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ELECTION BALLOT

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Only AIPG Members that have the right to vote will receive a ballot in their issue.

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Rational Science for Rational Policy: The Endangered Species Act and the Law of Unintended Consequences

Utah Legislature Passes Bill to License Geologists

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Rational Science for Rational Policy: The Endangered Species Act and the Law of Unintended Consequences

(Scientific Problems of the Endangered Species Act)

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The General Case

Legislation that addresses popular concerns often contains wording that creates problems greater than those the law was meant to address. Sometimes these unintended consequences occur inadvertently through failure to assess the long term impact and effects of present day actions, but sometimes the "unintended" consequences were really the result of deliberate efforts to accomplish agendas that may not have been otherwise favorably received at the time the legislation was considered. Legislators face the daunting task of supporting the major cause while opposing the hidden agendas.

The Endangered Species Act

The *Endangered Species Act* as currently implemented is ineffective. Some important endangered fauna may not be protected and others appear overprotected. There is no clear standard for population analysis and the definition of species is not scientifically valid. It is ineffective because actions taken under the act are now creating controversy rather than protecting biodiversity.

When the *Endangered Species Act* was proposed in 1966, it met with general approbation. People understood that the game animals of the African Veldt were declining in numbers, that other "headline" animals around the world were less numerous, and that it is an ethical responsibility of human beings not to unnecessarily impoverish the biodiversity of the Earth.

Estimates of human impact on global biodiversity vary greatly. At one recent meeting (Gerhard *et al*, 2000), participating biologists argued that the rate of extinction was 4,000 species per day, based on statistical studies of tropical rainforest diversity and loss of rainforest. The same biologists accepted 36 million as the number of species that presently exist. At that rate of extinction, no life would exist on earth in 25 years. Other people, such as Lomberg (2001), point out that the most likely consensus scenario is loss of 0.7% in biodiversity over the next 50 years, a far cry from 100% over 25 years. Credible analysis of the issue is needed, but is not available.

The 1966 *Endangered Species Act* (ESA) was only the first step down a legislative path that gradually expanded both the scope and the impact of the original 1966 act in 1969, 1973, 1978, 1979, 1982, and 1988. Today the amended ESA no longer stands as the beacon of environmental responsibility it was intended to be. Whether the ESA is viewed as the club of choice to bludgeon those who would develop land or resources, or the ultimate protection for plants and animals against the unbridled destruction of their habitat depends on the point of view of the observer in any particular controversy (Baur and Irvin, 2002). One thing is clear, however, the ESA has contributed greatly to the acrimony between environmental preservationists and resource users.

Purposeful or unintended, the ESA often pits urban wealth against rural poverty, and the American West against the East. According to a 1999 report from the House Resources Committee, 543 species were listed in the five Far West states, but only 39 were listed in the Northeast. Critical habitats were designated for 96 species in the West, but just nine in the East, despite the effects of eastern urbanization (*Wall Street Journal*, 2002).

Rarely has one well-intentioned and popular piece of legislation created so much rancor over so many years. Even in scientific journals, we have seen articles questioning a particular application of the legislation immediately followed by personal attacks on those who wrote the articles rather than reasoned arguments against the positions stated. The bitter and escalating emotional rhetoric is often the result of failure to understand the law or even read its language carefully.

Certainly it is rational to protect the biosphere from wanton species destruction. But it is no less rational to provide human beings with the resources they need to maintain the quality of their lives and improve their standard of living.

The Arkansas River Shiner

Consider the designation of the *Arkansas River Shiner* as a threatened species. This small fish has been extinct in most of the Arkansas drainage for many years and the actual original range of the shiner is not known. Dewatering of the Arkansas River in Kansas began during the last half of the 20th Century as a result of federal dams in Colorado. Subsequent withdrawals for irrigation from the stream aquifer along the river course in Colorado completed the dewatering, and except in times of very high runoff, surface water did not reach the Colorado/Kansas border. Thus, no fish of any kind were present in much of the Arkansas drainage.

