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Metamorphoses of the Zoo

Animal Encounter after Noah

Edited by
Ralph R. Acampora



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Zoos as Welfare Arks? Reflections on an Ethical Course for Zoos

Koen Margodt

Conserving Species or Zoos?

How would you design zoos as conservation arks, knowing that many species face extinction and you could help only some of them? You might take a variety of measures to help as many species as possible, such as (i) supporting the ones most in need, (ii) focusing in particular on smaller species to make better use of the limited space, (iii) keeping species that are inexpensive and easy to breed, and (iv) returning them as soon as possible to the wild. Are zoos taking such desiderata serious?

There is no doubt that many species are in peril. The 2007 *IUCN Red List* mentions that some 60,000 species of vertebrates and around 1,200,000 invertebrate species have been listed thus far. The percentage of these that is threatened is somewhere between 10 percent and 23 percent for the vertebrates and between 0.18 percent and 51 percent for the invertebrates (see also below).¹ This indicates that the total number of *listed* species that are threatened—and thus should be classified as Vulnerable, Endangered, or Critically Endangered—ranges between 8,160 and 625,800.²

It is even more complicated to assess the total number of *existing* species, though it is clear that the 1.6 million of *listed* species of vertebrates, invertebrates, plants, and other species form only a relatively small part. Biologist Edward Wilson refers to figures ranging somewhere between 5 and 30 million. He argues that even a conservative calculation leads to the conclusion

that each year about 27,000 species are disappearing, most of which are invertebrates.³

What are zoos undertaking to deal with this extinction threat? In 1993 the international zoo community, represented by the International Union of Directors of Zoological Gardens (IUDZG), published in cooperation with the International Conservation Union (IUCN) *The World Zoo Conservation Strategy: The Role of the Zoos and Aquaria of the World in Global Conservation*.⁴ About 15 years later a conservation symposium resulted in an extensive and remarkable reassessment by zoo practitioners and theorists of conservation efforts by zoos, namely *Zoos in the 21st Century: Catalysts for Conservation?*⁵ Together with other resources, these publications offer an interesting picture of zoos' conservation intentions, efforts, and results.

The target of zoo breeding programs is to maintain about 90 percent of genetic variability of a species for a period of 100 to 200 years or longer. This requires a population of about 250 to 500 animals. The *World Zoo Conservation Strategy* assumes that there are about 1,000 organized zoos, which have together space for 500,000 animals. It is thus estimated that zoos can organize captive breeding programs for 1,000 to 2,000 species.⁶ When taking into account that there are alone already some 8,000 to 625,000 species threatened among the *listed* vertebrates and invertebrates, it should be clear that zoos can offer space at best to only a very limited fraction of these species. Though Colin Tudge's *Last Animals at the Zoo: How Mass Extinction Can Be Stopped* (1991) is a very informative book, its subtitle is clearly misplaced.⁷ The comparison between the conservation intentions of zoos and the image of an Ark that rescues endangered species may be attractive, but when applying it to the current extinction threat most threatened species simply risk drowning. There is insufficient space on the Zoo Ark, even if zoos were to focus entirely on conserving threatened species.

Moreover, the real number of captive breeding programs seems to remain below the goal of 1,000 to 2,000 threatened species. The most intensively managed breeding programs of the AZA (the Association of Zoos and Aquariums, formerly American Zoo and Aquarium Association) and EAZA (European Association of Zoos and Aquariums) are respectively called Species Survival Plans (SSPs) and European Endangered species Programs (EEPs). In 1991 there were 110 SSPs and 76 EEPs, whereas in 2008 there were 114 SSPs and 172 EEPs. For a variety of reasons, one cannot simply count the number of SSPs and EEPs together in order to know for how many threatened species zoos have organized breeding programs. On the one hand, an SSP sometimes comprises more than one species. The 114 SSPs cover all together more than 180 species. In addition, besides the SSPs and EEPs, there

are also other, less strictly organized breeding programs, in which zoos receive guidelines that they can follow on a voluntary basis. These are Population Management Plans (PMPs, organized by the AZA) and European Studbooks (ESBs, by EAZA). As of 2008 there were 311 PMPs and 165 ESBs. And there also exist breeding programs outside of the AZA and EAZA, such as the AAPs (African Propagation Programs) and ASMPs (Australasian Species Management Programs).⁸

On the other hand, these are all regional breeding programs and there exists extensive species overlap between these programs. Also, breeding programs such as SSPs and EEPs refer in particular to species that need intensive management *within zoos*. These species are thus not necessarily threatened in the wild. Examples are the bottlenose dolphin (EEP), the keel-billed toucan (SSP) and toco toucan (SSP), none of which are considered threatened in the wild—all three have a status of "least concern."⁹ The main goal of SSPs, EEPs, and other breeding programs is to assure a genetically and demographically healthy, stable population in captivity. All in all, it remains unclear for how many threatened species zoos have now developed breeding programs, but it seems this ranges around a few hundred instead of the potential 1,000 to 2,000 that was brought forward by the *World Zoo Conservation Strategy*.

