

COMMENTARY

Further Role of Zoos in Conservation: Monitoring Wildlife Use and the Dilemma of Receiving Donated and Confiscated Animals

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The role of zoos in conservation has evolved. Additional roles that zoos can play in conservation include monitoring live wildlife use (one of the main threats for many species). Zoos in many parts of the world are offered animals by the public and are required to receive animals confiscated by the authorities. By quantifying these animals, zoos can monitor live wildlife use rates and trends and obtain relevant information on the environment of a region which can assist in situ conservation management. Zoos are sometimes forced to receive unwanted animals from the public or the authorities. Receiving these animals is a burden for zoos. Agreements between zoos and governments are important to take care of these animals and to optimize the use of conservation resources. It is not possible or desirable to maintain all donated and seized animals. The International Union for Conservation of Nature and Natural Resources provides useful guidelines on what to do with them. In all cases, species conservation should take precedence over individual animal welfare. These issues are illustrated with data collected at Zoológico Regional Miguel Álvarez del Toro (ZOOMAT) in Chiapas, southern Mexico. Zoo Biol 24:115–124, 2005. © 2005 Wiley-Liss, Inc.

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INTRODUCTION

The role of zoos has evolved from being centers dedicated exclusively to the collection and exhibition of animals and the recreation of the public or a privileged minority, to becoming multifaceted, progressive institutions. The main mission of modern zoos should be to promote the conservation of species and ecosystems, as well as the ecological interactions and evolutionary processes in which they participate and the environmental services they provide to society [Cuarón, 2004]. The means to accomplish this is through scientific research, captive breeding programs, and especially public education at all levels, and the support (financial and otherwise) of in situ conservation activities. Zoos can play an additional role in promoting conservation by monitoring live wildlife use although there are dilemmas that arise when zoos are forced to receive unwanted animals donated by the public or taken by the authorities. This occurs frequently in many zoos of the world, particularly in developing regions.

Monitoring Live Wildlife Use and the Environment

Direct exploitation threatens or directly causes the extinction of many species [World Conservation Monitoring Centre, 1992; Heywood 1995]. In many, if not most modern countries, there is legislation defining protected species and directed at reducing the negative effects of trade and other activities on wildlife [Carton de Grammont, 2002; de Grammont and Cuarón, 2005]. In conjunction with law enforcement, monitoring is necessary to minimize the potential negative effects of wildlife use. Limitations of human, material, and financial resources often restrict the extent to which monitoring and law enforcement can be carried out [Carrillo et al., 2000]. This is most often the case in tropical countries throughout the world where the vast majority of terrestrial species are found.

The live wild animal trade is still widespread at both local and international levels. International regulations and treaties, such as CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora), have been important in controlling the volume of the international trade for many species. The local trade, because of its often illegal nature and the lack or scarcity of control points and personnel, is sometimes more difficult to document and regulate [Carrillo et al., 2000]. In addition, there are many ways that wildlife is used (e.g., as foods, skins, pets) that complicates things further. This article uses the term 'trade' in a broad sense, including not only commercial exchanges, but also any other way in which live animals may be obtained (e.g., as a gift, barter, captured, found, rescued) for pets or other purposes.

Zoos in many parts of the world, but particularly in developing countries, are often offered animals (frequently former pets) by the public, and are more or less required to receive animals confiscated by the authorities [Aluja, 1983; Wemmer et al., 1990; Cuarón, 1991, 1997b; Paz y Miño et al., 1991]. In regions or countries with little capability for law enforcement and monitoring of wildlife use, zoos can play an important role by documenting live wildlife use. I present, as an example, results from a study on wild mammal use in southern Mexico which was based, among other sources, on data obtained at Zoológico Regional Miguel Álvarez del Toro (ZOOMAT) at Tuxtla Gutiérrez, Chiapas, Mexico [Cuarón, 1991, 1997b].

It is important to stress that the main objective of ZOOMAT and the Instituto de Historia Natural y Ecología (IHNE; the Chiapas state institution to which it belongs) is to promote conservation and knowledge about the biotic resources of Chiapas. The policy of ZOOMAT is not to sell or buy wild animals and not to encourage the animal trade in any way. ZOOMAT is a fine and beautiful zoo, situated in a tropical forest, which predates the concept of 'Biopark' [Robinson, 1988, 1992] by more than 40 years. Additionally, with other departments of IHNE, ZOOMAT participates actively in many other conservation activities, including the creation and management of part of the protected area system in the state of Chiapas.

