What is Conservation Science?

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PETER KAREIVA AND MICHELLE MARVIER

In 1985, Michael Soulé asked, "What is conservation biology?" We revisit this question more than 25 years later and offer a revised set of core principles in light of the changed global context for conservation. Most notably, scientists now widely acknowledge that we live in a world dominated by humans, and therefore, the scientific underpinnings of conservation must include a consideration of the role of humans. Today's conservation science incorporates conservation biology into a broader interdisciplinary field that explicitly recognizes the tight coupling of social and natural systems. Emerging priorities include pursuing conservation within working landscapes, rebuilding public support, working with the corporate sector, and paying better attention to human rights and equity. We argue that in conservation, strategies must be promoted that simultaneously maximize the preservation of biodiversity and the improvement of human well-being.

Keywords: conservation science, Anthropocene, biodiversity, ecosystem resilience, ecosystem services

Soulé (1985) helped define the emerging field of conservation biology with an essay that has been read by generations of students and that is now a science citation classic. However, a lot has happened in the world since 1985, and conservation, like any professional and scientific endeavor, needs to continually refresh its intellectual and academic framework to accommodate new ideas and information.

When Soulé wrote his now classic essay, the Society for Conservation Biology (SCB) did not exist, and the journal *Conservation Biology* had not yet been published. Today SCB boasts more than 10,000 members and has grown from an essentially North American society to one that is increasingly global. With over 25 years having passed since the publication of Soulé's foundational essay, it is worth exploring how his early vision for conservation biology might be updated in light of recent developments. In particular, Soulé envisioned the emerging field of conservation biology as the application of biological science to address the problems of species, communities, and ecosystems perturbed by humans. Today, one of the most important intellectual developments is the recognition that ecological dynamics cannot be separated from human dynamics (e.g., Liu et al. 2007, Folke et al. 2011). Therefore, Soulé's original delineation of conservation biology is in need of a broader framework that we label *conservation science* to distinguish it from an enterprise concerned solely with the welfare of nonhuman nature. Unlike conservation biology, conservation science has as a key goal the improvement of human well-being through the management of the environment. If managing the environment to provide human health and safety were the only goal of conservation science, we would probably label it *environmental science*. The distinguishing feature is that in conservation science, strategies to jointly maximize benefits to people and to biodiversity are pursued; it is a discipline that requires the application of both natural and social sciences to the dynamics of coupled human–natural systems.

Still a crisis discipline but evidence based

Soulé (1985) argued that conservation biology differs from many other scientific endeavors because it is a "crisis discipline." According to this line of reasoning, conservation biologists, like medical doctors, are often called on to act rapidly and without complete knowledge of the situation. We agree. However, since Soulé's essay, medicine has undergone a revolution whereby its practitioners increasingly rely on systematically accumulated evidence and meta-analyses of collections of studies rather than on personal experience and word of mouth (Evidence-Based Medicine Working Group 1992). A similar revolution is starting to take hold in conservation (Stewart et al. 2005). For example, in a systematic review of 68 case studies, Waylen and colleagues (2010) identified features of local culture that are associated with the success of community-based conservation efforts. And so, although conservationists continue to face crises, they can increasingly look to a growing body of quantitative evidence for best practices. Unfortunately, in conservation courses and training, the importance of rigorously assembling and weighing evidence is rarely emphasized. Just as modern students of medicine, dentistry, and nutrition take courses in evidence-based practice, so, too, should modern

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students of conservation. Evidence can sometimes yield surprising answers, and relying on evidence rather than on anecdotes or conventional wisdom will make conservation more successful and more cost effective.

Another important development is that conservationists increasingly use data-based decision science to identify which actions in which places will yield the greatest impacts under the constraint of limited resources (Wilson et al. 2007). The application of systematic conservation planning and formal priority setting is now foundational to conservation (Margules and Pressey 2000) and has evolved from a focus almost exclusively on biodiversity to one on multiobjective planning and priority setting (e.g., Nelson E et al. 2009).