In the mid-1990s the State of Kansas sued Colorado charging violation of water rights under the Arkansas River Compact. Kansas won the lawsuit and water was added to the Arkansas River system. Now water does flow though most of the Arkansas Channel most of the time.

Subsequent to the improvement in the river flow regime, the U. S Fish and Wildlife Service began the process of listing the shiner as a threatened or endangered species. The USFWS completed its listing in 1998. Since the actual range of the

shiner was then restricted to non-Kansas portions of the river, USFWS argued at the time that the designation of "critical habitat" was not prudent (Southwest Kansas Groundwater Management District, 2001). Thus, no significant public opposition was mounted to listing the shiner as an endangered species.

Once the listing was final, however, the USFWS rescinded its earlier determination and designated 1,148 mi of river and the 300 ft of adjacent land to be critical habitat for the shiner; 98% of the now "critical habitat" is private land.

Twenty-six grassroots groups have formed a coalition and filed a "notice of intent to sue" to reverse that listing of the shiner as an endangered species and the designation of the entire river as its critical habitat.

Unscientific, and inconsistent application and interpretation of laws that depend on scientific determinations has created citizen conflict with government.

It is not our place to decide for others what their standard of living should be, or to make more difficult the struggle of less fortunate people to attain their goals. It is, however, our obligation as citizens and scientists to point out some of the scientific problems with the ESA and to suggest how they can be resolved.

We believe we can have rational legislation protecting endangered species and their habitat, a sound rural economy, and an upwardly mobile society. To arrive at such a balanced position we will have to focus on the scientific rationale for the law and the constraints that can be fairly imposed on freedom of economic action.

There are three areas of scientific concern over the existing ESA: the definition of "species," the definition of the term "conservation," and determination of what characteristics define a species. The relatively new phenomena of defining species statistically, based on DNA, is yet another area of concern for scientists.

Definition of species: Most of us learned that the taxonomic term "species" referred to the basic building block of Linneaic taxonomy— the lowest formal taxonomic level at which an organism could be distinguished from all other organisms. Any subdivision of that taxonomic level was informal and poorly defined, often merely a way of honoring the scientist who first discovered or identified the organism. Our biology teachers defined species as organisms "incapable of interbreeding and producing fertile offspring." The standard example was the interbreeding of a horse and a donkey to produce the infertile mule.

However, the definition of species in the ESA is:

"The term "species" includes any subspecies of fish or wildlife or plants, and any distinct population segment of any species of vertebrate fish or wildlife which interbreeds when mature." (*The Endangered Species Act*, 93-205 et. seq).

It has been suggested that "The legal language of the Endangered Species Act contains a scientifically fraudulent definition of species, and does not provide at all for examination of the basis of designation of therein defined species." (Gerhard, 1998). The term fraudulent means "purposeful misrepresentation," a test that the ESA definition appears to meet.

The subspecies designation included in the federal definition of species is the root cause of the acrimony over protecting biodiversity. Some of the organisms protected are not necessarily those in danger of extinction as a true species, but are rather variants in a larger community. "Subspecies" are not sufficiently distinct taxonomically to justify their definition as species for the purpose of protection under a federal law.

Using population segments that may interbreed when mature as a definition also has its problems. Since species has already been defined in the ESA as subspecies, segments of subspecies can then be defined as separate species. Thus, each salmon run and each separate prairie dog town, can be considered a separate "species" for purposes of the ESA. Carried to extremes, New York City cannot eliminate its Norwegian rat population, because that population fits the definition of a "population segment that interbreeds when mature," and is not an insect "pest," the only recognized exception in the ESA (as a result of a 1988 amendment) (Littell, 1992. p. 16). The "distinct population segment" part of the species definition, if strictly applied to human populations, would result in the subdivision of humans into a significant number of species, based on the remoteness of some populations and other social factors.

