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# **Conserving Biodiversity in Human-Dominated Landscapes**

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## 22 Conserving Biodiversity in Human-Dominated Landscapes

*Dale D. Goble, J. Michael Scott, and Frank W. Davis*

In 1973, UPC barcodes were used for the first time, OPEC doubled the price of crude oil, a cease fire was signed in Paris to end the war in Vietnam, *Roe v. Wade* was decided by the U.S. Supreme Court, the Watergate tapes were released, and an embattled President Richard M. Nixon signed the Endangered Species Act into law on December 23. At the time, the human population of the United States stood at roughly 212 million; since then, it has increased nearly 40 percent to almost 293 million (Doremus 2006) and the gross domestic product is now eight times greater (Census Bureau 2004).

Obviously, much has changed over the past thirty years, not the least of which is our understanding of how the natural world is put together. In 1973, many ecologists and wildlife biologists assumed ecosystems to be in quasi equilibrium in the absence of human or environmental perturbations. Perturb a system and it would eventually return to the same steady state. The Endangered Species Act reflects this model: remove the threat to species, its population will return to normal, and the act will no longer be necessary. The act was a statute predicated upon planned obsolescence. But the more ecologists have learned about complex ecosystem and population dynamics, the less confident we are in making such predictions based on the historical state of the system (Wallington et al. 2005). We have also come to realize the importance of landscape-scale patterns and processes, greatly extending the relevant space and time scales for effective conservation. Contrary to public expectations and political demands, species protection and recovery is neither straightforward nor inexpensive. But as Jane Lubchenko commented in her presidential address to the annual meeting of the American Association for the Advancement of Science in 1997, “All too many of our current environmental policies and much of the street lore about the environment are based on the science of the 1950s, 1960s, and 1970s, not the science of the 1990s” (Lubchenko 1998, 495).

The two volumes of *The Endangered Species Act at Thirty* look backward to evaluate the effectiveness of the act over its first three decades (Wilcove and

McMillan 2006; Scott et al. 2006, chap. 2; Goble, this volume; Svancara, this volume; Callicott, this volume; Norton, this volume) and also forward to suggest how it can be used as a cornerstone for conserving biological diversity in increasingly human-dominated landscapes (Davis et al. 2006; Bean 2006). The chapters in part 2 of this volume, for example, appraise the science of the 1990s and 2000s at both the large scale (Lomolino, this volume; Naeem et al., this volume; Naeem and Jouseau, this volume) and the small (Waples, this volume; Haig and Allendorf, this volume; Reed et al., this volume) and examine the current debate over how science should inform the policy decisions that the act necessarily raises (Doremus, this volume; Ruckelshaus and Darm, this volume). As the authors note, conserving biodiversity involves more than science. The landscapes are, after all, human dominated—and as such must be human managed. The chapters in part 3 evaluate the issues that human management raise, its costs and benefits (Shogren, this volume; Sunding, this volume), emerging mechanisms that may offer tools to reduce the conflict by shifting increasingly to incentives (Scott et al., this volume; Heal, this volume; Fox et al., this volume), and an assessment of the potential to conserve biodiversity across a variety of sea- and landscapes (Armsworth, this volume; Brosi et al., this volume; Beatley, this volume).

The numbers seem stacked against success: the listing process is stalled despite a backlog four to five times larger than the number of currently listed species, recovery activities are funded at less than 20 percent of identified costs, research management partnerships fall far short of what is needed, and implementation of the act is bogged down in the courts. To overcome these and other difficulties in the next thirty years, we must be more creative in choosing our mechanisms and adapting them to conserve the ecosystems that sustain us. Essential to this effort will be an effective science-policy partnership (Ruckelshaus and Darm, this volume; Doremus, this volume).

Conserving the nation's biological heritage will necessarily require revising the Endangered Species Act. Although legally enforceable mandates remain crucial to the conservation of biodiversity, the act must also become a tool for fostering the necessary conservation management. We must find a way to move from permitting to enabling, from top-down to bottom-up conservation planning and implementation, from preventing extinction to promoting recovery, from triage to keeping common species common. The act must become a tool that both prods and permits us to move away from the species-specific toward an ecosystem understanding of our place in this world. Just as wildlife biology has evolved into the interdisciplinary field of conservation biology, the Endangered Species Act must become a mechanism that encourages integration, not only across political jurisdictions—from county to state, tribal, and federal—but also across the public and private domains. Private landowners are also

habitat owners and their role will become increasingly important over the next thirty years; there are also thousands of local organizations focused on meeting local conservation needs.

To achieve the purpose of the Endangered Species Act and “provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved” (ESA sec. 2(b)) will require a broader vision than we have so far managed. Some of the steps are clear:

- We must confront the large backlog of unlisted but critically imperiled species. The increasing loss of habitat and the growing number of invasive species suggest that the number of these species will continue to grow.
- We must, therefore, intervene before a species is endangered if we are to have any hope of getting ahead of the at-risk curve.
- We need a system of protected natural areas representative of the ecological and geophysical diversity of the country—a vision of the American conservation landscape dating back to 1917 and perhaps earlier (Ecological Society of America 1926) but still unfulfilled (Scott et al. 2001). Statewide wildlife habitat conservation plans embody a federal, state, and local planning partnership and should contain much of the information to fill the gaps in America’s conservation landscape.
- We must reconcile human actions with the biological needs of wildlife in our urban, suburban, and exurban landscapes because a reserve network is insufficient in itself. Rosenzweig (2006), Heal, Beatley, and Brosi (this volume) have identified some ways to reconcile human and wildlife needs on working landscapes. Adding to our difficulties is global climate change, which will shift species ranges in ways we do not fully understand (Root et al. 2003).
- We must be lighter on our feet so that we can respond to the changes.

Ultimately, we need a new land ethic—an objective that will require political leadership and will.