Humans and conservation science

In our view, the major shortcoming of Soulé's framing of conservation is its inattention to human well-being. In the traditional view of conservation, people play one of two roles: The vast majority of people are a threat to biodiversity, and a relatively small number—mostly Western biologists—act as biodiversity's protectors and, one hopes, saviors (e.g., Janzen 1986). Looking back on the last 25 years of conservation successes and failures, we see a much richer set of roles for people in conservation. First, conservation is fundamentally an expression of human values (Sarkar 2005). For better or worse, people's attitudes and actions help to shape and reshape the world that will be left behind for future generations. Therefore, the psychology and ethical reasoning that underlie people's actions and views of nature are a key but too often neglected dimension of conservation. Second, biodiversity is not the only entity affected by conservation actions and policies: People's lives and livelihoods also hang in the balance. As a direct result of conservation, economic well-being has, in some instances, been harmed, and there are well-documented instances of human communities having been unjustly displaced and disrupted for the creation of protected areas (Dowie 2009). Clearly, conservation can also benefit people, but the fact that it may disadvantage them highlights the need for paying more attention to the nexus of conservation and human society.

Conservation science that is focused primarily on biology is likely to misdiagnose problems and arrive at ill-conceived solutions. Today, we need a more integrative approach in which the centrality of humans is recognized in the conservation agenda. Although modern conservation science will continue to rely heavily on the biological disciplines, it must also embrace economics, psychology, political science, ethics, business management, marketing, anthropology, and other disciplines spanning the social sciences and humanities (figure 1).

Soulé's guiding principles

To help guide the then-nascent discipline of conservation biology, Soulé laid out four core principles, which he called *functional postulates*, and four core values, or *normative postulates* (see box 1). Soulé's functional postulates are no less true today than they were in 1985, but they are not necessarily what one would consider the essential principles for conservation in today's world. For example, the emphasis on coevolution and natural communities might seem misplaced, given that all around the world, there is now a preponderance of novel ecosystems and assemblages of species that have had little opportunity to coevolve (Hobbs et al. 2009). Thresholds and ecological tipping points certainly remain an important idea, but equally important is the recovery of ecosystems from environmental insults and degradation that in 1985 would have been viewed as irreparably damaging. Conservationists continue to observe the perils of small populations and the loss of genetic variation, but there have also been examples of successful captive breeding programs and the recovery of species from situations that once seemed insurmountable (e.g., Cade and Burnham 2003, Smith and Ferguson 2005). Strict nature reserves still command a great deal of conservation attention, but their sustainability has come into question (Mascia and Pailler 2011), and conservation attention is increasingly aimed at integrating human uses into conservation areas (Brechin et al. 2003) and working in

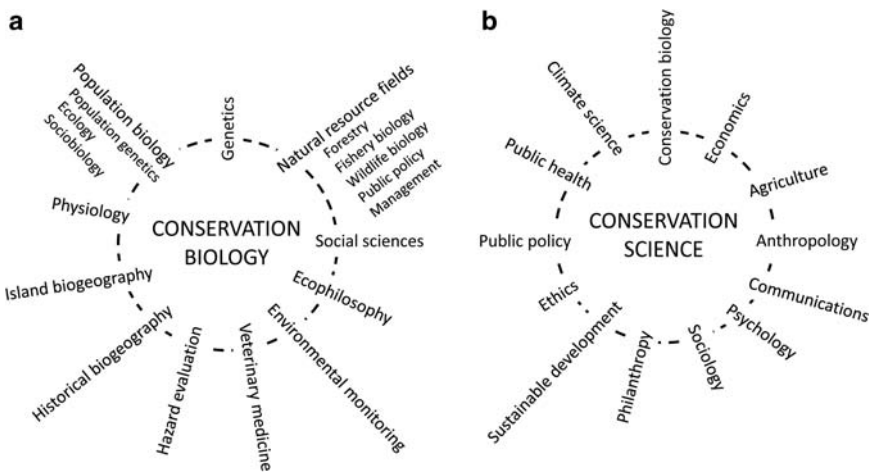

Figure 1. (a) Fields contributing to conservation biology and (b) those contributing to conservation science. In panel (a) is Soulé's (1985) depiction of the synthetic, multidisciplinary nature of conservation biology. Panel (b) depicts an updated view of conservation science, in which the many dimensions of conservation biology are part of a broader and more interdisciplinary endeavor to protect nature. As in Soulé's (1985) original figure, the dashed line indicates that the fields contributing to conservation span the boundaries between "basic" and "applied" research.

