

# INTRODUCTION

## BIODIVERSITY AND THE LAW: AN INTRODUCTION

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In March 1994, Defenders of Wildlife held the first accredited legal conference on biological diversity. There had previously been several informal workshops and a handful of publications on the subject, but no real attempt to pull the myriad legal tenets of biodiversity together in any comprehensive manner. Our conference speakers themselves reflected the diversity of individuals committed to advancing the protection of biodiversity, from policy makers and scholars to advocates and entrepreneurs. The articles that follow represent a cross-section of the topics discussed at the conference. They reflect the ultimate challenge of biodiversity law, which is to build sound and sensible policy from a litany of disciplines, administrative law, commercial law, endangered species law, international law, natural resources law, patent law, pollution law, property law, state and local law and zoning law, to name a few.

If protecting natural biodiversity is indeed a genuine policy goal, then existing law and implementation of that law are clearly inadequate. Biodiversity—the sum total of all species, habitats, and the natural processes that bind them together—is plummeting at an alarming rate. Many large mammals, from Asian tigers to Florida panthers, are on the brink of extinction as their home ranges shrink and poachers exploit them. A great majority of our planet’s bird species are in decline. Amphibians are vanishing mysteriously and precipitously. Countless invertebrates are disappearing before humans even know they exist. Native plant species are being trampled by development or overrun by exotics. Entire fisheries, once plentiful, have collapsed.

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Where does this bleak news leave *homo sapiens*? The law was specifically created by our species to ensure fruitful existence. As an amalgamation of human morality and culture, the law simply cannot ignore life, which in turn cannot ignore the concept of survival. Biodiversity law, then, is not only about life and survival. It is about challenging the human mind to face a world it has largely created and to shape inevitable change with our genetic intelligence.

But the challenge is monumental. Our species perches on the precipice of fundamental change with the surrounding natural world. As the law of life, biodiversity law describes not only the rules imposed upon ourselves as a species, but also the vast and powerful rules nature has thrust upon us. The natural laws of biodiversity await human discovery. They represent this generation's challenge to know and to advance, to understand the full splendor of life and to respond to the new social organization it will require.

Also Leopold's admonition, "To keep every cog and wheel is the first precaution of intelligent tinkering,"<sup>1</sup> is perhaps the most compelling reason to support biodiversity protection. Without biodiversity, humans would deny ourselves the myriad scientific treasures offered by nature and the very resources upon which we depend for survival. Though barely out of its infancy, the science of conservation biology is taking its first steps toward highly significant understandings of biodiversity. It is able to identify species that are indicator or keystone species for an entire ecosystem. It understands many ecological processes and their functional roles. It can even now crudely measure the overall health of the Earth. When the natural variety of species in a habitat area declines, it is highly likely that the associated condition of the land, air, water and food chain in that location are also declining. The necessity of a healthy environment, therefore, is helplessly intertwined with the importance of natural species diversity. Only life possesses both the ability and liability to reflect fundamental environmental change. This is why biodiversity law will inevitably become the central tenet of environmental law.

In its relatively brief history, the protection of wildlife species has focused almost exclusively on those plants and animals directly threatened with extinction. The U.S. Lacey Act of 190, amended several times subsequently,<sup>2</sup> was originally enacted to prohibit the interstate

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1. ALDO LEOPOLD, A SAND COUNTY ALMANAC 190 (1949).

2. Lacey Act Amendments of 1981, 16 U.S.C. §§ 3371-3378 (1988).

commerce of wild animals taken in violation of state law. The 1934 Fish and Wildlife Coordination Act, also subsequently amended,<sup>3</sup> required the U.S. Fish and Wildlife Service to minimize and mitigate the adverse wildlife effects of federal projects in order to avoid species imperilment. The U.S. passed its first Endangered Species Act (ESA) in 1966, which was amended in 1969. Finally, in 1973, meaningful enforcement mechanisms were embedded into the Act, making it, after additional reauthorizations in 1978, 1979, 1982 and 1988, the powerful conservation law that it is today.

