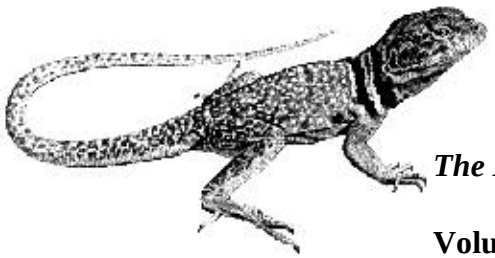

The Glade

The Newsletter of the Missouri Chapter of the Society for Conservation Biology

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Contents

Announcements and Notes

- ♣ The MOSCB web page can be used by members to advertise speakers or other events of interest to conservation biologists in the state. Send your announcements by e-mail to Michelle Boone at moscb@showme.missouri.edu.
- ♣ If you are interested in writing an article for future issues of *The Glade*, please contact Michelle Boone at the above address.
- ♣ Conservation Biology Workshop at the Missouri Natural Resources Conference (MNRC): MOSCB will be sponsoring a workshop addressing how the principles of conservation biology are applicable to natural resource management policies and practices here in Missouri. We will be encouraging participation by natural resource professionals throughout the state at this workshop to be held in conjunction with the MNRC February 2-4, 2000 at Marriot's Tan-Tar-A (Osage Beach).

Vice-President's Corner: Iconography and Mythology in Conservation Biology

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Growing up in the 70's, before the days of cable TV and the Discovery Channel, I remember my deep devotion to all animal and wildlife programs. I loved them all: Nature, National Geographic, and above all, Mutual of Omaha's "Wild Kingdom," with Marlin Perkins and Jim Fowler. It was around this time that words like ecology, ecosystem, endangered species, and conservation entered my every day use. I knew then that ecology was my calling, although my mother hoped that the animal phase would fade out just like the dinosaur phase did (little does she know that I still spend a lot of money on dinosaur books and models). Recently, while brewing coffee and watching "The Today Show," one of the guests was no other than Jim Fowler. As always, he had several critters with him including a Komodo dragon, which he, in his characteristic idiom, ended wrestling away from Katie Couric. That image evoked fond memories of watching him and Marlin Perkins chase antelopes and rhinos in the African savannas, or wrestle anacondas in South America. That was what I wanted to do when I grew up.

These nature programs were my early education in ecology and conservation. Three major themes repeated frequently among all of them, and today they figure as canons in ecology in the pop culture. First and foremost, that there is a great animal diversity in this planet, which consists of mammals, birds, and some reptiles and amphibians. Second, nature is in balance. What that balance is or how is achieved or what does it mean, was never clearly explained. As an extension of this second canon, I learned that everything in nature was connected to everything else. Thus, if a species was disturbed or went extinct, all other species in the ecosystem would also suffer. That leads to the third canon, which is that all disturbance, natural or anthropogenic, was bad. Fire destroys ecosystems and kills animals. Hurricanes and wind throws damage trees, which in turn serve as nesting sites for birds, and so on. This knowledge I took to heart, and set out to become an ecologist.

Given enough time, effort, and training, I did become an ecologist. As I write this article, I am an assistant professor in the Department of Biology at Saint Louis University where I teach ecology and animal behavior. I also conduct research and direct several graduate students in ecology, restoration and conservation. So, why am I writing this piece, if after all I did become an ecologist? The reality is that when I teach ecology and conservation I have to spend a significant amount of time deconstructing the myths that our students have learned so well in school and in the media.

Metamorphoses Bk X: 143-144
Orpheus Charms the Beasts, by Regius

There is no doubt that the origins of this mythology of conservation, as stated in the three canons above, can be traced to ecology. The problem is that what is presented as truths about ecosystems is only a reflection of our state of knowledge in the 50's and 60's. Ecology, like all sciences, is tremendously dynamic, constantly changing as we improve our knowledge of the natural world. But scientific work is unglamorous, and like the great Stanford ecologist Stephen Schneider states: *science is done in second rate hotels and in cluttered labs and offices*. Effective conservation biology has to be anchored in strong ecology and sound policy. In turn, ecological work consists of designing experiments, gathering data (always a limiting factor), analyzing data, and lots of debate. The latter is always accompanied with a healthy dose of skepticism. Rarely does one have to chase down or wrestle an animal.