Box 1. Functional and normative postulates for the field of conservation biology (Soulé 1985).

Functional postulates

Many of the species that constitute natural communities are the products of coevolutionary processes.

Many, if not all, ecological processes have thresholds below and above which they become discontinuous, chaotic, or suspended.

Genetic and demographic processes have thresholds below which nonadaptive, random forces begin to prevail over adaptive, deterministic forces within populations.

Nature reserves are inherently disequilibrial for large, rare organisms.

Normative postulates

Diversity of organisms is good.

Ecological complexity is good.

Evolution is good.

Biotic diversity has intrinsic value, irrespective of its instrumental or utilitarian value.

landscapes outside of protected-area boundaries (Daily et al. 2003, Polasky et al. 2005).

Similarly, Soulé's normative postulates are not necessarily the leading values among contemporary conservationists. Missing is any mention of ecosystem services, which are now emerging as a primary motivation for conservation. Moreover, human rights and questions about equity and who is responsible for paying for conservation are given scant attention in Soulé's normative statements, whereas such questions of fairness are now at the forefront. Before providing our own updated functional and normative postulates, it is worth summarizing how the context for conservation has changed in the last 25-plus years.

How the global context for conservation has changed since 1985

In 1985, the global human population was 4.8 billion people. Last year, in 2011, the population raced past 7 billion—an increase of more than 40% in one human generation. Pertinent to conservation, this population growth has been and will continue to be most rapid in the very areas of the planet that harbor the highest levels of biodiversity (Cincotta et al. 2000). Therefore, the challenge of accommodating people and biodiversity has escalated dramatically since 1985 and is certain to continue to grow.

Consumption has also increased: Per capita energy use was 1420 kilograms (kg) of oil equivalent in 1985 compared with nearly 1800 kg in 2009 (*http://data.worldbank.org/indicator*). Over roughly the same period, the amount of atmospheric carbon dioxide measured at Mauna Loa increased to 391.6 parts per million (ppm) in 2011 from only 346 ppm in 1985 (NOAA 2012), and in part as a result of rising levels of carbon dioxide and other greenhouse gases, the global mean temperature has increased by approximately 0.5 degrees Celsius over the last 25 years (NASA 2012). Managed ecosystems increasingly dominate the planet. Nearly 40% of Earth's ice-free land has been converted to pastures or croplands to feed people (Ramankutty et al. 2008).

On the positive side, the amount of land under some form of conservation protection has more than doubled since 1985, from a bit more than 6.5 million square kilometers (km^2) to more than 16 million km^2 (IUCN and UNEP-WCMC 2012). Marine protected areas, which constituted less than 1 million km^2 in 1985, now cover some 8.1 million km^2 of marine habitat (*www.wdpa.org*). Therefore, conservation can boast of real success over the past couple of decades, but protected areas alone are not enough to protect biodiversity in the face of increasing human pressures (Mascia and Pailler 2011). Moreover, trends in public attitudes foreshadow a potential crisis in political will for conservation. Evidence of declining public support includes the response to a Gallup poll (*www.gallup.com/poll/1615/environment.aspx*) question that asked respondents to decide whether "protection of the environment should be given priority, even at the risk of curbing economic growth, or [whether] economic growth should be given priority, even if the environment suffers to some extent." In September 1984, 61% of the survey respondents prioritized the environment over the economy. In March 2011, the percentage favoring the environment was only 36%. With the public becoming increasingly indifferent to environmental issues and the environment ranking lower than most other voter priorities, US national policies have become less and less proenvironment (Nordhaus and Shellenberger 2007). On a global scale, the trends are complicated by an overall positive relationship between environmental concern and wealth, but some of the wealthier economies, such as Japan and Germany, are showing stable or declining environmental concern despite economic growth (Franzen and Meyer 2010).