The political problems that presently plague the ESA are in many ways a reflection of the confused messages that Congress has sent to the Act's implementing federal agencies, the Departments of Interior and Commerce, since the modern era of endangered species protection began in 1973. On the one hand, as National Oceanic and Atmospheric Administration (NOAA) lawyer Jason Patlis points out, an explicit purpose of the ESA is to protect ecosystems upon which threatened and endangered species depend. Although biodiversity was barely a recognized concept in 1973,<sup>4</sup> several sections of the Act certainly possess biodiversity overtones. On the other hand, as reflected in much of the express obligations and Congressional history of the Act, many Senators and Representatives believed that the ESA was to be a legislative tool that primarily addressed charismatic megafauna like the bald eagle and American alligator. A reasonable middle-ground supposition is that a bipartisan Congress desired to protect a full panoply of fish and wildlife in 1973, but has since experienced gradual defections as the reality of its lofty goals sometimes inflict serious political discomfort to an American society accustomed to unabridged consumption patterns.

Driving the bulk of the present controversy over the ESA is its perceived and real effects upon private property rights. This is largely because no other federal statute has ever even contemplated the type of land use regulation necessary pursuant under the ESA to conserve species and their habitat. Consequently, a coalition of opponents to the Act have begun to vociferously assert that the ESA, particularly Section 9's

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3. 16 U.S.C. §§ 661-667(c) (1988).

4. The late Senator Magnuson (D-WA) presciently recognized, "the need for biological diversity for scientific purposes." SENATE COMM. ON COMMERCE, THE ENDANGERED SPECIES ACT OF 1973, S.1983, S. REP. NO. 93-307, 93D CONG., 2D SESS. (July 1, 1973).

prohibition against harming listed species habitat,<sup>5</sup> runs counter to the Fifth Amendment of the Constitution, which states that “private property” shall not be “taken for public use without just compensation.”<sup>6</sup> ESA supporters charge that most of these claims are greatly exaggerated by a minority of well-financed business interests striving to avoid any reasonable oversight to their profit seeking and, in any event, the ESA need not be implemented in a way that denies reasonable activities on private property. In addition, the federal courts have *never* found that the ESA’s regulatory reach constitutes a taking. Yet a growing number of conservationists, cognizant that at least half of all listed species in the U.S. occupy private land at some time, are taking a closer look at species protection on private land—for the sake of property owners and wildlife alike.

As veteran attorney Lindell Marsh notes, habitat conservation plans (HCP) under Section 10 of the ESA allow nonfederal development to occur on listed species’ habitat in exchange for an overall conservation plan on behalf of the species in question. Although the HCP process has not been without criticism, Marsh forcefully argues that its more cooperative and participatory approach has increased society’s support for species protection. Even Marsh concedes, however, that such cooperation would be less effective without some sort of regulatory stick, particularly under ESA sections 4, 7 and 9.<sup>7</sup>

The HCP process is an excellent example of the ESA’s impressive flexibility and scope. In southern California, it has served as a model for an even more ambitious biodiversity plan to save much of the coastal sage scrub habitat and the approximately 100 sensitive species

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5. “Harm in the definition of ‘take’ in the Act means an act which actually kills or injures wildlife. Such act may include significant habitat modification or degradation where actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering.” 50 C.F.R. Section 17.3 (1993).

6. U.S. CONST. amend. V. The U.S. Supreme Court has historically utilized a fact-based balancing test to evaluate takings claims, including the purpose of the government’s action and the economic effect upon the property owner. *See, e.g., Penn Central Transportation Co. v. New York City*, 438 U.S. 104 (1978).

7. A March 11, 1994, D.C. Circuit opinion could emasculate the ESA’s ability to regulate, presumably in a reasonable way, habitat harm on private property. *See Sweet Home Chapter of Communities for a Great Oregon v. Babbitt*, No. 92-5255 (D.C. Cir. Mar. 11, 1994). Note that the Supreme Court has agreed to hear this case in 1995. *Sweet Home Chapter of Communities for a Great Oregon v. Babbitt*, 17 F.3d 1463 (D.C. Cir. 1994), *cert. granted*, 63 U.S.L.W. 3513 (U.S. 1995); *see also Palila v. Hawaii Department of Land and Natural Resources*, 639 F.2d 495 (9th Cir. 1981).

that depend upon it. This effort could revolutionize ESA implementation by combining the best features of federal oversight, state regulation and private initiative. Yet, because there is not yet a clearly established enforcement mechanism,<sup>8</sup> it could also become a hard lesson in the difficulty and danger of leaving biodiversity enforcement to mere cooperative good will. Time will tell.

