Conservation Biology and Four Types of Advocacy

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Introduction

The advocacy debate in ecology and conservation goes back a long way. In the early part of the twentieth century some ecologists were actively pursuing nature conservation, but others eschewed this kind of activism. When the Ecological Society of America (ESA) formed in 1915, a divide already existed regarding the mission of the society and the role of advocacy for preservation of natural areas (Nature Conservancy 2006). This conflict eventually resulted in a faction from within the ESA forming The Nature Conservancy in 1951. The discussion of advocacy in conservation biology is much the same, centering on whether or not scientists should use the results of their research to try to influence policy or management actions (Kirchhoff et al. 1995; Noss 1999; Mills & Clark 2001; Steel et al. 2004). We call this *professional advocacy*. Professional advocacy is important, but advocacy in the broad sense also includes other matters that are equally or more important; these are advocating for science, for ecosystem services, and for the natural world.

Professional Advocacy

Professional advocacy involves informing policy makers, managers, and the public about issues that arise in one's area of expertise. A very conservative former colleague of the senior author, the late Robert Whittaker, felt that publication in books and journals was the only appropriate outlet for this kind of information transfer. This method works satisfactorily but slowly; many of Whittaker's ideas (e.g., Whittaker 1973) have seeped into management philosophy and practice. Nevertheless most agency biologists do not have the time to make extensive literature searches, so relying on "passive advocacy" for information transfer is slow and uncertain. Because most decisions needing input from conservation biologists are imminent, we see no reason why the process should not be accelerated. For example, Beever et al. (2003) reported that most low-elevation populations of pikas (*Ochotona princeps*) in the Great Basin had become extirpated. Their results show that the strongest predictors of pika extirpation are climate-related variables, although the possibility of direct human influences could not be eliminated. Because of the importance of these findings, we distributed reprints of this article to agency heads at a Nevada Biodiversity Initiative meeting. By speeding up information transfer in this way the Nevada Department of Wildlife incorporated the findings from this paper into their Comprehensive Wildlife Conservation plan for the state in 2005.

Distributing a reprint of a peer-reviewed article is a good way to provide decision makers with the "best available science," but some decisions cannot wait for the rather lengthy process that leads to such a publication. This was the case with the Carson wandering skipper (*Pseudocopaeodes eunus obscurus*). In 1998 this subspecies had been collected from only two sites, one of which had become a shopping mall in the 1980s. The remaining one was directly in the path of a proposed freeway bypass. Because *P. e. obscurus* was on a list of Nevada's potentially sensitive butterflies, the U.S. Fish and Wildlife Service required the Nevada Department of Transportation to address its concerns for the species before the bypass could proceed. We conducted 2 years of intensive monitoring that showed *P. e. obscurus* already had been extirpated at the bypass site, the result of previous development nearby and a wetland mitigation plan gone wrong. Nevertheless extensive surveys that covered many square miles of salt grass (the larval food plant) resulted in the discovery of two other populations—about 50 and 70 miles from the freeway site.

In negotiating on behalf of the U.S. Fish and Wildlife Service with the Nevada Department of Transportation, we went beyond our data, but we were very careful to distinguish clearly among what we knew for sure (there are two known extant populations, and the one at the bypass site is extirpated), what we thought we knew (the habitat at

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the former freeway bypass site was already so degraded that it would be very unlikely to support a population again without a huge restoration effort; the subspecies will very likely go extinct without active management of the other populations), and our opinion (federal highway funds should be used to help conserve the species even though the planned freeway did not have anything to do with its extirpation at the bypass site). We received $200,000 of federal highway funds for conservation activities, and we think our success resulted from the clear distinctions we made among data, informed conjecture, and opinion.

The political climate for conservation in the United States has changed in the last few years. Conservation biologists, particularly those working for federal agencies, now are often confronted with a so-called tragic choice, a choice between competing fundamental values. The tragic choice is to publish your findings and lose your job, or hide critical data and damage the resources you are trying to protect. The entire staff of the Fish Passage Center—which measures the number of fish traveling around and over dams on the Snake and Columbia rivers and studies factors related to smolt survival—recently found this out. After a federal judge used the center's data and recommendations to justify ordering more water be released to aid fish survival, Senator Larry Craig (R-ID) retaliated by ending the center's funding forever through a backroom legislative maneuver (Public Employees for Environmental Responsibility 2006). The Ninth Circuit Court of Appeals issued a temporary stay, but the center's future is hardly guaranteed. Circumstances like this clearly put professional advocacy in a different light.

Advocacy for Science

Most people are woefully ignorant about science. They do not understand what science is or how it differs from other ways of knowing such as faith or tradition. The roots of the problem in the United States go back to poor science education in primary and secondary schools, but we in the university community do not do a very good job of communicating about science either. It is disheartening enough to try to teach scientific inference to incoming university students; to find that an understanding of science has increased little if at all in graduates is terribly depressing.

What should conservation biologists do? We all need to be comfortable talking about how science works, how it is self-correcting, its lack of certainty, and the differences between goals, hypotheses, and theories. We need to stress that science can reduce but not eliminate uncertainty and that decisions often have to be made in the absence of complete certainty. We also must try to ensure that management decisions are based on the current state of our scientific understanding and that scientific results are not ignored if they happen to be inconvenient for people in power. This can be a major challenge; for example, the George W. Bush administration has been accused of routinely bending scientific data to fit its political agenda, although it has been supportive of science in other ways (Anonymous 2006).