Numerous animals were taken to ZOOMAT by the public for many different reasons. Most of these animals were former pets that were not wanted anymore by their owners because they became problematic, were in poor health, or other motives. Some were taken because people were interested in having their pet reproduced (with zoo animals), because they thought it would live under better conditions at the zoo, or because people wanted to 'help,' thinking the addition of the animal to the collection would be useful for the zoo. Occasionally people bought, out of mercy or ignorance, animals that were being sold, and took them to the zoo for their care. People also indicated they allegedly found some of the animals they took to the zoo (perhaps escapees from private homes, or animals they did not want to accept having obtained in another way). No matter how they were acquired, all these animals were removed from wild populations. It is important to note that during the time frame of this article, the tenure of live wild animals was illegal in Mexico and not properly regulated [Cuarón, 1997b].

During a 3-year period (April 1984–March 1987), ZOOMAT received 276 wild mammals (36 species from 15 families) from the public and the federal authority responsible for regulating wildlife use and enforcing wildlife-related legislation (Table 1) [Cuarón, 1991, 1997b]. This is equivalent to receiving one wild mammal every 4 days, or 93 mammals a year (although only the case of mammals is discussed here, similar or larger numbers of birds and reptiles were received each year). From this sample it was possible to determine the species in the live animal trade as well as their relative abundance in the trade, thereby obtaining information about the preferences of people in southern Mexico. There were clear trends in the selection of mammals in the live animal trade in southern Mexico. Approximately half of the mammals taken to ZOOMAT were threatened species. Eighty-seven percent of the animals were given by the public, and only 13% had been confiscated by the federal authorities. This is a clear indication that at the time the efforts of the authorities to control the live wild animal trade were inadequate. It is not unreasonable to say that the records of animals taken to ZOOMAT represent a more accurate picture of the live animal trade than that of the federal authorities. The information obtained at the zoo may therefore be more useful to design management policies for many of the species than the one obtained by the authorities. Furthermore, because during the study period, animals confiscated by the federal authorities in the state of Chiapas were taken to ZOOMAT, the sample also shows a record of the success, or lack of, the activities of control by the authorities, and can assist in improving their performance.

Additionally, the sample of mammals taken to ZOOMAT reflects several aspects of the biology of the species and of the environmental situation in southern Mexico at the time of the study [Cuarón, 1991, 1997b]. For instance, an annual peak of trade in species like the grey fox (*Urocyon cinereoargenteus*) coincided with the

TABLE 1. Mammals donated by the public or seized by the authorities and taken to ZOOMAT (April 1984 – March 1987)^a

Family	Seized			Donated			Total			
	Individuals			Individuals			Species		Individuals	
	Species	<i>n</i>	%	Species	<i>n</i>	%	<i>n</i>	% in Chiapas ^b	<i>n</i>	%
Procyonidae	3	3	8.1	4	53	22.2	4	100.0	56	20.3
Cebidae	2	18	48.6	3	22	9.2	3	100.0	40	14.5
Canidae	1	2	5.4	2	31	13.0	2	100.0	33	12.0
Myrmecophagidae	0	0	0.0	2	25	10.5	2	100.0	25	9.1
Dasypodidae	2	3	8.1	1	22	9.2	2	100.0	25	9.1
Felidae	1	1	2.7	4	17	7.1	4	80.0	18	6.5
Sciuridae	2	3	8.1	2	15	6.3	3 ^c	40.0	18	6.5
Dasyproctidae	2	4	10.8	3	10	4.2	3	100.0	14	5.1
Tayassuidae	1	2	5.4	2	11	4.6	2	100.0	13	4.7
Didelphidae	0	0	0.0	3	8	3.3	3	37.5	8	2.9
Leporidae	0	0	0.0	2	8	3.3	2	66.7	8	2.9
Mustelidae	0	0	0.0	2	7	2.9	2	25.0	7	2.5
Cervidae	0	0	0.0	2	7	2.9	2	100.0	7	2.5
Erethizontidae	1	1	2.7	1	2	0.8	1	100.0	3	1.1
Geomyidae	0	0	0.0	1	1	0.4	1	50.0	1	0.4
Total	15	37	100.0	34	239	100.0	36	19.5	276	100.0

^aFamilies are shown in order of importance. Data are from Cuarón [1991, 1997].