The central character in this conservation saga is a four-inch, ESA-listed bird called the coastal California gnatcatcher, an indicator species for a habitat type that once occupied over 2.5 million acres in the California but now is confined to less than 0.5 million acres. With some remaining land valued at over \$2 million per acre because of its prime location (most of which is in private hands), the effort to save the gnatcatcher and its habitat is a near perfect case study for broader lessons in biodiversity conservation. From a broad perspective, the idea behind saving coastal sage scrub is deceptively simple identify remaining habitat, protect the ecologically most important habitat, and allow human development on the least sensitive habitat. However, highly complex questions of science, financing and state-federal relations make this exercise quite challenging.

The key point is that profound innovations in ESA implementation are percolating up from nonfederal and federal collaborators alike—without one single legislative action by Congress! While the results of these changes are still unclear, it is certain that a wide variety of individuals and institutions will continue to play a major role in cutting-edge endangered species protection. The stickiest question for Congress, however, will be funding. In addition to the costly requirements of biological research and land planning, millions of dollars will be needed to purchase easements of fee simple title to wildlife reserves and corridors. In this age of tight government budgets, who will pay for these necessary conservation efforts? While those who seek to develop ecologically sensitive land should bear the cost of their actions, it is nonetheless unfair to saddle present users with the costs of all past development. Indeed, the search for an equitable solution to this ESA

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<sup>8</sup>. See U.S.C. 1533(d). See also *Sierra Club v. Clark*, 755 F.2d 608 (8th Cir. 1985). Still unresolved regarding Secretary Babbitt's gnatcatcher plan is the interplay between the flexibility of ESA § 4(d) and the holding of *Sierra Club v. Clark*, which appears not to allow a species "take" by general regulation.

funding dilemma possesses ramifications for the broader effort of biodiversity protection on private lands.<sup>9</sup>

Most significantly, the challenge of private land conservation starkly reveals the massive and harmful public land subsidies that now exist in the U.S. Not only does the federal government lose billions of dollars to below market sales of timber, water, mineral rights and grazing permits annually, but these same subsidies simultaneously increase the costs of protecting threatened and endangered species. In addition, there exist billions of unused dollars in the Land and Water Conservation Fund (LWCF)<sup>10</sup> reserve, which is generated by a tax on offshore oil production and federal property sales, and is used to purchase rights in private property every year. Other intriguing funding ideas include utilizing monies from the 1991 Intermodal Surface Transportation Efficiency Act,<sup>11</sup> assessing natural resource damages for injuries to listed species or their habitat,<sup>12</sup> and authorizing a federal real estate transfer tax that could be levied only by state and local governments in an approved planning area.

Still, it is worth noting that the ESA is supposed to work as legislative security blanket that catches species from joining the passenger pigeon as museum relics. The 1976 National Forest Management Act (NFMA),<sup>13</sup> 1976 Federal Land Policy and Management Act (FLPMA),<sup>14</sup> the wetlands provisions of the 1972 Clean Water Act (CWA),<sup>15</sup> as well as state and local land use laws should all

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9. Professor J.B. Ruhl, for example, has proposed a biodiversity protection model based upon the Coastal Zone Management Act, 16 U.S.C. § 1451 (1988). Under his scheme, states would identify and nominate biological resource zones; local governments and citizens would develop plans per federal approval; and all regulations would fall under the auspices of approved plans. J.B. Ruhl, *Biodiversity Conservation and Ever Ever-Expanding Web of Federal Laws Regulating Nonfederal Lands: Time for Something Completely Different?* (October 24, 1994) (unpublished manuscript on file with author).