Space on the Zoo Ark is limited and many species are in peril. Therefore, one would expect zoos to face enormous dilemmas in making selections among the threatened species that they will try to save from extinction. However, though it is difficult to assess for how many threatened species zoos have breeding programs, it is obvious that *only a very limited part of available space in most organized zoos is dedicated to threatened species*. In 1991, zoo conservationist Ulysses Seal of the Captive Breeding Specialist Group (CBSG) referred to estimates of the ISIS (International Species Information System), according to which only 5 to 10 percent of the space available in zoos participating in this system (at that time 370 zoos in 34 countries) were allocated to endangered species.¹⁰ In 2007, Alexandra Zimmermann (Chester Zoo and Oxford University) and Roger Wilkinson (Chester Zoo) reported on a survey they sent to 725 zoos and aquariums in 68 countries. 26 percent of these institutions responded (which was 190 institutions in 40 countries) and 72 percent of the respondents reported that fewer than 30 percent of the species in their care were listed by the IUCN as threatened species. 29 percent keep less than 10 percent threatened species and 43 percent state that somewhere between 11 percent and 30 percent of their collection consists of threatened species. 19 percent of the respondents hold 31–50 percent of threatened species, 5 percent have 51–70 percent of threatened species, and

the remaining 4 percent (or less than ten institutions) hold more than 70 percent of threatened species.¹¹

Mark Stanley Price and John Fa of the Durrell Wildlife Conservation Trust analyzed the conservation status of animals kept by 188 South American zoos. These zoos hold 49,665 individuals of 1,211 species and the collections are predominated by mammals, birds, and reptiles. Within these three groups only 8 percent of the species are threatened. And only 13 species counting 54 individuals are classified as critically endangered. The authors selected South American zoos for illustrative purposes, not because this region's performance was radically different from that of other regions.¹² These data put the idea of the zoo community as a Conservation Ark for threatened species in perspective. Only a very limited amount of available space in zoos is dedicated to threatened species. In other words *space for threatened species seems to be restricted to one of the Zoo Ark's lifeboats, whereas the majority of its inhabitants are simply not members of a threatened species (not of vulnerable, endangered, or critically endangered species)*. This has been so for decades, and it makes one wonder what course the Zoo Ark is following.

Zoos do not tend to maximize their conservation role by breeding especially smaller species that breed quickly and are less expensive. No, their focus is rather on large animals. The majority of their breeding programs consist of mammals (52.62 percent). Birds come in second place (35.56 percent), and both groups of organisms represent together 88 percent of all breeding programs of the AZA and EAZA (see table 1.1). Reptiles come in third place (9.32 percent), and amphibians, fishes, and invertebrates each represent barely 1 percent. When looking at the more strictly organized breeding programs—SSPs and EEPs—this pattern is even more pronounced: mammals represent no less than 70 percent of these breeding programs, whereas birds take up around 20 percent (see table 1.1 and figure 1.1). Together, both groups correspond to 90 percent of all SSPs and EEPs.

There is no ecological justification for these proportions. They do not reflect the percentages of threatened species as listed in the 2007 IUCN Red List—see table 1.2. It would be inaccurate to state that large animals in particular are threatened with extinction. Neither is this especially so for mammals and birds. For example and as indicated by Lesley Dickie, Jeffrey Bonner, and Chris West, the percentage of threatened amphibians (29–31 percent according to latest data) exceeds that of threatened mammals (20–22 percent) or birds (12 percent). Notwithstanding the zoo bias toward mammals and birds, it is pointed out that amphibians would be excellent candidates for breeding and reintroduction programs, due to their high fecundity, low maintenance costs, and few behavioral problems.¹³

Table 1.1. Numbers of AZA and EAZA Breeding Programs According to Taxa

	SSP	PMP	EEP	ESB	Totals	Percentage	Totals (SSP/EEP)	Percentage (SSP/EEP)
Mammals	75	121	126	79	401	52.62	201	70.28
Birds	22	147	37	65	271	35.56	59	20.63
Reptiles	11	37	7	16	71	9.32	18	6.29
Amphibians	3	4	0	2	9	1.18	3	1.05
Fishes	1	1	0	2	4	0.52	1	0.35
Invertebrates	2	1	2	1	6	0.79	4	1.40
Totals	114	311	172	165				

Calculations based upon AZA, www.aza.org/CandS/SSP.xls (September 8, 2008), AZA, www.aza.org/CandS/PMP.xls (September 8, 2008) and EAZA, "Breeding Programs—Statistics," EAZA, www.eaza.net/index.php (September 8, 2008).