The factors that lead people to pro-environmental behavior are complex, but level of education is generally considered an important factor (Kollmuss & Agyeman 2002). Logically, increasing scientific knowledge might be a reasonable objective for promoting greater public interest in conserving natural resources. A recent study of public acceptance of evolution is a good indicator of scientific knowledge and understanding (Miller et al. 2006). Among the 34 countries examined, the top 10 on the list were all European with the exception of Japan, and each of these countries had a >75% acceptance rate of evolution. The United States was second only to Turkey at the bottom of the list, with only a 40% acceptance rate, a drop of 5% from 20 years previously.

If you think you need more information on how to advocate for science, join the National Center for Science Education (http://www.ncseweb.org). Although largely focused on the evolution-creation conflict, its *Reports*, published bimonthly, is a rich source of information on the use and misuse of scientific inference.

Advocacy for Ecosystem Services

Three concepts are almost completely foreign to people who are not ecologists: (1) natural ecosystems provide services on which our economic, social, cultural, and political systems depend; (2) when these processes are altered our quality of life declines; and (3) when the processes fail life becomes very difficult or impossible. As a result of this ignorance, conservation is seen by many as a minor amenity benefiting a small cadre of birdwatchers or backpackers that stands in the way of "progress" that benefits all.

It is necessary for all conservation biologists to arm themselves with information on ecosystem services and the economics of ecosystem and biodiversity conservation and be willing to talk about it in public. There are good books on the topic (e.g., Daily 1997; Heal 2000; Daily & Ellison 2002), and several recent papers have come out on the economic value of ecosystem services. Costanza et al. (1997) estimated the average global value of ecosystem services to be US$33 trillion per year. Four ecosystem services provided by insects–dung burial, pest control, pollination, and food for many vertebrate wildlife species—have an estimated annual value in the United

States of at least US$57 billion (Losey & Vaughan 2006). Cleveland et al. (2006) describe the impact of Brazilian free-tailed bats (*Tadarida brasiliensis*) on the cotton bollworm (*Heliocoverpa armigera*), a major pest of cotton in Texas. In an 80-county area the bats have an annual value of US$741,000, or about 12% of the cotton crop per year. Similar evaluations of ecosystem services have been done in China (Guo et al. 2001; Xue & Tisdell 2001) and Indonesia (van Beukering et al. 2003). These and similar stories are good to know and retell to the right audiences.

There are some who believe that nature has an intrinsic value that makes it priceless, and they emphasize the primacy of ethics and aesthetics in conservation (e.g., McCauley 2006). Although we do not disagree in principle, we believe that in our largely economically centered global society, communicating the economic value of ecosystem services can add an important dimension to conservation.

Advocacy for the Natural World

Advocacy for the natural world may be the most important of all. The roots of the conservation ethic in many people have come from outdoor experiences such as camping, hunting, fishing, and birdwatching, but as the world becomes increasingly urban, its human population is becoming more isolated from nature (Turner et al. 2004). In the United States hunting and fishing license sales have been in decline for years (Cordell & Super 2000), as has participation in camping and backpacking (Outdoor Industry Foundation 2005). Why is this a problem? Without a first-hand familiarity with nature the conservation ethic wanes, no matter how many nature videos have been watched.

The problem is particularly acute in children. A recent Associated Press article points out that traditional sleepover summer camps are beginning to disappear due to competition with specialty camps that do not focus on the outdoors (Irvine 2006). Louv (2005) addresses the eroding connection between children and nature and asks who the future caretakers of our planet will be. A recent issue of *National Wildlife* magazine (June/July 2006) is devoted to why contact with the natural world is necessary for healthy minds and bodies and why so many children are growing up without that contact. When was the last time you saw kids just playing outside—chasing bugs, looking for tadpoles?

The solutions are obvious; figure out ways in which children and their parents can get out of the house and into the field. Ducks Unlimited and Trout Unlimited encourage dads and moms to take their children hunting and fishing; many schools and city recreation programs have outdoor experiences. Most importantly make your kids play outside instead of being glued to the TV or to x-boxes and game boys.

Those of us in academic positions have a special obligation to fight administrators who want to end field trips and field courses (they are expensive and have huge potential liability costs), replace the "ologies" with other types of courses, and give away our natural-history collections (e.g., Schmidly 2005). We have been lucky at the University of Nevada Reno: we still teach ornithology and mammalogy regularly; and entomology, herpetology, and ichthyology are offered from time to time. We have two field-ecology courses that are taught regularly. A previous vice president for research (an insect collector in his youth) found permanent space for our vertebrate collections. Nevertheless demands for more premed courses, lack of space, and the tendency to replace retiring ecologists and organismal biologists with molecular researchers are clear and ongoing threats at universities (Roush 1997).

Summary

We have talked about a lot of things to advocate, and most of us are too busy already. Do we really have to be advocates within our areas of expertise, for science in general, for ecosystem services, and for involving people in nature activities? We believe we do. Conservation biologists are most effective when they do research of interest to management, are willing to inform policy decisions, and clearly distinguish among data, informed speculation, and opinion. Being comfortable with science in general and with ecosystem services and incorporating these topics into our writing and conversations should be fairly easy. Read articles, copy them, file them, and refer to them. Natural history advocacy? Surely on a personal level taking your kids or grandkids for a hike is better for mind and body than watching TV and certainly more fun than cleaning out the garage, and a trip to a national park or wildlife refuge is a lot cheaper than one to Disneyland. Nevertheless much of the burden for natural-history advocacy is on academics. If courses about the natural world disappear from our curricula, we will lose our clientele within a generation.

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