10. 16 U.S.C. Section 460(d) (1988). *See also* Federal Aid in Wildlife Restoration Act (Pittman-Robertson Act), 16 U.S.C. §§ 669-669i (1988); Federal Aid in Fish Restoration Act (Dingell-Johnson Act), 16 U.S.C. §§ 777-777k (1988); Fish and Wildlife Conservation Act (Non-game Act), 16 U.S.C. §§ 2901-2911 (1988).

11. Pub. L. No. 102-240, 105 Stat. 1914 (1991).

12. *See* Endangered Species Act, 16 U.S.C. § 1540 (1988); *see also* Marine Sanctuaries Amendments of 1984, 16 U.S.C. Section 1443 (1988); Oil Pollution Act, 33 U.S.C. 2706(d)(1)(b) (supp. V 1993).

13. 16 U.S.C. § 1601 (1988).

14. 43 U.S.C. § 1701 (1988).

15. 33 U.S.C. § 1344 (1988).

ideally provide substantial conservation benefits. Unfortunately, actual practice has not conformed to legal theory. Domestic U.S. species continue to be added to the threatened and endangered list as precipitous rates, which forces ESA implementation into crisis management. There are now over 900 endangered and threatened species, and 4000 candidate species of plants and animals on the U.S. list, compared to the 109 in 1973. While critics of the Act point to this fact as evidence of legislation gone awry, supporters counter that the ESA merely reflects the dangerous disregard Americans display toward the natural world as housing tracts, road construction and strip malls continue to proliferate around the country.

Internationally, biodiversity law possesses other significant obstacles. Not only must it deal with the interdisciplinary challenges of biodiversity itself, but it is also stuck with the inherently diffuse and sometimes chaotic character of international law generally. In addition, many capital hungry developing countries view biodiversity protection as a luxury. Because there is no real central authority in global affairs, the preeminent issue under international biodiversity law is enforcement. The lack of enforcement mechanisms often render international obligations meaningless, but their presence immediately raises sovereignty concerns. Finding a balance is the study of international law.

Short of war, trade leverage is one of the few international mechanisms available to enforce environmental and biodiversity standards. Use of environmental trade measures, however, has proven to be highly controversial.<sup>16</sup> Lesser developed countries argue such measures amount to eco-imperialism. Economists fret about the inefficiencies of the measures. And, multinational corporations balk at the prospect of disparate regulation in an age of growing global interdependence. As a result, the General Agreement on Tariffs and Trade (GATT)<sup>17</sup> has been quite hostile toward environmental trade

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16. See, e.g., DAN ESTY, GREENING OF THE GATT (1994); Steve Charnovitz, *A Taxonomy of Environmental Trade Measures*, 6 GEO. INT'L ENVTL. L. REV. 1 (1993).

17. The recently concluded Uruguay Round of GATT possesses trade disciplines that would generally only allow environmental trade measures of "least trade restrictive." General Agreement on Tariffs and Trade (The Uruguay Round) (Dec. 15, 1993), 33 I.L.M. 9 (1994). The Round also created a new World Trade Organization (WTO), which will possess enhanced enforcement powers over its predecessor. *Id.* at 13.

measures, especially those aimed at harmful production and process methods (PPMs).<sup>18</sup>

The challenges and opportunities of international environmental protection are aptly crystallized in the 1992 Convention on Biological Diversity (CBD).<sup>19</sup> Finalized at the United Nations "Earth Summit," signed by almost every country in the world, and now ratified by well over 100 nation-states,<sup>20</sup> the CBD is our planet's seminal biodiversity blueprint. It possesses two fundamental pillars to recognize biodiversity conservation as a legitimate and important international goal, and to facilitate the equitable and sustainable use of global biological resources.<sup>21</sup>

At the recent Conference of the Parties for the CBD in December 1994, member states established basic rules of procedure, identified a substantive work program, and debated serious questions posed by biotechnology. Perhaps the most controversial conservation issue discussed was the treatment of forest under the Convention. Although forests contain over 60% of the planet's terrestrial biodiversity, several timber producing countries continue to want to negotiate an international forestry accord outside the CBD's auspices. Conservationists cannot fathom how the CBD can avoid explicitly addressing forest protection. This tension arises precisely because the challenge of forest conservation contains the core elements of most international environmental disputes, huge trade flows, unsustainable PPMs, and development starving countries.

