDS

In the United States, as well as in other countries colonized by England, wildlife species are public resources that often occur on private land. When the public resource is adversely affected or when the public resource adversely affects the private landowner, then a conflict often ensues. These types of issues have been repeated for years. An endangered species is found on a private timber company's land preventing a planned timber harvest. A black bear population develops a taste for the inner bark of rapidly growing trees and kills trees before they can be harvested. Who is responsible for addressing these problems? Should society expect the landowner to assume the financial burden associated with these issues? In many cases, the expectation is that the private landowner bears the responsibility for providing habitat for animals and use of those animals is controlled largely by the landowner allowing access to her or his land (through trespass laws). But if a landowner is prohibited from managing her land because of the presence of an endangered species and is required to leave economically valuable structures for habitat, structures that increase management costs, or controlling damage to property, in most cases there is not an avenue for compensation for that landowner. Some landowners adopt a stewardship philosophy or a land ethic so that in those cases, conflicts may be minimized. But for many private landowners, private property rights take precedence over serving a public expectation. And in some states in the United States, landowners are compensated if a wolf kills a sheep or cow. But because of the strong emotional feelings of many in society toward wildlife, the strong sense of private property rights, and the inconsistent policies for financial compensation of bearing the financial burden of providing habitat, continued conflicts are inevitable.

CASE STUDY: ENVIRONMENTAL ACTIVISM AND EFFECTS ON HABITAT

There are countless examples of environmentalists taking a stand against what they perceive as a threat to forests and the ecosystem services that they provide: Tree sitters in the redwoods of California, lawsuits filed against the U.S. Forest Service over intensive forest management practices in Montana, and demonstrations against timber cutting in the Karri forests of southwestern Australia. All had an influence on habitat. In many cases, where environmental activists have been successful, habitat was retained for species associated with late-successional forests, at times at the expense of providing early successional conditions suitable for other species. One example in Thailand dealt with the opposition to loss of forest in several large reserve areas in the face of flooding caused by a proposal to build a large dam that would provide electricity, protect downstream areas from flooding, and provide water for irrigation (Rigg 1991). The Nam Choan Dam was proposed for the Kwae Yai River in western Thailand. Although the project had considerable political and industry support, local public pressure by grass roots activists caused the project to be postponed indefinitely. The opposition to the construction of the Nam Choan Dam was focused on the flooding of large areas of forest in the Thung Yai and Huai Kha Khaeng Wildlife Sanctuaries (Rigg 1991). The resulting reservoir would have formed a barrier separating parts of the two parks and concerns were also raised with regard to increased access to the area by poachers and developers. In this case, and others in Southeast Asia, the success of the environmentalists in opposing the construction of the dam was not based as much on empirical data as the ability of the environmentalists to influence public opinion (Rigg 1991). Initial environmental movements were largely driven by concerns raised from educated urbanites who saw environmental deterioration in the areas outside the cities. Recently, the base for environmental opposition to several economic development proposals has included individuals from a wide range of economic classes and localities in the country. In 1989, environmental pressures on politicians led to a prohibition of logging in the country following flooding, which had been connected to deforestation (Rigg 1991).

So, were the decisions to prohibit logging and to stop the development of the Nam Choan Dam correct and in the best interest of the people of Thailand? Did the will of the environmental community lead to the correct outcome for the country as a whole? Answers to those questions, and similar questions regarding protection of old-growth Douglas-fir and redwood forests in the Pacific west, or karri trees in Australia are not at all clear. But they do illustrate the effect that environmental activists have had in influencing the forests, their structure, composition, and dynamics in many areas of the world. Cultural values and associated ethics, individual and collective behaviors, and the actions of individuals in environmental movements have resulted in changes in forest policy and management. It seems clear that continued demands for resources by individuals with utilitarian values will remain pitted against those with more biocentric values so long as the demand for resources continues to increase. The skills and involvement of individuals adept at conflict resolution and mediation will be increasingly necessary to ensure that acceptable solutions are reached by both groups working together to care for the planet.

SUMMARY

Forest ecosystems provide products and services that sustain life for humans and other species. Some ecosystems have become degraded and no longer provide the suite of services and goods that societies require. Ecological restoration is the process of managing a system to allow it to provide a certain suite of ecosystem services and products that may have been lost due to human use or activities. Ecological restoration efforts can also provide benefits for conservation of biodiversity as well as ecosystem services. Societies and their needs for ecosystem services change over time. Incorporation of new values into a society may oftentimes result in conflict. Individuals that feel passionate about protecting or restoring ecosystems and the products and services that they provide often are the outspoken "actors" in a social debate about how we treat natural resources. Others

make decisions about how to manage their lands and are the quiet "do-ers" who set examples for others.

When wildlife, a public resource, is adversely affected or when the public resource adversely affects the private landowner, then a conflict often ensues. Resolution to conflicts may require objective information, but when it comes to making decisions, objective information may be necessary but it is not sufficient. Emotions, spirituality, and deeply held convictions are often more likely to cause an individual or group to act in a certain way than information alone.

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