One additional change since 1985 is a generational shift in the experience that children have with nature, largely due to urbanization, less outdoor play, and the dominance of computers and video games in their daily lives. Richard Louv, author of the best-selling book *Last Child in the Woods*, has started a movement to counter this trend, but the data reveal that children are continuing to become less engaged with nature and less knowledgeable about it (Miller 2005, Pergams and Zaradic 2008). For example, kids recognize hundreds of corporate logos but fewer than 10 native plant species (references in Miller 2005). Even children's books reveal the increased detachment of youth from nature; a study of 286 Caldecott Prize–winning children's books since 1938 (and 8036 images therein) showed a steady decline in the frequency with which natural environments and wild animals appeared in these books, to the point that natural environments "have all but disappeared" (Williams et al. 2012, p. 155). With early experiences of

nature affecting lifetime support for conservation (Zaradic et al. 2009), the lack of nature experiences for our youth does not bode well.

New postulates for conservation science

As Soulé (1985) did in his essay, we offer a set of fundamental axioms about nature. These axioms help define the context within which conservation science must work.

Functional postulates. First, "pristine nature," untouched by human influences, does not exist. Scientific assessments of the planet have shown that the effects of human activities are utterly pervasive (Sanderson et al. 2002, Halpern et al. 2008). Birds, fish, and whales in remote arctic oceans have flesh contaminated with chemical pesticides (e.g., Corsolini et al. 2006). The nitrogen and hydrological cycles are dominated by humans; human activities produce 60% of the fixed nitrogen deposited on land each year (Kaiser 2001), and people appropriate more than half of the annual accessible runoff (Postel et al. 1996), leaving little freshwater for other species. Human modifications of habitats include deforestation; the draining of wetlands; the impoundment of rivers; urbanization; pollution; species introductions; climate change; and the overharvest of plants, fish, and other wildlife. Scientists have coined a name for this era, the *Anthropocene*, to emphasize that we have entered a new geological era in which human influences on landcover, biogeochemical cycling, water quality and availability, and other major features of the world now rival or even surpass those attributable to nonanthropogenic forces (Steffen et al. 2007). Of course, pervasive human influence is not a new development; even the supposedly "virgin" rainforests of South America, Asia, and sub-Saharan Africa have, in fact, been subjected to a long history of slash-and-burn agriculture and were once dotted with surprisingly large human settlements (Willis et al. 2004). What has changed is that human domination is now so widespread and profound that it can no longer be ignored in any conservation decision.

In Western conservation, lands and waters relatively untouched by humans have historically been given high priority for protection. The creation of protected areas through the displacement and exclusion of human communities—what some people term *fortress conservation* (Wilshusen et al. 2002)—is an important manifestation of this attachment to places free of human influences. However, given the extensive human effects on the planet and the reality that protecting so-called wilderness may first require moving people out of the area, conservation centered on areas free of people is socially unjust and often scientifically misguided (Guha 1989, Nelson MP and Callicott 2008). Although protected areas will continue to be an important part of conservation, future conservation efforts will, by necessity, be focused increasingly on areas that have been and that will likely continue to be affected by human activities. Moreover, in the face of climate change and species introductions, protected areas will increasingly require active intervention to maintain the feeling of wilderness or other conservation values desired by people (Botkin 1990).

Second, the fate of nature and that of people are deeply intertwined. Human health and well-being depend on clean air, clean water, and an adequate supply of natural resources for food and shelter. Many of the activities that harm biodiversity also harm human well-being. Chemical pollution of air and water is an obvious example in which both human and nonhuman life are harmed. Less obvious, however, is that the destruction of mangrove forests can exacerbate the loss of human life caused by tsunamis or hurricanes (Das and Vincent 2009). Similarly, deforestation in mountainous regions is linked to more severe downstream flooding (Bradshaw et al. 2007). Perversely, attempts to control flooding by creating levees, which often facilitates home building on floodplains, can worsen the damage that floods cause to human lives and livelihoods (Opperman et al. 2009). Clearing tropical forest harms more than just lianas and butterflies; it also destroys an important carbon store and, therefore, contributes to global climate change, with myriad impacts on human food production and safety. All people need functioning, unpolluted ecosystems for everything from food and materials to medicines and protection from natural disasters. The ecosystems that provide these services to humanity are the same ecosystems on which many other species also depend.