The problematic relationship between environmental law and international trade rules is particularly acute in the area of marine biodiversity. Because many threats to marine ecosystems are PPMs (e.g., overfishing), efforts to enforce biodiversity-related standards with trade

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18. William Snape and Naomi Lefkowitz, *Searching for GATT's Environmental Miranda: Are "Process Standards" Getting "Due Process?"*, CORNELL INT'L L.J. (forthcoming Winter 1995).

19. Convention on Biological Diversity, June 5, 1992, 31 I.L.M. 818 [hereinafter Convention on Biodiversity].

20. Although the U.S. Senate Foreign Affairs Committee approved the treaty by a vote of 16-3 in June 1994, Sen. Jesse Helms (R-NC) and Sen. Robert Dole (R-KS) held up consideration on the Senate floor late in the 103rd Congress, and the U.S. still has not ratified the CBD.

21. While most commentators identify three objectives of the CBD—conservation, equity, and sustainable use—this author argues that sustainable use is a necessary component of both biodiversity conservation and equitable sharing and, as such, is redundant to list as a separate objective.

measures are problematic. Suzanne Iudicello points out that trade leverage has historically been quite successful in negotiating and implementing international fisheries agreements. She stresses, however, that the many threats to marine biodiversity demand an ever broader approach. While the scientific and technical hurdles of managing the world's vast marine ecosystems are daunting, she notes that it is imperative to move beyond traditional single-threat, single-species approaches.

Similarly, the relationship between trade and biodiversity is about more than trade measures or sanctions. David Downes explains that the CBD may be the first treaty to recognize that strict free market economics are not always consistent with the natural laws of ecology. Large-scale monoculture agriculture is a good example. On an ever shrinking planet bound by advancing technology, Downes reminds us of the several billion indigenous people and small-scale farmers who are not necessarily advantaged by the formal international trading system. Furthermore, the incentive<sup>22</sup> for individuals to conserve and protect vast amounts of biodiversity in developing countries is integrally linked to how trade rules and the CBD are cooperatively implemented.

While the Biodiversity Treaty affirms that “the conservation of biological diversity is a common concern of humankind,”<sup>23</sup> it also expressly acknowledges the importance of biodiversity's considerable commercial applicability.<sup>24</sup> At issue is the scientific and commercial revolution in various biotechnology products, which not only is of great importance for new food varieties and medicines, but also has forced new developments in intellectual property rights law. The biotechnical revolution raises both ethical and practical challenges. Is there a limit as to how far humans should alter life? How will national governments be able to track and enforce the infinite number of potential life patents? Can humans control the uncertain public health and natural ecosystem risks associated with genetically-altered, reproducing organisms.

Biodiversity's protection and profitability raise profound legal questions. Somehow the legal system must accommodate the enormous

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22. See Convention on Biodiversity, *supra* note 19, art. 11 (Incentive measures).

23. *Id.* pmbl.

24. See, e.g., *id.* art. 15 (Access to Genetic Resources); art. 16 (Access to and Transfer of Technology); art. 17 (Exchange of Information); art. 18 (Technical and Scientific Cooperation); art. 19 (Handling of Biotechnology and Distribution of Its Benefits); art. 20 (Financial Resources).

importance of nonhuman life to humans. Individuals and their governments must find a way to balance the centuries-old tension between community and private rights. This will entail building a new conception of property based upon ecological values.<sup>25</sup>

One intriguing approach is the concept of a trust. Black letter law defines a trust as the fiduciary relationship between a trustee and a beneficiary with regard to property called the *res*. Trusts are created by a settlor, who can be an individual, association, corporation or government. The fiduciary duty is paramount to a trust and obligates the trustee to act for the benefit of, and not compete with, the beneficiary's granted property *res*. Historically the rules governing trusts were considered "equitable," meaning they were adjudicated by courts of chancery, where rules were more flexible than in courts of law and based upon principles of justice and common sense. While all trusts contain the same essential components, the trust *res* can be almost anything. Governmental and charitable trusts, for example, frequently involve creating a societal benefit to improve the quality of human life.

