

THE INSUFFICIENCY OF ZOOLOGICAL GARDENS

David Hancocks
Executive Director
Arizona-Sonora Desert Museum

Presented

**American Zoo and Aquarium Association
Annual General Meeting
Seattle, WA, 1996**

About twenty years ago, Seattle's Woodland Park Zoo produced its Long Range Plan. It was the first zoo plan ever prepared by landscape architects, rather than by architects. Also it was the first based on bioclimatic zoning.

Many zoo professionals ridiculed the concept of bioclimatic zoning. Recently an architect board member of Zoos Victoria rejected it as worthless, saying it was "just all about the sun and trees and that sort of thing." Traditionalists in the zoo world argued for retaining taxonomic grouping as the basis for zoo plans.

Another novel approach introduced at Woodland Park Zoo was the creating of large-scale outdoor exhibits in which people and animals shared the same naturalistic landscape. Landscape architect Grant Jones, in preparing the Zoo's Long Range Plan, coined the term "landscape immersion" for this approach. Unfortunately some zoo professionals thought it wasteful to dedicate space and money to landscaping, and opposed the emphasis on plants.

Landscape immersion, and naturalistic exhibits that replicate specific habitats, and even bioclimatic zoning, have now become accepted, and are regarded by many zoos as standard practice. Indeed, zoo people often talk of such techniques as an ideal. This is unfortunate, because these concepts, though worthwhile, do not go far enough. The zoo profession needs to reach far beyond the present goals. In their present form zoos are not sufficient for the coming century.

The so called "greening" of western zoos in recent years, and the development of what is called "habitat" exhibits have for the most part dealt only with cosmetic problems. Fundamental problems have been only prettified and merely covered over. There is no doubt that zoos throughout North America tend to be much more attractive as places to visit than was typical through the 1960s, but far more waits to be done, and in a more convincing manner.

It may help here to examine the history that led us to our present position. Until about 200 years ago nature in the western world was seen through very different eyes than it is today. Everything

until then was imbued with a god-given purpose, usually a didactic one. Man had given himself the same image as the Supreme Being, and declared humankind to be a separate and special creation.

THE 18TH CENTURY ZOO FOUNDATION

The western European view of nature began to shift during the Age of Reason. The first encyclopedia was produced in the 18th Century, and promoted as "the conqueror of ignorance." A new age of inventions began. Science became fashionable. The climate of opinion was characterized by a demystification of the Universe, and nature came to be seen as something intrinsically beautiful and especially as being open to human understanding.

Concurrently there was growing interest in the unusual plants and animals being discovered by explorers of unknown lands. Stamford Raffles returned from his travels in Asia and founded the London Zoological Society. This led in 1828 to the world's first public zoological garden. Two other innovations of the 18th Century had significant impacts on the history of zoos and are worth noting. First was the publication of Linnaeus's System of Classification, which literally put the apparent chaos of nature in order. The other was the emergence of the picturesque English garden.

The zoological garden that evolved from these new ways of thinking about and looking at the world has remained generally unchanged in concept, in appearance, and in structure: it remains essentially as an institution that concentrates on large, visually fascinating animals presented in taxonomic groupings and displayed in picturesque parks.

It is perhaps not surprising that there has been such little change for the most part of zoo history. It was not until the 1960s that zoos, along with many other hallowed traditions, began to face widespread public criticism. It was the sight of wild animals in barred and sterile cages that generated this hostility, and it is not just coincidental that these sentiments emerged soon after television began regularly documenting images of wild animals in their natural habitats.

The criticisms from 20 and 30 years ago have been largely dispelled by a combination of new standards in veterinary care, introduction of enrichment programs, development of a professional ethics code, raising of accreditation standards, very successful breeding results, and, for the public eye, most especially by construction of exhibits that create visions of natural habitats.

Yet for all these improvements, in many important ways zoos have still not reached the goals outlined by Heini Hediger almost 50 years ago (Hediger 1950, 1955). It is still the rule rather than the exception for most zoo animals to spend the greater part of each day in concrete cubes or cages so like the conditions that Hediger argued against. Enter almost any service area in almost any zoo and you step back into the zoo conditions of the nineteenth century.

THE 20TH CENTURY ZOO SHORTCOMINGS

Even in the new "habitat" exhibits, too few zoo animals have interaction with anything approaching the vitality and complexity of natural environments. Little commitment is made to refurbishing and re-landscaping. When zoos provide trees they too often resort to making them of cement and plastic, deluding themselves and their visitors that these create a habitat. Indeed, it is not uncommon to find zoo exhibits built entirely of artificial concrete rockwork in various sculpted forms yet referred to as a "zoo habitat".

