A Hard Look at the Endangered Species Act

by Jane Takenouchi

A Place to Start - The Statute

Section 2(b) of the Endangered Species Act (ESA), 16 U.S.C. § 1531(b), delineates the Act's broad purposes. This section reveals Congress' intent "to provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved and to take such steps as may be appropriate to achieve the purposes of the treaties and conventions set forth in subsection (a)." [1] Subsection (a) declares "that fish wildlife and plants have been so depleted in numbers that they are in danger of or threatened with extinction"[2] and that "the U.S. has pledged itself to conserve to a practicable extent"[3] these various species of fish, wildlife and plants. Underlying the statute is a concern for overall species diversity and the global ramifications of the loss of genetic diversity. ESA is designed to protect genetic diversity by (1) listing those species threatened with extinction, (2) determining each listed species' "critical habitat,"[4] and then (3) enforcing recovery plans geared towards preserving that habitat. The center of the plan revolves around the first step, the process wherein the Secretary of the Interior determines which species are to be saved.

Looking Towards Genuine Biodiversity

Many parts of ESA are controversial, but of particular interest lately is the debatestemming from the actual core of the Act: the channeling of resources to save individual "endangered species."[5] This approach is criticized as being both under and over inclusive, depending on one's point of view. Some people argue that entire biological Kingdoms are left out of the Act simply because humans cannot readily identify with them.[6] Others feel that certain charismatic species receive copious but disproportionately inclusive attention.[7] Critics also point to the fact that at least four species have been removed from the endangered species list due to more complete documentation of actual population sizes.[8] To many, this illustrates an overall lack of information regarding rare or recently discovered species. In general, however, critics share a common disappointment with seemingly unsuccessful recovery rates. Fortunately, this has spurred an interest in forming new determinative goals which look towards more effective means of preserving overall genetic diversity. This article criticizes the "species by species"[9] approach which, until now, has characterized the Act. This approach is biologically flawed and renders ESA ineffective in conserving true "global" biodiversity.

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Critical Flaws

ESA can readily be attacked for its apparent species bias. An editorial in *Conservation Biology* heralds a cry for "Equal Rights for Parasites."[10] Though amusingly titled, this editorial adds serious substance to the debate when it reveals ESA's disturbing species bias. The statute seeks to conserve biodiversity but is only concerned with "fishes, wildlife and plants."[11] ESA § 3 defines endangered species as "any species in danger of extinction...."[12] Yet the declaration of purpose (§ 2) looks only at

"fish, wildlife and plants."[13] Section 3 then defines fish and wildlife as members of the animal kingdom, while plants are members of the plant kingdom.[14] ESA makes special inclusions for subspecies and distinct population segments for these kingdoms and defines the geographic ranges of these animals and plants as "critical habitat."[15]

It is interesting that any concern for the smaller organisms is completely absent from the Act. Prokaryotes, protozoans and fungi are huge sources of genetic diversity not even characterized by ESA. Prokaryotes are the oldest living organisms in the world with countless interesting and useful characteristics. For instance, some bacteria have thermophilic adaptations that manufacture proteins which allow them to live in thermal vents. Other bacteria have the ability to fix nitrogen in soils so that other organisms can grow; their importance in microbiology is staggering. Enzymes used in techniques such as PCR (Taq polymerase) were first discovered in rare forms of prokaryotes. Bacteria can also be a huge source of genetic diversity. There are more than 1,600 species, and because many engage in conjugation as well as binary fission, the resulting genetic diversity is extraordinary. Taken together, these organisms are the most abundant in the world. It is important to remember that on a smaller scale, wiping out a hot spring full of genetically unique thermophilic bacteria should be just as concerning as the extinction of a species in the animal kingdom.

Similarly, protists, though mostly unicellular, show tremendous diversity. Included in this kingdom are the algal phyla, diatoms and other organisms absolutely critical to aquatic ecosystems. These are the primary sources of marine photosynthesis. There are many different alga, each with phenomenal diversity and useful applicability to human life—many are consist of only one highly specialized cell. Scientists are in general agreement that all other eukaryotic (multi-celled) organisms, including plants and animals, originated from this Kingdom.[16] Nevertheless, according to ESA, these organisms do not warrant protection as a species.