The trust concept has direct relevance to biodiversity. Nothing but political will now stops society should from designating a trustee to protect the biodiversity *res* for the benefit of all people. Professor Ralph Johnson reveals that the public trust doctrine, a common law edifice that basically governs the public use of navigable water, may already do just that. Because water has always been central to human life, governments since the Roman Empire have granted themselves the power to manage it for the greater public good, even when private water rights have been adversely affected. In its more modern form, the public trust doctrine continues to reflect the intrinsic value of water to humans. There is little reason why the public trust doctrine cannot or should not be extended to biodiversity, and Johnson reveals the change may already be occurring.

However, considering that humans have identified less than 20% of all suspected wildlife species, governments will obviously experience difficulties protecting what they are not sure exists. Effective science-based governmental regulation is near impossible without sufficient baseline information. The Biodiversity Treaty recognizes this need for information by asking countries to identify and monitor their natural

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25. See, e.g., *Just v. Marinette County*, 56 Wisc. 2d 7, 201 N.W.2d 761 (1972) (A locality can use its police powers to zone an area for natural values). *But see Lucas v. South Carolina Coastal Council*, 112 S. Ct. 2886 (1992).

biological resources at all levels of diversity (i.e., genetic, species, ecosystem).<sup>26</sup> In the U.S., this process has begun through the work of the recently established national Biological Service (NBS),<sup>27</sup> modeled after the Department of Agriculture's original biological survey<sup>28</sup> and the U.S. Geological Survey,<sup>29</sup> each of which were initiated last century.

Ironically, had the NBS been operational two decades ago, one of the most infamous Endangered Species Act (ESA) conflicts would not have even occurred.<sup>30</sup> In that case, the Tennessee Valley Authority, Department of Interior, Department of Justice, Supreme Court, Congress and environmental groups all spent the better part of a decade fighting over the construction of the Tellico Dam on the Tennessee River. At issue was whether the dam would destroy the remaining habitat for the only known population of a small fish called the snail darter. Several years and many dollars later, biologists found healthy populations of the snail darter in other waterways, effectively mooted much of the heated debate that the conflict had created. The NBS can provide this information and prevent such societal clashes.

Once basic biological knowledge is gathered, the next step is to assess and minimize avoidable negative impacts on biodiversity.<sup>31</sup> Dinah Bear explains that in the U.S., such a policy process is probably already required of federal agency actions through the National Environmental Policy Act (NEPA) of 1969. NEPA, the grandparent of modern environmental law, sets the fundamental goal of a healthy environment

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26. Convention on Biodiversity, *supra* note 19, art. 7.

27. The Department of the Interior is authorized to establish the NBS under the 1956 Fish and Wildlife Act, 16 U.S.C. § 742 (1988). However, incoming House Budget Committee Chairman John Kasich (R-OH) has targeted the NBS for elimination.

28. The original survey was eventually folded into the U.S. Fish and Wildlife Service (FWS) in 1939 but was subsequently abandoned.

29. 43 U.S.C. § 31(a) (1988).

30. *See generally* TVA v. Hill, 437 U.S. 153 (1978). As a result of this decision, Congress subsequently created the Section 7 exemption process, known as the "God Squad," which possesses the authority to allow species extinction if "the benefits of such action clearly outweigh the benefits of alternative courses of action." Congress also eventually exempted the Tellico Dam project from all federal laws by a rider to the Energy and Water Development Appropriations Act of 1980, Pub. L. No. 96-69; 93 Stat. 437 (1979).

31. Article 14 of the CBD asks each party to "introduce appropriate procedures requiring environmental impact assessment of its proposed projects that are likely to have significant adverse effects on biological diversity with a view to avoiding or minimizing such effects and, where appropriate, allow for public participation in such procedures. Convention on Biodiversity, *supra* note 19, art. 14.

and requires a public review of all major federal agency actions that significantly affect the environment. Although NEPA has not yet inherited specific biodiversity regulations, agencies are beginning to scope, plan and mitigate the effect of their actions upon biodiversity beyond specific endangered species or protected area impacts. Furthermore, NEPA created opportunities for public comment and judicial review have, in effect, created a public trust for governmental biodiversity information. Bear stresses that these democratic procedures, together with substantive biodiversity policy developments, have not yet realized their on-ground protection potential.