The second myth of pop ecology is that nature is in balance. As a consequence, or is it because of this, that all species are interconnected. For that reason all species count equally. Removing a species at one end of the food web will result in alteration of another at the opposite end. So called "natural experiments", as well as planned manipulations, have demonstrated that this is not how ecosystems work. Equilibrium analysis was borrowed from mathematics in the 50's and 60's as an analytical tool to better understand the behavior of species population dynamics. We now know that communities are never in equilibrium, but in constant flux. Populations are constantly being depleted and renewed, and some species are more important to ecosystem function than others. This is known as the keystone species concept. Ecosystems are not closed, self-contained "super organisms," but rather networks of interacting units within landscapes.

Probably one of the most fundamental shifts in the way ecologists perceive nature began to take place in the 70's. This was such a profound change in our understanding that is referred to as a paradigm shift. We started to recognize that disturbance was not bad. In fact, disturbance is the mechanism by which many ecosystems are structured. For example, tree and shrub diversity in South Africa's bush landscape is mediated by the trampling and "destruction" caused by elephants. When elephants were kept out of certain areas to prevent damage, the diversity of shrubs and trees started to decrease. The damage caused by the pachyderms was needed to maintain ecosystem diversity. In a similar fashion, rain forest diversity in islands of the Caribbean is maintained by hurricanes and tropical storms. These large scale events shuffle the system and reset it to an earlier state of succession. These disturbances maintain a constant flux of biomass, energy, and species diversity.

A major role of a conservation biologist is that of an educator. We have to make the fundamentals of ecology widely known before we can effectively do conservation. I remember a National Geographic special in which the narrator pointed out, quite factually and assertive, that the extinction of the panda would result in a significant loss of diversity and damage to the ecosystem. As a scientist I strongly disagree with that statement. Trying to conserve biodiversity by producing quasi-scientific statements that pull and tug at our feelings is wrong. Endangered species, degraded ecosystems, pollution, etc., are not science, but problems that need a lot of scientific investigation to provide sound, effective answers. Conservation biologist must have a commanding knowledge of ecology and biology in order to address those problems.

Zoos as Conservation Organizations

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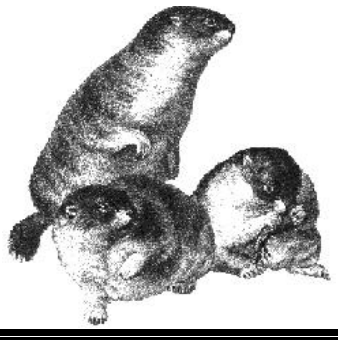

The role of the modern zoo has changed dramatically from entertainment to centers of conservation. Although not the answer for all endangered species, captive breeding programs can focus attention on the plight of animals in general, raising public awareness and encouraging support of *in situ* projects and habitat preservation. In 1980, the board of directors of the American Association of Zoos and Aquariums (AZA) voted unanimously to set wildlife conservation as the highest priority. More complete information on zoo conservation activities can be found in the AZA Annual Report on Conservation and Science. The AZA Conservation Endowment Fund assists in financing cooperative conservation and related scientific and educational activities of its members.

Species Survival Plans

AZA's Species Survival Plans (SSP) form the foundation of its endangered species conservation programs. SSPs, established in 1981, address genetic and demographic issues associated with the maintenance of small populations in captivity. Through the SSP, individual animals can be managed collectively as one population through the cooperation of individual zoos. Each SSP is directed by a species coordinator under the advice of a propagation group, whose members represent institutions that have signed memoranda of cooperation. Advisors in genetics, veterinary medicine, nutrition, reproduction or behavior may also participate. The group develops a *Master Plan*, a regional breeding strategy, which results from extensive genetic and demographic analyses based on studbook data. From the *Master Plan*, annual breeding recommendations are made to minimize the deleterious genetic effects which could result from the small population size and to maximize founder representation. Recommendations are updated yearly to accommodate the changing population. Currently, there are 90 SSPs with a goal of 100 by the end of the century; more than 200 species have studbooks.

Taxon Advisory Group

There are currently more than 40 Taxon Advisory Groups (TAG) that make conservation recommendations for groups of related species, often at the level of family. Members often include field biologists and representatives from other conservation organizations, as well as zoo professionals. Each TAG assesses the need for captive propagation of particular species, evaluates the potentially available captive space, and recommends new species for studbooks and SSPs. The outcome is the development of a regional collection plan for the taxon under its umbrella.