Conservation as Soulé framed it was all about protecting biodiversity because species have inherent value. We do not wish to undermine the ethical motivations for conservation action. We argue that nature also merits conservation for very practical and more self-centered reasons concerning what nature and healthy ecosystems provide to humanity. The Millennium Ecosystem Assessment (2005) was the first and largest effort to date in which global trends were assessed in terms of the many products and services that natural ecosystems provide to people. The main conclusion of the assessment was that human activities have, over the last 50 years, reduced nature's ability to provide two-thirds of the world's ecosystem services. This should serve as a call to conservation action. It is not just biodiversity that is at risk; it is also human health and happiness.

Third, nature can be surprisingly resilient. Nature is often portrayed as fragile, and conservationists routinely talk about damages as catastrophic and irreparable (e.g., a Google Scholar search on 3 April 2012 for *ecosystem* and either *irreparable* or *irreversible* returned more than 40,000 hits). The reality, however, is that nature often rebounds from even severe perturbations (Jones and Schmitz 2009). For example, many marine ecosystems have recovered completely after severe oil spills. Similarly, lakes can undergo surprising recovery following eutrophication if the excessive phosphorous inputs are curtailed. The near-total deforestation of Puerto Rico offers another example of nature's resilience. On the basis of species–area curves (an approach recently shown to be flawed; He and Hubbell 2011), one would predict that the denuding of Puerto Rican forests

should have caused forest birds to dwindle to only one or two species. However, the bird fauna remained almost completely intact, because many species found refuge in coffee plantations and because the forests regrew before the bird species declined to extinction (Lugo 1988). Marine ecosystems are proving equally resilient. Even in the once highly overfished Baltic Sea, cod is making a surprisingly fast comeback (Cardinale and Svedäng 2011), and the Bikini Atoll, which was vaporized by a hydrogen bomb in 1954, today harbors a greater diversity of coral species than it did before the explosion (Richards et al. 2008).

The ability of nature to recover from many types of insult does not provide humans license to inflict unfettered environmental damage. Recovery occurs only after humans stop polluting, overfishing, and clearcutting, and even then, nature might rebound in ways that are unexpected and novel. Moreover, nature is not universally resilient; in some cases, ecosystems can undergo a state change from which recovery is unlikely on timescales relevant to humans. Nonetheless, the prevalence of recovery is a very different story from the apocalyptic collapse of ecosystems that environmentalists commonly herald, and conservationists should take advantage of the natural resilience of ecosystems.

Fourth, human communities can avoid the tragedy of the commons. Hardin (1968) profoundly influenced how conservationists view the world. According to Hardin, any unregulated commonly shared resource such as fisheries, forests, or water will be overexploited, because individuals will invariably act in their own short-term self-interest. If one accepts the inevitability of the tragedy of the commons, the only ways to practice conservation are to enact strict regulations and restrictions or to simply buy and protect the resource directly.

Analyses by Nobel-prize winning economist Elinor Ostrom (2009) challenged the inevitability of the tragedy of the commons. Specifically, Ostrom discovered that communities will impose costs to themselves to sustainably manage resources when the benefits of such management are transparent and the potential for cheating is sufficiently reduced. The implications of these findings for conservation are profound. Instead of relying on national governments to impose restrictions or on the endless involvement of nongovernmental organizations, sustainable conservation can be achieved by empowering local people to make decisions for themselves.