^bPercentage of native species found in Chiapas.

^cIncludes one species not native to Chiapas.

time when pups emerge from their dens and seasonal burning was used to prepare fields for agriculture. Some species (Mayan howler monkey [*Alouatta pigra*]; white-lipped peccary [*Tayassu pecari*]; Central American agouti [*Dasyprocta punctata*]; and Mexican anteater [*Tamandua mexicana*]) had not been recorded in the trade before 1983, and their recent occurrence was attributed to the construction of roads into a wilderness area (Selva Lacandona) or to deforestation in other regions. These “new trade” species accounted for almost a quarter of all animals taken to the zoo. Most mammals received at ZOOMAT were native to the region. It is clear, however, that animals are taken to places well beyond their natural distribution within the country. For example, Nearctic ground squirrels (*Spermophilus sp*) were also donated to ZOOMAT, and howler monkeys and many other southern species found their way into zoos in central Mexico (Table 2). Information obtained at ZOOMAT, with additional evidence from field studies [Cuarón, 1991], showed that the recent presence of the Mayan howler monkey in the trade was related to the decline of spider monkey (*Ateles geoffroyi*) populations; although the latter was a preferred pet species, its extinction as an economic resource for traders resulted in the use of howlers.

An opportunistic survey by Aluja [1983] showed that other zoos in Mexico also received a significant number of animals. Data on howler monkeys taken to other zoos in southern and central Mexico suggest that these zoos may receive the same order of magnitude of animals as ZOOMAT (Table 2). This seems to be a general phenomenon. In Ecuador, a substantial number of the animals in the zoos were donated by the public [Paz y Miño et al., 1991]. A similar situation exists in India [A.K. Gupta, personal communication], Brazil [L.M.M. Formiga, personal

TABLE 2. Howler monkeys (*Alouatta* spp.), donated by the public or seized by the government, received at selected Mexican zoos (1983–1987)

Site	Period	Number of animals	Source
ZOOMAT, Tuxtla Gutiérrez, Chiapas ^a	1983–1987	34	Cuarón, 1991
Zoológico San Juan de Aragón, Mexico City, D.F.	1983–1986	25	Hernández Landín, 1986.
Zoológico de Chapultepec, Mexico City, D.F.	1983–1986	7	Hernández Landín, 1986.
Zoológico Benito Juárez, Morelia, Michoacán	Unknown*	26	G. Fernández, Personal communication
Centro de Convivencia Infantil, Villahermosa, Tabasco	1986	5	S. Ortega, Personal communication
Total		97	

^aIncludes also specimens recorded outside the intensive study period and which are not reported in Table 1.

*Undetermined period in the mid-1980s.

communication], Costa Rica [Drews, 2002], and in many other emergent or developing countries [Wemmer et al., 1990; Drews, 1999]. The same happens in the developed world where former wild animal pets are taken to zoological institutions of different types. In December 2002, for example, a newspaper article in the British press highlighted the problem of unwanted pet green iguanas in the United Kingdom and the need for someone to take care of them. International television also shows multiple similar instances in the United States (e.g., the problem of large felids kept at private homes and makeshift zoos). These cases may or may not have been properly documented in literature.

Many studies on wildlife exploitation [Colyn et al., 1987; Robinson and Redford, 1991; Heinen and Leisure, 1993; Cuarón, 1997b; Fa et al., 2000] document use by sampling in places such as villages, markets, shops, or kitchen middens, where wildlife specimens accumulate. In the same light, zoos are loci that can provide information on the magnitude and trends of live wild animal use [Cuarón, 1991, 1997b]. An important caveat is that zoos, by their very nature, may attract (willingly or not) donors, and different zoos may have different levels of attraction. The quality of the zoo and its location may affect the quantity of animals it receives. Care must be exercised when attempting to assess the impact of the trade from data originating solely in zoos. Although animals taken to a zoo can be indicative of wildlife use in a region, some species are likely to be taken less often than their actual use rate. This includes species that are favorite food items, such as deer and peccaries, or charismatic long-lives species that manage to survive well in captivity (e.g., spider monkeys). The use on this sort of species is likely to be underestimated. Nevertheless, in the worst of cases, it is possible to calculate an index of species use from which trends and minimum rates of use can be estimated.