Conservation Action Partnerships

Recognizing that each species can exist only as an integral part of its ecosystem and that habitat destruction is the primary force behind species endangerment, Conservation Action Partnerships (CAP) help coordinate conservation activities of AZA zoos in specific geographic regions. CAPs foster cooperation and communication with foreign zoos as well as governmental and non-governmental organizations to support local nature preserves, zoos, and aquariums, as well as field research and conservation education programs. CAPs currently exist for Brazil, East Africa, Madagascar, Meso-America, North America, Paraguay, Southeast Asia, Venezuela, and the West Indies.

Scientific Advisory Groups

Scientific Advisory Groups for behavior and husbandry, veterinary sciences, genome banking, contraception, reintroduction, systematics, nutrition, and small population management (genetics and demography) promote collaborations among zoos and between zoos and university biologists, advise AZA committees, and communicate with scientific societies and with IUCN/SSC specialist groups.

Conservation Research

The validity of captive research is sometimes questioned because of the unnatural conditions in which the animals live. However, there are advantages to captive research, such as the ability to control variables like photoperiod or diet to better understand their effects on biological parameters. A further advantage: the accessibility of the subjects and their habituation to humans. Increasingly, the benefits of collaborations between field and zoo biologists are being recognized, because their combined results can provide the most complete perspective. In addition, captive populations can be used for validating techniques, such as fecal hormone assays or radio-telemetry techniques, before they are implemented in the field.

Conservation Education

At least 600,000,000 people, approximately 10% of the current world population, annually visit zoos worldwide. The yearly zoo, aquarium, and wildlife park attendance in the U.S. and Canada is more than 112,000,000—greater than the number at football, baseball, and hockey games combined. Although these visitors go to zoos primarily for recreation, their presence gives zoos the opportunity to increase public awareness about endangered species and conservation. Books and movies cannot substitute for a living animal. Experiencing animals firsthand produces a deeper and longer-lasting impression, and makes the visitor more receptive to information about the animal's plight in the wild. The zoo-going audience is very diverse, which presents a challenge to zoo educators, but also offers the opportunity to reach people with a very wide range of attitudes.

St. Louis Zoo Conservation Activities

The St. Louis Zoo has included conservation as a primary goal since its initial charter in 1914. Its staff is very active in AZA conservation programs, including 5 SSP coordinators, 4 TAG chairs, 2 SAG chairs, 1 CAP chair, 10 studbook keepers, and 3 population management plan coordinators, representing a wide taxonomic range from invertebrates to mammals. The education department is one of the largest in the country, and its veterinary and research departments are among the most developed, with veterinary residency and graduate student programs. Many of its professional staff have participated in field conservation and reintroduction programs, and sponsor field research projects through the zoo's small grants program. The zoo also conducts and annual international training program in Costa Rica. With the establishment of the new endowed joint professorship between the zoo and the University of Missouri-St. Louis' biology department, the zoo hopes to further develop its field research and conservation efforts.

Sociological Reflections on Science, Policy, and the Endangered Species Act

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Many environmental problems seem abstract in social terms; they are not something people experience personally. It is difficult, for example, to *see* global warming at present or to *feel* the extinction of a species. Thus, science serves as a means whereby problems are identified and described to the public and policy-makers. Scientists, however, are not the only translators of scientific results. In the course of public policy debates, science is also incorporated into law by lobbyists, lawmakers, and other actors within legal and political arenas providing another public representation of science. The meaning of science in the creation of policy, therefore, may be very different from those meanings attributed to it by the scientists themselves. It is important to recognize that incorporation of science into biodiversity policy is affected by social, cultural, and political factors throughout the policymaking process.

The long history of the formulation and reformulation of United States endangered species legislation provides both an enduring and well-documented history of a science-to-law process. As the extinction of plants and animals continues, scientists, governments, and other concerned people have sought ways to stymie the loss of the earth's biodiversity. In the United States, one result has been the Endangered Species Act (ESA) of 1973, one of the world's boldest legislative attempts to address the extinction issue. As written, the ESA seeks to "provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved, [and] to provide a program for the conservation of such endangered and threatened species (16 U.S.C. § 1532)." While this charge may seem clear at first glance, twenty-six years of social and political conflict over the meaning and scope of the Act prove otherwise. Since the first test of the Act's fortitude, which came with the Tellico Dam-Snail Darter case in 1978, great debates have arisen over the intent and interpretation of the ESA, along with its implementation. Congressional members and interested groups continue to argue about how, and even if, to protect species and their ecosystems under the ESA. Each time the ESA comes up for reauthorization, several arenas of discourse emerge, each charged with condemnations and praise for the past performance under the Act, as well as for its future.