Just as protists are ignored for lack of multicellularity, Fungi are not protected for lack of photosynthesis capabilities. Fungi are heterotrophs, meaning they absorb organic and inorganic materials from outside food sources. They are critical in ecosystems for their role as decomposers. In fact, fungi may be the easiest Kingdom to protect because their requirements are on the scale of a fallen tree or an old log. Unfortunately, many people find it difficult to appreciate the value of saving organisms that can be responsible for diseases in plants and animals. Fungi illustrate how ESA is only superficially designed to conserve global biodiversity; it is in actuality only concerned with the individual species it chooses to acknowledge.

ESA subjects itself to another form of species bias. An analysis of species recovery plans reports that "with few exceptions, a taxonomic bias was detected that favors animals over plants, vertebrate over invertebrates and birds and mammals over fish and herpetofauna."[17] When a 1979 amendment required the Fish and Wildlife Service and the National Marine Fisheries Services to prioritize listed species, the agencies' response was to adopt a scheme that favored the "higher" life forms of mammal and birds.[18] Such prioritization is indicative of a deep-rooted bias that favors the furry or feathered, and those species which people can easily relate to. Literature in the field seems to indicate that there is little evidence that such ranking has scientific significance. This bias, however, can adversely affect the actual state of biodiversity. Concentrating efforts on saving something cute and furry, though popular, generally means that there are less resources available for other projects which could possibly conserve entire ecosystems of "lower" life forms.[19] Disturbingly, an assessment of recovery plans revealed that only 3.5% of the listed species are "keystones" (umbrella species that indicate the health of the many other organisms).[20]

Furthermore, there is little emphasis on creating plans that cover multiple species.[21]

Despite a 1993 lawsuit mandating a greater emphasis on protecting plants and invertebrates, there is still a "neglect of the little things that run the world."[22] The average listing size of vertebrate animal populations is on an order of magnitude greater than the average listed plant population, and only vertebrates have "distinct population segments" currently protected under the Act.[23] In fact, 80% of the mammals proposed for listing are "populations," as opposed to only 5% for mollusks.[24] A recent issue of *Science* points out that freshwater mussels mark the high end of the extinction rate range, a position shared only with gymnosperms (8.6%).[25] This implies that these organisms are nearing extinction much faster than most others. Mollusk populations, however, are only listed sparingly.

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The ESA approach looks to preserve biodiversity primarily through saving individual species. In doing so, it "obscures our larger task"[26] of preserving what is truly essential to the bulk of biological diversity. By emphasizing individual species for biased reasons, ESA opens itself to questions about the validity of its "species by species approach."[27] By protecting some species with more vigor than others, the Act is over-protects a few species at the cost of neglecting other, equally deserving organisms.

Connections

This type of species bias leads to an incomplete picture of an ecosystem. Contemporary science suggests that every facet in an ecosystem is important. Unfortunately, by definition "science" can never have all the pieces to the ecosystem puzzle, and there may be disputes about the pieces it does discern. A 1994 assessment identified the lack of actual biological data as a critical deficiency in 81% of the recovery plans.[28] Only 8% of the recovery plans could even distinguish between the factors that are proximate causes of species decline and factors that are the ultimate causes of species decline. In many cases (45%), even the population count was a guess. Basically, most analysis for listing species is based on "some general ecological concepts where substantial detail is lacking."[29] The nature of science is such that infinite possibilities make everything at best a matter of probability.