Zoos can assist in situ conservation activities by monitoring the live animal trade. They can also help plan management strategies for species affected by the trade by making the information on the donated and seized animal they receive accessible to managers. This alone is an important contribution, particularly in

countries with weak wildlife law enforcement programs. A group of cooperating zoos could constitute a network to monitor the live animal trade and assist in identifying the rates of species' use in each region and the movement of species between regions. Additionally, through education zoos can help reduce the negative effects of the animal trade on some species. Information on why it is not good to have wild animals as pets should be provided to the public in zoo education programs in a clear and easily understandable way. Also, each time a donor takes an animal to the zoo, the person should be informed on the conservation and animal welfare implications of buying or possessing wild animals. Additionally, zoos should have clear policies on not buying animals from or selling animals to the public, so not to inadvertently encourage the illegal trade.

An important prerequisite for this scheme would be that all zoos have adequate and functional record-keeping systems. Unfortunately, in some regions of the world this is still a problem that needs to be solved. More information can often be obtained from each donated or confiscated individual than is traditionally found in zoo records. Some examples include the locality or region of origin of the animal and the donor; the way the animal was obtained by a person (bought, captured, rescued, found, received as a gift, and so on); the price of the animal, in case it was bought; the age (or age class) of the animal when obtained as well as when it was taken to the zoo; information on the behavior and health record of the individual; the husbandry conditions under which the animal was maintained; and the reasons for the donation. These kinds of information can be used to answer questions about the animal trade, and can help to make management decisions for each donated animal. An important caution is the need to treat second-hand information with care. Not all donors are truthful or manage all the information with precision.

Dilemma of Receiving Unwanted and Confiscated Animals

Receiving unwanted and confiscated animals is more a problem than a benefit for a zoo. Although sometimes very valuable animals are received, most are not welcome additions to the zoo: collection planning strategies are complicated; the health condition of some of the donated animals is uncertain and there are potential health risks for the rest of the zoo animals. Zoos usually have limited space, limited budgets, and overworked personnel. Can you imagine the challenge for zoo staff of having to receive more than 100 animals a year in an unplanned way? Why should zoos receive these animals? Some people from zoos in developed countries may think that this is a non-issue, and that the problem could be solved simply by having policies of not receiving unwanted and confiscated animals. Numerous zoos have such policies. In these countries, there are governmental or non-governmental organizations, usually animal welfare organizations, which take care of donated animals. For zoos in other regions of the world the situation is not so simple, as there are few or no organizations to fill this gap [Drews, 1999; Nassar-Montoya and Crane, 2000]. Some zoos have developed a strong image of being organizations caring of the environment and animal welfare through example and successful education programs. Hence, the public perceives that it is part of the role of the zoo to take care of unwanted animals. It seems contradictory in the eyes of the public that an institution is said to be promoting conservation on the one hand, whereas on

the other it does not receive animals needing help. Conservation and animal welfare issues are confused [Norton et al., 1995].

The responsibility for enforcing environmental laws is usually that of the government. The resources that many governments allocate for this activity are very limited. Once animals are confiscated, somebody has to take care of them. Although some governments attempt to take care of these animals, resources are often restricted, and they have inadequate facilities and insufficient or poorly trained personnel. Many of the confiscated animals are taken to zoos because staff and housing (some) are available. Because zoos also have scarce resources, a good practice would be to formalize agreements between governments and zoos, so that the latter assist in providing facilities and trained staff to take care of the animals until a decision on their destiny is made. The government should finance, or help finance, the maintenance of the animals (feeding, medical treatment, etc.) and construction of enclosures when necessary. This would help to avoid duplication of efforts and would make the use of conservation resources more efficient. Care should be taken that this does not divert valuable resources from in situ conservation efforts. Once animals are formally incorporated into the zoo collection, zoos should bear the entire responsibility on the maintenance and welfare of the individuals. The government, responsible for disposing of those animals, would benefit by delegating its responsibility of taking care of confiscated animals to the zoo, thereby saving public funds. The zoo would reduce its expenditures on donated and confiscated unwanted animals, which can drain its resources and detract from conservation efforts. The zoo would also benefit occasionally by receiving important specimens for its captive breeding, education, or research programs, rescuing them for planned activities. This should not be confused with purposely extracting animals from the wild for these programs because the donated animals have been removed from the wild for other reasons and are essentially lost to their populations. The information obtained on the animal trade could be used by the government and conservationists to improve law enforcement and to design management plans for the species in the wild.