The early zoos gained rapid popularity because of the inherent fascination we humans have for animals. In a time before color printing or television, people were content just to see the size of an elephant, the colors of a macaw. But after seeing hundreds of zoos I am bored with them. There is very little diversity among them. For the most part zoos are bland variations on a weak and inadequate theme. Conversely, almost every week I read a book on natural history, or watch a wildlife documentary, and never fail to learn something new and absolutely astonishing.

Two fundamental problems lie behind the insufficiency of zoos. These are based on the composition of typical zoo collections, and on the manner in which these collections are presented to the public.

Zoo Collection Inadequacies

Wild nature is composed of the most intricate and wonderful relationships between mammals and microbes and trees and fungi and insects and flowers and birds, and one never hears about them in zoos. At the zoo visitors are supposed to be amazed by factoids, usually as simplistic as the statement that the giraffe has seven vertebrae in its neck, just like humans. There is invariably no context to these factoids, and no meaningful purpose. Mention of evolution is avoided; ideas that might challenge the visitor are shunned; and knowledge that might cause you to become a little less materialistic is as unwelcome as the possibility of wholesome vegetarian food in the zoo restaurants.

In addition, self-imposed limitations prevent zoos from telling their visitors about the inter-relationships and the inter-dependencies between living things, and why they cannot reveal the dynamic interactions of ecosystems. The very fact that they are called zoological gardens means that, by nomenclature, they are limited to animals.

But it is not zoos alone that have such limitations. The same is true of arboretums, and botanical gardens, and geology museums, and all the other disparate natural history institutions that are a product of an 18th Century European view of the world. These self-limiting facilities will be insufficient for the new century that is almost upon us. Indeed, I don't believe they are sufficient for today's needs.

Despite the fact that a great variety of popular natural history institutions have been in expanding existence these past two hundred years, the general level of knowledge and understanding about

the natural world is embarrassingly low. Worse, it seems to be declining as people lose contact with nature.

Information gathered by elders about the natural world around them is no longer in the collective memory of the younger generation. Although young people today probably know more facts about tropical rainforest species than do their grandparents, their intimate knowledge of their immediate biome is rapidly becoming sparse (Nabhan and St Antoine, 1993). Young people's information about wildlife now comes mainly from sources such as the Discovery Channel, where they are denied the very experience of discovery, and from trips to the local zoo, where they are presented with a distorted and very narrow view of the animal world.

The extent to which the typical zoo collection is skewed can be seen by comparing the average number of species represented in North America's accredited zoos with the number of species that actually occurs in nature. For example, there are about 1639 mammal species in nature, and the average AZA zoo collection contains 53 of them. This gives a zoo-mammals to wild-mammals ratio of 1 in 31. For zoo-birds to wild-birds the ratio is only 1 in 98. For reptiles the ratio is 1 in 104. Amphibians are represented at a ratio of merely 1 in 2000 species. And when we get to invertebrates, the ratio is an ironically minuscule ratio of 1 in several millions (Boyd 1995). The picture that zoos present is an upside down version of what exists in nature. More than 95% of the world's fauna are smaller than a hen's egg, and are almost completely unknown to zoos.

The problem here is not simply a matter of fair representation. I am not pleading for equal rights. My principal concern is not even that the typically insufficient zoo collections deprive visitors of access to knowledge about, and thus an interest in, small life forms -- all those beetles, newts, spiders, millipedes, worms, salamanders, scorpions, leaf insects, toads, snails, and countless others that are each equally as fascinating as, say, zebras or lions. The greater problem is that these small life forms are probably more important, in an ecological sense, than the species we choose to focus on in zoos. The little animals are invariably more critical to the habitat. Invertebrates, especially, usually have more biomass and thus greater influence, with more vital and more direct links to the functions of their ecosystems. Without these species, therefore, the stories that zoos can tell about the maintenance and management of wild habitats are very severely compromised.

It is ironic that zoos ignore these small life forms: typically they have behaviors and life styles that are much more interesting and illuminating than the traditional zoo species. There are even important and fascinating stories to tell about microorganisms such as protozoa, tardigrades, rotifers, volvox, or radiolarians, and surely there is no more astonishing behavior than that of slime mold. If zoos are to convince society that biodiversity conservation is an important issue, they must pay appropriate attention to these species.