Policy Issues

An article criticizing the biological flaws in ESA mentions that establishing the criteria for a secure population is essentially a policy decision.[30] Basically, the public must decide the amount of insurance it wants to purchase to indemnify a species against extinction. In other words, the amount of security afforded to an individual species under the Act is completely discretionary. Another major concern is that ESA lacks specific criteria for determining when a species is actually in danger or threatened by extinction. Because there is no way to account for stochastic events, the security of a particular species can boil down to a roll of the dice. After all, the population dynamics of organisms involve a great deal of complexity and, as examined later, the data regarding these estimates is constantly evolving. Currently, ESA depends on population counts to determine the numerical quantity of organisms. Because of a myriad of mitigating factors, quantitative data (even if complete) is misleading. For example, genetic diversity cannot be efficiently attained if population counts reflect members of a clone population or close relatives. Furthermore, the viable population size for rare insects and other

short lived invertebrates should be at least on an order of magnitude greater than that of the vertebrates. This, however, is not reflected in the ESA listing process. [31]

In addition, the practices of both the Fish and Wildlife Service and the National Marine Fisheries Service concentrate on the degree of threat to an organism. In doing so, the recovery plans take on an "emergency room"[32] role in conservation. As in the health care crisis, it is apparent that this is an inefficient way to handle the biodiversity crisis—once a species is endangered, its chances of recovery are quite low.[33] Recent reports of population geneticists confirm that estimates currently in use for the maintenance of viable populations could be as much as twenty times too small.[34] The concern is that the progeny of small populations will cause extinction anyway. ESA currently employs critical population standards based on "variation in quantitative, polygenic traits;"[35] traits that are controlled by multiple genes. These traits are subject to mutations and serve as the basis of evolution via natural selection. Biologists are discovering that this mutational process takes a toll on the overall fitness of a population, rendering ESA's current effective populations too small for long term survival. Field scientists have documented a "mutational meltdown"[36] wherein small populations consistently accumulate mildly deleterious mutations. The cumulative impact of this "meltdown" eventually leads to extinction.[37]

Administration

Disturbingly, the historical the guideline for resource allocation has been based primarily on degree of threat. Between 1982 and 1986, almost half of ESA's resources were spent on the recovery plans of only 12 individual species.[38] Concentrating on the immediacy of threat to a species means that ESA channels resources to species that have the lowest chances of long-term fitness and survival. To improve recovery rates, we must recognize that our ability to save endangered species is limited; we need to initiate preservation efforts to save species while they are still a common and viable part of self-sustaining ecosystems.[39] In fact, critics estimate that 60% to 73% of the vertebrate recovery plans have set goals which, even if achieved, will not improve the species' overall status.[40]

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Arguments

Scientific literature reflects a great deal of interest in shaping policies that can better deal with the species conundrum that plagues ESA. Among the most prominent factors that render a species-centered approach ineffective is a general lack of scientific knowledge about rare species. Without adequate information, it is impossible to determine how best to preserve a particular species. Some scientists advocate eliminating the focus on species altogether. This new approach would emphasize the development of habitat preserves that greatly expand the landscape matrix.[41] Using this technique, the landscapes most conducive to biodiversity would be considered for habitat reserves. This however, would involve revamping our priorities away from the "wild and aesthetically pleasing landscapes"[42] which the National Parks and Wilderness Services currently favor.

In an attempt to defend ESA, one report highlighted the statute's six most positive attributes. The first point was that "the Act is the only U.S. Legislation protecting imperiled fauna and flora and their habitats, as well as genetic diversity."[43] In a sense, the author is implying that ESA should be protected because it is the only law of its kind. However, even the best intentions can make bad policy. Perhaps

it is time to replace ESA with a more scientifically sound approach that promises a higher probability of success.

The second positive aspect was that since the "adoption of the act in 1973, more than a dozen species have disappeared from the wild."[44] The author is implying that without ESA many more species would have disappeared. Yet part of what makes the Act so appealing for the political chopping block is the fact that in the last 25 years, only five out of 950 protected taxa have fully recovered. By focusing on endangered species and not endangered ecosystems, the chances for individual organism recovery are low. Furthermore, it is impossible to estimate how much biodiversity has actually been lost since the Act favors only "popular" species.

Other reasons for supporting ESA is that "the act is sufficiently clear ... and its goals can be achieved given adequate funding and political will" and that "the act provides protection for an important and widely popular good."[45] However, in light of the dismal emerging evidence, it is questionable that increased funding would better provide for long term species recovery. It would require an infinite amount of resources to successfully approach the problem one species at a time. "Flexibility" is mentioned as another ESA strong point.[46] Although the Act's flexibility allows for a degree of economic reconciliation, such elasticity is not unique and can be written into any statute. The last highlighted advantage is that "ESA is a forceful example for the rest of the world."[47] Perhaps a more effective means of preservation could set an even better example for the rest of the world to follow.