Nowhere are NEPA's dual roles of process and substance more vital than in managing the 191 million acre U.S. national forest system, home to vast biodiversity. The rationale for a public trust is particularly strong in national forests because these lands are owned by the American people and managed with taxpayers' dollars. national forest planning is expressly bound by the requirements of NEPA, as well as a duty to manage for natural diversity under NFMA.<sup>32</sup> Similarly, FLPMA, which governs practices on Bureau of Land Management (BLM) land, contains similar requirements to "weigh long-term benefits to the public against short-term benefits" and to "consider the relative scarcity of the values involved."<sup>33</sup> A bill designed to create organic law for the national wildlife refuge system, stalled by Senate Republicans in 1994, would have made biodiversity protection an overarching management directive for those lands.<sup>34</sup> But even with settled biodiversity law, establishing effective biodiversity indicators that balance competing notions of sustainable resource use continues to pose management difficulties. In other words, knowing how to manage (or not manage) for biodiversity is far from obvious.

Nonetheless, answers are emerging for many ecosystem types. This is particularly true for forests, where intensive research is yielding biodiversity indicators for key species and ecological processes. Developing such indicators is, at least for now, the only practical way to

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32. 16 U.S.C. § 1604(g) (1988); 36 C.F.R. §§ 219.19 (1993).

33. Federal Land Policy and Management Act (FLPMA), 16 U.S.C. § 1712(c)(7) (1988); 43 C.F.R. § 1725.3-3 (1993)

34. See Bills to create a "National Wildlife Refuge System Management and Policy Act," S.823, H.R. 833, 103rd Cong., 2d Sess. (1994). See also National Wildlife Refuge Administration Act, 16 U.S.C. §§ 668dd (1988); Wilderness Act, 16 U.S.C. §§ 1131 (1988); Wild and Scenic Rivers Act, 16 U.S.C. §§ 1271 (1988); National Park Service Organic Act, 16 U.S.C. § 1 (1988).

gain a handle on ecosystem or ecoregional biodiversity. Some indicators, like spotted owls in the Pacific Northwest ancient forests, are relatively straight forward. But sometimes indicators are counter-intuitive. One notable example is fire, which is highly beneficial for a number of forest types; the absence of fire in certain ecosystems can lead to long-term biodiversity catastrophe.

Despite our scientific advancements in the field of conservation biology, most Americans do not know what biodiversity is, why it is important, or that we are losing it precipitously. According to a American public survey conducted by Peter Hart and Stephen Kellert in April 1993, only 22% of the American populace have even heard of the issue “the loss of biological diversity.” In a democracy, public policy can be effective only if understood by the public it is supposedly serving.<sup>35</sup> A trust on behalf of biodiversity, therefore, will only work if citizens demand it. Once so demanded, a democratic state as trustee will have no choice but to accordingly respond. As Justice Oliver Wendell Holmes poignantly asserted almost a century ago, “the state has an interest independent of and behind the titles of its citizens, in all the earth and air within its domain. It has the last word as to whether its mountains shall be stripped of their forests and its inhabitants shall breathe pure air.”<sup>36</sup>

Still, it is not enough to lock away a park or a national forest and claim that biodiversity will be saved. It is not enough to grant commercial rights in a valuable gene and assume that the public interest would be guarded. Private property must somehow become a part of the public biodiversity rubric. While the line between private use and public benefit might change as a result of such a paradigm shift, the result need not be government tyranny. Private property has always been a function of a greater societal end, even to its greatest proponent John Locke. Although explicitly shifting private property rights in favor of a biodiversity public trust is not without its risks, its alternative is arguably more dangerous. The quality of human life as we know it may depend upon this transformation.