Finally, the "flat world" (*sensu* Friedman 2005) means that local conservation efforts are deeply connected to global forces. The meme of thinking globally and acting locally is no longer sufficient. No matter how effectively a nation or community reduces its carbon emissions, climate change may still take its toll if the rest of the world continues to spew carbon dioxide. The long-range transport of air pollutants similarly links continents in ways never before anticipated (National Research Council 2009). Global trade and the demand for food or biofuels can drive massive conversion of forests to meet agricultural demands (Pearce 2012) or poaching of African rhinos and elephants to meet demands in China (Milner-Gulland 1993, Naylor 2005). Therefore, conservationists need to worry as much about deliberations of the World Trade Organization as they do about designing networks of protected areas.

Normative postulates for conservation science. Soulé's normative postulates were statements of values and tenets of a potential ecological philosophy meant to guide conservation actions. We deviate from this approach and, instead, offer practical statements of what conservation should do in order to succeed.

First, conservation must occur within human-altered landscapes. Ecosystems that have undergone extensive human modification have traditionally been neglected by conservationists. However, the desire to focus efforts solely on pristine places is becoming increasingly unrealistic. Because of anthropogenic climate change, extensive conversion of habitats for human use, and a flood of introduced species, the world increasingly consists of novel ecosystems and working landscapes.

That no place is free of human influence does not mean that a large, mature forest has the same conservation value as a plantation or an urban playground. However, when conservationists do place a high priority on landscapes perceived to be the least impacted by humans, it is key that they recognize that people have nonetheless probably been a part of the history of these systems and that humans are also likely to inhabit and make a living from some of the world's wildest places. In these places, protection should protect the people as well as the biodiversity.

The strategy of moving people off of their land has sometimes backfired for conservation, because human activities such as setting fires, grazing livestock, or hunting were responsible for maintaining the conservation value of the landscape (Martinez 2003). For example, a ban on livestock grazing in India's Keoladeo Ghana National Park led to a serious decline in the park's habitat quality (Vijayan 1987, Lewis 2003). Many existing protected areas are working well, and the protected-areas strategy should certainly not be abandoned. However, there are many places where removing people or banning their activities simply will not work. The good news is that even highly modified ecosystems can offer significant conservation value in terms of both biodiversity and ecosystem services (e.g., Daily et al. 2003). Conservation needs complementary strategies that simultaneously maximize the protection of nature and that of human well-being in the areas where people hunt, harvest, and live.

Second, conservation will be a durable success only if people support conservation goals. As Nordhaus and Shellenberger (2007) noted, Martin Luther King Jr.'s famous "I have a dream" speech would have led nowhere if he had framed his message as "I have a nightmare," yet this is exactly the sort of message of hopelessness that conservationists too often deliver (Miller 2005). Because the success or failure of conservation depends heavily on whether human

behaviors can be changed (Mascia et al. 2003, Ehrlich and Kennedy 2005), conservationists should pay greater attention to human psychology and the impact of their messages on people. One strategy to increase support for conservation would be focused on children and reconnecting them with nature. Another strategy is to broaden the concerns of conservation beyond biodiversity and also to pay attention to economic development, jobs, poverty, and environmental justice. However, conservationists often reject activities aimed at poverty reduction and economic development as mission drift (Salafsky 2011). We do not agree with accusations of mission drift; we see poverty alleviation as a central concern, because conservation can succeed only if people embrace its mission.

Third, conservationists must work with corporations. A small number of global corporations have a huge impact on land conversion, mining, energy extraction, and consumer choices. In essence, corporations are the "keystone species" of global ecosystems. Obviously, corporate practices, just like the actions of individuals, governments, and even religions, can be damaging to the environment, but there is a simple reality that must be faced: Through the resources that they use and the wastes that they produce, corporations drive much of what happens to our lands and waters. One cannot expect corporations to go away, nor would anyone who cared about people's lives want them to; therefore, part of the solution is to work with corporations to improve their practices. However, conservationists are prone to vilifying large corporations and rejecting attempts by conservation organizations to work with them (Choudry 2003).