Conclusions

Supporters of the Endangered Species Act suggest that we must save the Act's integrity if we want to effectively conserve biodiversity. However, the effectiveness of ESA as a means towards this end is questionable. Scientific criticisms of the Act are not mere trivial flaws, but instead reflect foundational problems rooted deep within the statute. The apparent weaknesses of ESA should lead us to the development of sounder policy. But until such a policy is established, the public bears the burden of funding inadequate legislation. Supporters urge that incrementally strengthening ESA will eventually repudiate these concerns. This, however, does not address the Act's core deficiencies. The data indicates that the more effective approach would be to shift our focus from preserving endangered species to maintaining healthy ecosystems. A sound statute, like a good physician, should treat the disease and not just the symptoms.

Jane Takenouchi graduated from UCLA with a B.S. in Biology and is currently a 1L at King Hall.

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NOTES

1 16 USCA §1531(b) (West 1995).
2 16 USCA §1531(a)(2) (a)(3) (West 1995).
3 16 USCA §1531(a)(4) (West 1995).
4 16 USCA §1532 (5) (West 1995).
5 16 USCA §1532 (6) (West 1995).
6 Jerry F. Franklin, *Preserving Biodiversity: Species, Ecosystems or Landscapes?*, Ecological Applications, 3(2) 202-

205 (1993).
[7] Daniel J. Rohlf, *Six Biological Reasons Why the Endangered Species Act Doesn't Work- And What to Do About It*, Conservation Biology, 5(3) 273-282 (1991).
[8] Thomas Eisner, et al., *Building a Scientifically Sound Policy for Protecting Endangered Species*, Science 298, 1231 (September 1, 1995).
[9] Franklin, *supra* note 6 at 202.
[10] Donald A. Windsor, *Equal Rights For Parasites*, Conservation Biology, 9(1), 1-2 (1995).
[11] 16 USCA §1531 (a) (1) (West 1995).
[12] 16 USCA §1532 (6) (West 1995).
[13] 16 USCA § 1531 (a) (1) (West 1995).
[14] 16 USCA § 1532 (8) (West 1995).
[15] 16 USCA § 1532 (5) (a) (West 1995).
[16] Helena Curtis, Biology. 368 (Worth Publishers, 1979) (1968).
[17] Timothy H. Tear, et al., *Recovery Plans and the Endangered Species Act: Are Criticisms Supported by Data?*, Conservation Biology 9(1), 182 (1995).
[18] Rohlf, *supra* note 7 at 275.
[19] *Id.*
[20] Tear *supra* note 17.
[21] *Id.*
[22] *Id.* at 193.
[23] David S. Wilcove, et al., *What Exactly Is an Endangered Species? An Analysis of the U.S. Endangered Species List: 1985-1991*, Conservation Biology 7(1) 87 93 (1993).
[24] *Id.* at 90.
[25] Eisner, *supra* note 8.
[26] Franklin, *supra* note 6 at 203.
[27] *Id.*
[28] Tear, *supra* note 17 at 184.
[29] *Id.*
[30] Rohlf, *supra* note 7 at 276.
[31] Wilcove, *supra* note 23 at 92.
[32] Rohlf, *supra* note 7 at 275.
[33] Elizabeth Culotta, *Minimum Population Grows Larger*, Science, 270, 31 32 (October 6, 1995).
[34] *Id.*
[35] *Id.*
[36] *Id.*
[37] *Id.*
[38] Rohlf, *supra* note 7 at 275.
[39] Tear, *supra* note 17 at 194.
[40] *Id.* at 191.
[41] Franklin, *supra* note 6.
[42] *Id.* at 203.
[43] Michael O'Connell, Response to: *"Six Biological Reasons Why the Endangered Species Act Doesn't Work and What to Do About It"*, Conservation Biology, 6(1) 140 143 (1992).
[44] *Id.* at 142.
[45] *Id.*
[46] *Id.*
[47] *Id.*