This is not an ideal situation (zoos should not be rescue centers; it should not be their role to receive animals from the trade), but a pragmatic solution. Some benefit exists for in situ conservation by monitoring the trade and occasionally important specimens are obtained to enhance captive breeding programs. With time, this type of scheme will become redundant, as the mentioned institutional limitations are superseded and trade stops posing a significant threat to animal species.

What to Do With Unwanted and Confiscated Animals

There has been considerable discussion on the problem of surplus zoo animals, animals that are no longer needed for the goals of a zoo program [Lacy, 1991, 1995; Lindburg, 1991; Lindburg and Lindburg, 1995; Wagner, 1995; Graham, 1996]. These discussions have been focused primarily on cases in which this surplus is the result of 'successful' or irresponsible population management in captivity. The cases discussed in this study, however, are different because zoos are not responsible for the origin of the unwanted animals. These animals were not sought after by the zoo. Zoos are forced to solve a problem they inherited.

Clear policies of what to do with the redundant animals should be explicitly established. Often, governmental authorities and zoos are forced to face difficult

decisions on what to do with many of the donated or confiscated animals. It is not always necessary or even desirable to keep all of the animals. Guidelines on what to do with confiscated animals have been proposed by the International Union for Conservation of Nature and Natural Resources [2000], and these could be used for most animal groups, donated or seized. This useful statement considers, from the point of view of conservation, three options: 1) to maintain the animals in captivity for their rest of their natural lives; 2) to return the animals to the wild; and 3) to euthanize the animals (i.e., humanely destroy them). The advantages, disadvantages, and possible variants of each are discussed and recommendations for each are made. The appropriate option may vary between individuals, species, regions, and specific conditions. An important consideration is that, from the conservation point of view, the welfare of wild populations in the long term should take precedence over the welfare of individual animals [International Union for Conservation of Nature and Natural Resources, 2000]. Additionally, policies should consider collection planning strategies at the institutional, regional, and global level [Hutchins et al., 1995]. Decisions would have to be made on a case-by-case basis. A well-informed decision on what to do with each specimen should be made soon after it is received at a zoo or animal facility. This should help reduce costs and avoid wasting necessary resources.

Many people and organizations are becoming interested in rescuing, rehabilitating, and releasing former pets and confiscated animals, and many of them work on animal welfare agendas rather than to conserve biological diversity. Although initiatives like these may be commendable, they should not be supported when their objectives clash with species and ecosystem conservation [Cuarón, 2004]. There are considerable technical and financial difficulties in reintroduction programs, and the potential for detrimentally affecting wild habitats is great [International Union for Conservation of Nature and Natural Resources, 1987, 1998; Cuarón, 2004]. Only in very particular situations should animals be released back in the wild, and always carefully following internationally accepted guidelines [International Union for Conservation of Nature and Natural Resources, 1987, 1998]. Competition for limited conservation resources should also be avoided. This is an important note of warning, as many well-intentioned people (including governmental authorities) are releasing animals to the wild in an uncontrolled and irresponsible manner.

What happened with the 276 mammals taken to ZOOMAT? Many animals were used to establish or complement captive breeding programs. Others were integrated into the zoo collection for research, exhibition, and educational purposes. Some animals were sent to other Mexican zoos or research centers. Few were released into the tropical forest where the zoo is located (which is a protected area) [Cuarón, 1997a]. Specimens of common species, which arrived in poor health or for which it was not possible to find housing in other zoos or research centers, were euthanized. Although perhaps unpleasant and controversial, this illustrates the conservation and ethical dilemmas zoos confront when dealing with confiscated and donated animals.

CONCLUSION

Aspects of the wild animal trade and other environmental issues in a given region will be reflected in the animals taken to zoos by the public and confiscated by

authorities. Zoos can assist in situ conservation by monitoring the live animal trade. This situation is general, but it is particularly important in countries and regions with limited capabilities for wildlife law enforcement and wildlife monitoring. Receiving donated and confiscated animals is often a burden for zoos. Cooperation between zoos and governments in taking care of the animals can help to reduce the load on each of them and to optimize the use of limited resources for conservation. Clear policies of what to do with donated and seized animals should be established. International Union for Conservation of Nature and Natural Resources [2000] provides useful guidelines. Long-term species conservation should take precedence over individual animal welfare.

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