This is not to say that the transformation will be easy. To the contrary, some personally disadvantaged by the change are lashing out with vengeful violence.<sup>37</sup> Also driving social tensions over biodiversity

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35. Convention on Biodiversity, *supra* note 19, art. 13 (Public Education and Awareness).

36. *Georgia v. Tennessee Copper Co.*, 206 U.S. 230, 237 (1907).

37. *See generally* DAVID HELVARG, *THE WAR AGAINST THE GREENS* (1994).

protection are the scientific limits of present consumption patterns, as well as a revolution in environmental law itself.<sup>38</sup> The violence only underscores what is at stake. While past developmental policies do not comport with any notion of sustainability, reflexively slapping new federal regulations upon new problems can be costly and inefficient. The legal system must be calibrated to create incentives for biodiversity protection, yet simultaneously reaffirm that some core human values are beyond a price tag. It is not a coincidence that ecology and economics possess the same Greek root meaning “home.”

Conservationists, citizens and Congress would all benefit from greater attention to the relationship between economics and ecology. One tack, which should receive a curious reception by the Republican controlled 104th Congress, is to simply follow federal money where direct biodiversity protection does our tax money buy, and where do tax dollars for other activities needlessly harm biodiversity? These questions, if honestly asked, will discomfort a number of vested individuals on both sides of the policy debate but just might lead to enhanced biodiversity protection. It will probably mean greater flexibility for private landowners and greater accountability for public users.

But the inescapable solution to our extinction crisis, of which biodiversity budgetary politics are but only one part, is the potential genius of human adaptability. Unlike any other species, humans possess the unique capacity to create and destroy. The challenge for our species in this era of unprecedented economic and social specialization is to understand the surrounding natural world, and to build a harmonious spot within it.

The cultural shift necessitated by a closer relationship to nature will be a massive learning experience. Some of the requirements for the shift are familiar ethical virtues touted strongly in other contexts: diligence, responsibility, compassion, honesty, patience, humility and team work.<sup>39</sup> Other necessities, such as respect for the diversity of people,<sup>40</sup> will be no easier to achieve for biodiversity than they were (and

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38. Jessica Mathews, *Scorched Earth: Why the Hill Has Become an Environmental Disaster Area*, WASH. POST, Dec. 18, 1994, at A25.

39. See generally WILLIAM BENNETT, *THE BOOK OF VIRTUES* (1993).

40. See, e.g., *Elder's Wish Outweighs Law, Hunter Say: Protected Whale Slaughtered So That 94-Year Old Can Taste It Again Before He Dies*, THE GLOBE AND MAIL. (Toronto), Sept. 26, 1994.

still are) for civil rights.<sup>41</sup> The bottom line, however, is that a societal shift in thought and behavior toward nature need not lower qualitative human living standards and, in fact, should elevate them.

From a wholly legal perspective, the shift on behalf of biodiversity may already be occurring. an international treaty directly addresses it. Endangered Species Act implementation now emphasizes ecosystems. Public land managers now regularly include species diversity as part of their lexicon. Even common law doctrines are creeping toward biodiversity values. The papers that follow are testimony to these changes.

But are the changes being outpaced by a looming crisis of biodiversity loss? Science tells us that the threat is real. In any event, the legal system could certainly be improved to protect biodiversity. As Defenders of Wildlife president Rodger Schlickeisen explains, no less than a Constitutional amendment may be needed to steer our massive body of laws toward a sustainable future. This amendment would not seek to replace fundamental American values, but to supplement them. It would not seek to deny American citizens of hard won gains, but to secure them.

Biodiversity law is the law of life. Its protection will require multifaceted and unprecedented cooperation between humans and nature, rich and poor, public and private. To be effective, biodiversity law must ultimately depend upon the affirmative values of all citizens, not just “experts.” Although these values will be influenced by sophisticated tenets of science and economics, their strength will be grounded in common sense and in the eternal hope that humans can and must do better in cherishing the gift of life.

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41. See, e.g., DAVID HALBERSTAM, *THE FIFTIES* (1993); LANI GUINIER, *TYRANNY OF THE MAJORITY: FUNDAMENTAL FAIRNESS AND REPRESENTATIVE DEMOCRACY* (1994).