Those in the natural sciences are typically called upon to define the problem of biodiversity and to recommend plausible scientific solutions. Therefore, it is not surprising that scientists and scientific information are frequently relied upon in discourse over the meaning of he Act, as well as its successes and failures. Science is invoked to nswer complicated questions at the heart of social and political debate over the implementation of the ESA. For example, under the ESA, endangered and threatened *species* are to be conserved. A species is defined as "…any subspecies of fish or wildlife or plants, and any distinct population segment of any species or vertebrate fish or wildlife which interbreeds when mature" (16 U.S.C. § 1532 (3) (15)).

This definition is often interpreted as to exclude hybrid species. Because the question of species is essentially genetic and biological, lawmakers and interest groups rely on scientists to tell them when a species is really a *separate* species: in other words, to provide a final definition of the meaning of "species" itself. When there is a conflict over listing or protection efforts, science is called upon to verify the species eligibility or ineligibility for protection under the ESA. Scientific information has been and continues to be sought after and used to reformulate the meaning and intent of the Act, to guide its implementation, or to justify different opinions on legal obligations imposed under the ESA.

However, in the creation of biodiversity policy, complex scientific explanations are requested by lawmakers, submitted by scientists and advocates, and, along the way, sifted through the political and legal processes. Thus, as science enters arenas of policy discourse it passes through a variety of structural and sociopolitical filters as it is shaped and simplified in the process of informing laws and regulations intended to channel a social response to species extinction. This process leads to questions about the role science actually plays in the formation of environmental policy and about what version of science is ultimately codified into law.

Science, like other social artifacts, is not concrete. There are different scientific theories, perspectives, and interpretations. Like society in general, science is composed of a negotiated set of beliefs and meanings that are ever changing and, thus, the scientific reality is dynamic and in a constant state of flux. This reality, however, is not created by chance. Rather, it is subject to manipulation by those who have the desire, authority, and/or power to perpetuate or, in some cases, alter the dominant perspective. In policy-making for example, lawmakers ultimately have more power to define endangered species than do biologists by virtue of their ability to codify preferred scientific findings or theories. Similarly, biologists have more legitimate authority to define endangered species than do environmentalists, largely because they posses the expertise to articulate endangered species issues. Throughout the policy-making process actors vie for the codification of their own environmental policy ideology, supporting different conceptions of science over others. In addition, a group or individual might distort or enhance a particular scientific concept or information in order to advance their perspective and gain the right to attribute meaning to the endangered species issue.

Given the contested nature of scientific meaning, the position of science in arenas of debate over the ESA and biodiversity issues in general remains dubious at best. Science fails to provide grand solutions to the problem of biodiversity, nor does it always provide socially, politically, and economically attractive solutions to the problems it identifies. Thus, science is routinely offered and contested by those who dialogue about biodiversity in policy-making arenas. As a result, science itself often becomes a point of contention within ESA debates because different stakeholders support various bodies of scientific knowledge or interpretations of that knowledge. The perspectives and interpretations they support depend upon their beliefs, interests, experiences, and goals.

Science is an important factor in the formation of endangered species policy. However, it is important to note that, ultimately, the goals, objectives, and outcomes of the ESA are necessarily entangled in political and social discourse about the scientific reality.

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University of Missouri-Columbia Conservation Biology Seminar Series

Seminars are held in 2-16 Agriculture Building from 4:00-5:00 p.m. Refreshments are available from 3:30-4:00 p.m.

Oct. 14, 1999 Fred W. Allendorf, University of Montana
The rise and fall of bull trout: Five lessons in conservation genetics
Nov. 18, 1999 Gerardo Ceballos, Universidad Nacional Autonoma de Mexico, Centro de Ecologia
Vanishing lords of the neotropical forests: Jaguar ecology and conservation in Mexico

Membership Information

The goal of MOSCB is to promote communication among conservation biologists throughout the state of Missouri. Membership in MOSCB is free. To become a member send your name, address, phone number, and email address to: moscb@showme.missouri.edu or write to the address listed below. Membership must be renewed annually. Membership expires on August 1st of each year. Please visit the MOSCB web page for more detailed information (http://www.missouri.edu/~moscb/index.html).

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