The problems that will result from the present rapid reduction of diversity in nature and the extinction of ecological relationships cannot be overemphasized. Loss of biological diversity is perhaps the greatest of all the environmental threats to the planet. Yet apparently zoo visitors are learning nothing about it. Indeed, Americans are "clearly unaware of some of the most fundamental facts about diversity of life." (Louis Harris Associates, 1994). There is much

concern about clear-cutting old forests, and spilling oil on beaches, and thinning of the ozone layer. These problems make headlines because they are tangible and immediate and generate personal difficulties. But the loss of biological diversity? Only 1 in 5 Americans claims to have even heard of it, and in a 1994 survey by Defenders of Wildlife zero percent of the 1500 sampled volunteered biodiversity loss as a problem of any magnitude (Communications Consortium Center, 1994).

It seems that four issues get in the way of a common understanding about the loss of biological diversity and its dangers. All are based on ignorance, and this lack of knowledge is one of the great collective failures of our zoological parks.

First there is ignorance of just what we have lost in the past, and why. Most people know only about a handful of extinct species, such as saber-toothed tigers and mammoths and, of course, dinosaurs, and are frankly not at all concerned that these species are not around today. Awareness of the unnaturally high rates of recent extinctions, moreover, is almost completely absent. But if zoos cannot encourage people to comprehend the scale and the value of those species which have been eradicated by human activity in the past 500 years, how are people to understand the danger of losing many thousands more in the next 500?

The second, and linked, dilemma is that general knowledge about which species are presently threatened with extinction is so limited. It is confined to just the spectacular and well publicized few that receive so much attention via zoos, such as tigers, rhinos, gorillas, and the California Condor. Yet these represent no more than the glittering tip of a massive berg of life forms sinking into the abyss of extinction.

The third issue is the public's lack of understanding about the dynamics of habitats and the complex web of connections between soils, plants, and animals within a habitat. Almost 100 years have passed since John Muir reminded us that "When we try to pick out anything by itself, we find it hitched to everything else in the Universe". But still today most Americans are incapable of identifying any cause for biodiversity loss: only 8% are aware that destruction of habitats is related to reduction in biological diversity (Louis Harris and Associates, 1994)

I think the fourth issue is human inability to comprehend the scale of deep history. For most people human history stretches back no further than two to four thousand years. When people developed the ability to perceive annual cycles they gained one of the keys to civilization. During the Renaissance the concept of measuring time in centuries was developed. We now need to go very much further if we are to comprehend the ramifications of extinction and evolution and conservation. We need to develop clever exhibits and compelling stories to make that understandable and worth knowing.

For example, after each of the catastrophic drops in biodiversity in the past -- and there have probably been at least five such immense implosions in Earth's history -- nature has always recovered. But these periods of recovery have sometimes taken 100 million years. We are simply not able to think in such time scales. Yet in less than one century we might reduce the diversity of species to such an extent that it will take one million centuries for evolutionary recovery.

Humans, moreover, are not just eradicating species, but are destroying what E O Wilson (1992) calls the "Theaters of Evolution"; those natural environments in which evolution can begin to create new species. The zoo professionals who think that captive breeding programs are the solution to the problem are merely tilting at windmills. It would indeed be more accurate if the SSP acronym for the AZA's premier "conservation" program was used as the shorthand term for "Self Sustaining Populations" rather than its present title of "Species Survival Program." In any case, zoos need to admit that most of the present SSP species are selected more because of their importance to zoos than their urgency to nature.

Zoos are paranoid about their visitors becoming bored, probably because they so often are, yet zoos consistently fail to find ways to engage visitor interest. The paranoia seems to manifest itself in a reluctance to present anything that might be challenging. Thus, zoos reduce their educational messages to suit what they consider to be the perception level of a ten-year old.

I have seen in zoos graphic panels stating that every time we lose an animal species we might be losing a cure for cancer. Surveys among American schools have shown -- and I suspect that zoo educators have much to do with this -- that for some reason schoolchildren perceive tiger extinction as one of the world's major environmental problems. From this comes the zoo argument that if we save tigers we will encourage people to save tiger habitat, and thereby save biodiversity. The truth is we cannot generate sustainable support for conservation of biodiversity by reducing the message to one of simple guilt or spurious promises.

A message of conservation based on utility will, anyway, ultimately fail, because it assumes that only species useful to humans should be saved, and accepts the loss of the apparently non-useful species. Saving endangered species in zoos is, moreover, not going to conserve biodiversity. The preservation of biodiversity and endangered species are not synonymous problems.