We do not view working with corporations as merely a necessary evil; in fact, corporations can be a positive force in conservation. In 1997, Unilever, one of the world's largest consumer goods corporations, and the World Wildlife Fund jointly launched the Marine Stewardship Council (MSC), a program that certifies sustainably harvested fisheries. In 2010, 12% of the global harvest of wild seafood for human consumption was MSC certified (Howes 2010). More challenging, perhaps, are corporations involved in mining and resource extraction, for which, it would seem, negative impacts on the environment are inevitable, but even here, there are bright spots. For example, in 2004, Rio Tinto adopted the corporate goal that its operations should yield no net loss of biodiversity (Rio Tinto 2008). Although Rio Tinto's goals may seem unrealistic, the company has undertaken an ambitious monitoring program to track its net impacts, which is more than can be said of most conservation nongovernmental organizations.

Greenwashing, whereby corporations provide mere lip service to sustainability but continue their environmentally destructive practices, is a real threat. This does not mean that conservationists should turn away from working with corporations; the influences of corporations on the natural world are simply too large to neglect. It does mean, however, that conservationists need to be savvy about how they engage with corporations.

Fourth, only by seeking to jointly maximize conservation and economic objectives is conservation likely to succeed. Win–win outcomes for people and nature are possible, and discovering their preconditions should be a focus of research (Kareiva et al. 2008). In other cases, there may be trade-offs between conservation and economic development, but actively seeking to optimize both conservation and economic goals can minimize those trade-offs (Kareiva 2012). Modern advances in trade-off analyses and multiobjective planning approaches have integrated social science, business practices, and economics with planning approaches that were formerly focused only on biodiversity (Planning Evolution Team 2011). In addition, although they are not yet a feature of conservation strategy development, conservation could benefit greatly from systematic bright-spot analyses as a way of accelerating progress (Heath and Heath 2010). This approach, which involves looking for rare successes and trying to duplicate the conditions associated with success, is common in public health and business but largely absent from conservation practice.

Finally, conservation must not infringe on human rights and must embrace the principles of fairness and gender equity. The people who have been pushed off their lands and hunting grounds in the name of conservation overwhelmingly tend to be poor and politically marginalized. This is, quite simply, unacceptable. Obviously, life is not always fair, but conservationists should not make it less so. If there are costs to conservation, conservationists must find ways to ensure that those costs are borne by people who can afford them. In addition, women in much of the world have few rights and little input into decisions. Although this might not seem relevant to conservation, research reveals that when women are involved in resource decisions, those decisions are more likely to support sustainable resource management than if men alone control the resources (Shandra et al. 2008, Agarwal 2009).

People deserve a voice in their own fates as well as in the fates of the lands and waters they rely on. Not only is this arguably the right thing to do from an ethical perspective, it will probably improve conservation outcomes. When communities self-organize to manage their local resources, their efforts are more effective than top-down approaches (Ostrom and Nagendra 2006).

Conclusions

In the concluding paragraph of his essay, Soulé acknowledged that we cannot reverse history and restore the world to a prelapsarian past. He suggested that conservation can potentially reduce the rate of extinction, improve the management of wildlands, and mitigate the impacts of technologies. *Conservation* as it was defined by Soulé is reactive and on the defensive; its goal is to minimize losses and, to the extent that this is possible, to maintain the world as it once was. Although we share Soulé's nostalgia and similarly hope that majestic species such as the wolves and grizzly bears of the United States will not be lost to extinction, we

are also relatively certain that these species will never be as abundant and widespread as they once were. Some realism is in order. Given the magnitude of human impacts and change, conservation cannot look only to the past. Instead, it must be about choosing a future for people and nature. Forward-looking conservation protects natural habitats where people live and extract resources and works with corporations to find mixes of economic and conservation activities that blend development with a concern for nature. It also seeks value in novel ecosystems and remains open to some of nature's modern experiments, such as the recent evolution of large coyotes in North America that have received genes from wolves that make them bigger and more capable of taking down deer and even elk (Levy 2012). Increasingly, conservation will entail grand restoration projects on the scale of whole ecosystems—an ambition every bit as necessary as creating networks of protected areas. Our vision of conservation science differs from earlier framings of conservation biology in large part because we believe that nature can prosper so long as people see conservation as something that sustains and enriches their own lives. In summary, we are advocating conservation *for* people rather than *from* people.

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