Also, by act of Congress in 1978, invertebrates may not be divided into population segments (Littell, 1992, p. 16.).

An additional problem is the lack of "naturally occuring" in the definition, as we more frequently encounter invasions of exotic species that form distinct population segments.

The most obvious rational way to fix the definition of species is to make a simple change in the circuitous and scientifically unsupportable language of the existing statute: "The term "species" includes any species of fish or wildlife or plants which interbreeds when mature and whose viable offspring of such union are themselves fertile, and which naturally occur."

Any acceptable species definition must evoke positive responses to the query, "if the legal definition of species were to be extended to human populations, would it be socially acceptable?"

Standard of practice: *The Endangered Species Act* does not establish any scientifically justifiable criteria for designating species, much less subspecies. Nor is "distinct population segment" ever defined with any scientific rigor. Instead, the Secretary of Interior is empowered to use "the best scientific and commercial data available" in making decisions (Littell, 1992. p. 59).

The consequences of these oversights allow any individual to designate an organism to be a subspecies in taxonomic rank, and then by demonstrating rarity, argue for its listing as an "endangered species" entitled to protection against all human activity under the ESA.

There is clearly need to write into the Act a standard of practice for taxonomic designation, whether by legislative amendment or by judicial decision. One such standard might be acceptance by the International Commission of Zoologic Nomenclature, another general acceptance by widely recognized peer-reviewed scientific journals.

Definition of "Conserve:" Although accurately defined, the use of the term "conserve" in the Endangered Species Act

is misleading to the reader who does not follow the arcane language of the act. "Conserve" has traditionally meant "wise use." The ESA defines the word "conserve" as "preserve." The word "preserve" should be substituted in the act to clearly reflect the intent of Congress and the public.

Use of genetic codes for taxonomy: Cracking the genetic code of life has been a continuing process for a number of years. The results are showing up in both theoretical and practical applications such as genetically modified organisms. Advances in the science have been huge.

One of the results of the DNA research has been its application to taxonomy. In the last year, African elephants have been split into two species (Roca et al, 2001), based on DNA differences without regard to interbreeding. This is a strong indication that DNA may well be the device used to designate species for purposes of the ESA in the future. However, this is not a step to be taken lightly.

Currently, in both biology and paleontology, there is a tendency towards splitting taxonomic divisions, leading to more taxons, and with less important criteria used to differentiate taxons. While one can now argue physical resemblances as criteria for either maintaining or splitting one species into several, once statistical DNA methods are permitted, then mathematics can play a larger role in taxonomy than natural divisions. The legal ramifications of this advance in technology must be carefully considered.

Summary

Although the divisions between people and organizations over the *Endangered Species Act* are deep, more careful use of language and a few relatively simple technical modifications in the current act could mitigate the effects of overzealous implementation and lead to a consensus that protection of biodiversity is important and benefits all.

As Congress continues to debate reauthorization of the ESA, there is an opportunity for all concerned scientists to make the act work better and more equitably. Protecting biodiversity is a goal that should unite people rather than divide them.

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Views expressed in this article are those of the author and do not necessarily reflect those of AIPG.

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The American Institute of Professional Geologists Announces the Award Recipients for 2002

The American Institute of Professional Geologists is pleased to announce that the following individuals have been named the recipients of this year's Honors and Awards.

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Larry D. Woodfork, CPG-02370

MARTIN VAN COUVERING MEMORIAL AWARD
Madhurendu B. Kumar, CPG-02370

JOHN T. GALEY, SR. MEMORIAL PUBLIC SERVICE AWARD
Thomas M. Berg, CPG-08208

AWARD OF HONORARY MEMBERSHIP
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Roy J. Shlemon, CPG-01766

Awards will be given to recipients at the AIPG • AEG Annual Meeting in Reno, Nevada. The Awards Banquet will be held on **September 25, 2002**.