Zoos may save a species' genes, but they in no way preserve that species' inter-relationships within an ecosystem. That is another reason why I believe a focus on species conservation could actually be a hindrance to conserving biodiversity. Biodiversity is not a "thing" that can be saved. It is a complex and dynamic ecological relationship between plants, animals, and microbes in a biotic community. It includes "co-evolved guilds of plants, pollinators, seed dispersers, mycorrhizal and rhizobial associations of plants, and the microbial mutualists in animal guts" (Nabhan, 1995).

If zoos want to be more effective in concentrating on species to maximize the benefit to a habitat, they should concentrate not on self-designated "flagship species" but on "keynote species." (Mills, Soulé and Doak, 1993). Any administrator can select a species for flagship designation, but keystone species are determined ecologically. They are critical to the continuing survival or well being of a natural habitat.

Sometimes keystone species are charismatic megafauna species, such as African elephants. In other circumstances a keystone species may be an apparently insignificant little mouse. In either case, zoos are more likely to make greater contributions to habitat preservation by maintaining and interpreting the keystone species, through both captive propagation for release, and by putting them in the spotlight of interpretation. Most people have no knowledge even of the

concept of keystone species, let alone knowing which ones they are. Providing this awareness could be an extremely important role for zoos.

Zoo Interpretation Inadequacies

The strategic shifts outlined above would come automatically, if zoos would focus on interpreting NATURE rather than just SPECIES. One hopes that moves are being made in this direction. An increasing number of more exhibits are now given habitat names, rather than species names. More efforts are being made to create total habitat experiences rather than just putting animals on exhibit.

A much wider focus on all the components of nature within a habitat, and a much more holistic interpretation of the natural world, would greatly increase the ability of zoos to reach their potential. They can become something much greater than just a zoological park, and could, with care, metamorphose into Ecological Parks, if not in name then at least perhaps in fact.

If zoos would move closer to recognizing that they do not need to depend upon such things as lions and bears and giraffes to attract an audience, and instead give more of their attention to micro-fauna, then zoo visitors, in turn, would come to realize that there is far more enjoyment and satisfaction in learning about the intricacies of nature than can be found in the traditional zoo.

Society therefore needs its zoos to present and explain the interdependencies between all living things. We need them to reveal the complex dynamics of ecosystems. We need them to demonstrate the connections between trees and ants, between flowers and minerals, between soils and micro-organisms, between moths and agriculture, between spiders and hummingbirds and mountains and plankton and forests and bats and every other component of nature.

These are vitally important stories to tell. If zoos will not or cannot tell them, who will? And if people don't come to recognize and understand the important stories about nature, what hope do we have?

The collective inadequacies of zoos in history, with their bear pits and lion cages, has perpetuated false images in the past. Present day defects in the zoo concept, with their rigid focus on a narrow band of wild animal species, continue to convey wrong perspectives to the present generation.

Zoos are failing to teach the basics about what our planet is and how it works and why we must protect it. There is a scale and pattern of ecological illiteracy in modern society that is frightening. Yet millions upon millions of people visit zoos each year, many with open minds, thirsty for knowledge, craving contact with and better understanding of that "other world" of nature. Our increasingly urbanized populations could gain strategically critical contacts with animals through zoo visits.

If zoos reinvented themselves they could help their visitors to form new insights, to develop new attitudes of compassion and respect for all living things, and to understand why every person needs to be concerned about the results of their actions on the environment.

It is time for all zoos to re-examine their philosophies, and to develop a new focus on promoting biological diversity.

Zoos no longer need to show people what a camel or a leopard looks like so much as to explain the dynamic systems of nature. Zoos need to make the concept of biodiversity not just intelligible but wonderful to their audiences. The richness and the interdependence of all life forms must be seen not only as fascinatingly wonderful, but also as absolutely vital to the continuing health and well being of humankind and of the planet.

Eventually, conservation must be recognized by all peoples as something worth making sacrifices for; something sufficiently valid to warrant changes in life style. Altruism must be seen as the only way that our present ways can be sustained.

The shift away from just exhibiting species -- especially in the unnaturally tidy arrangements of taxonomic groupings -- and the move towards revealing the stories about the world of nature, will bring greater intellectual challenges for zoo professionals. Consequently it will bring greater intellectual rewards. Best of all, and of most enduring value, it will bring untold benefits to future generations of visitors who, maybe even more than us today, will desperately need to understand the complexity of the world, and their place in it.

David Hancocks,
Executive Director
Arizona-Sonora Desert Museum
(1996)

Presented at the AZA Annual Conference, 1996, in Seattle, WA

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