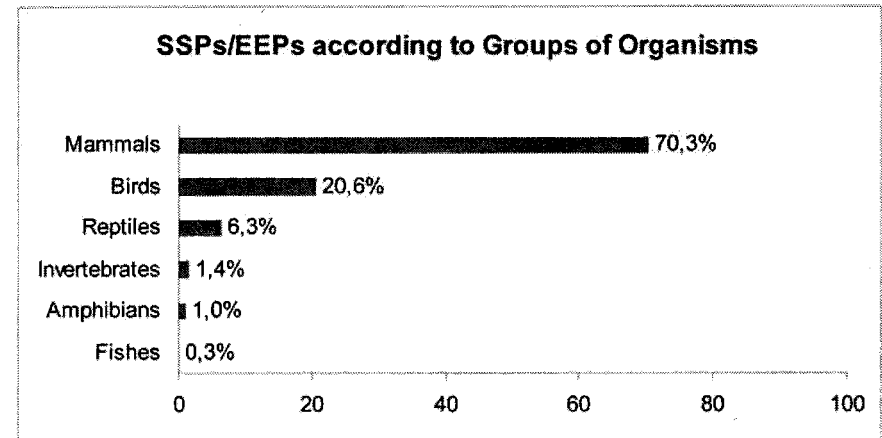


Figure 1.1. Percentages of SSPs and EEPs according to Groups of Organisms. (Calculation based upon table 1.1)

Table 1.2. Numbers and Percentages of Threatened Species (as reported in the IUCN Red List of 2007)

	Number of Described Species	Number of Evaluated Species	Threatened Percentage of Species Listed	Threatened Percentage of Species Evaluated
Mammals	5,416	4,863	20	22
Birds	9,956	9,956	12	12
Reptiles	8,240	1,385	5	30
Amphibians	6,199	5,915	29	31
Fishes	30,000	3,119	4	39
Invertebrates	1,203,375	4,116	0.18	51

IUCN, "Table 1: Numbers of threatened species by major groups of organisms (1996–2007)," IUCN, www.iucnredlist.org/info/2007RL_Stats_Table%201.pdf (September 8, 2008).

Moreover, it would be a misconception to say that large animals in particular play an important ecological role. As argued by Edward Wilson, keystone species may as easily comprise smaller organisms.¹⁴ Zoos are apparently aware of the need of making greater efforts for smaller species, as indicated by their participation in project “Amphibian Ark” and the marking of 2008 as the “Year of the Frog.” The Amphibian Ark’s director Kevin Zippel comments in *Scientific American* that amphibians are “absolutely vital to their ecosystems” and that “for the price to keep a single elephant in captivity for a year, about \$100,000, you could pay for the expertise and facilities to save an entire amphibian species.”¹⁵

One reason for the disproportions in breeding programs may be that it is far easier to obtain reptiles, amphibians, and fishes from the wild in comparison to mammals or birds. Whereas 79 percent of mammals and 63 percent of birds mentioned in the ISIS (International Species Information System) zoo database of 2003 were born in captivity, no less than 59 percent of reptiles (over 33,500 individuals) and 73 percent of amphibians (more than 16,000 individuals) were caught in the wild.¹⁶ The availability of these species from the wild may mean that there was far less pressure on zoos to organize breeding programs in order to assure the presence of these groups of organisms for continued display in zoos.

In addition, and perhaps even more important, there is clearly a strong preference for keeping and breeding (large) mammals. Zoos are typically about elephants, giraffes, lions, tigers, dolphins, bears, and gorillas. *The motivation for this is not ecological, but rather anthropocentric—species selection by zoos is driven largely by economic interests, perceived visitor preferences, and aesthetic appraisals.* For example, Colin Tudge writes that ideally we would conserve California condors and every Amazonian beetle, but if one would need to choose “then it would seem perverse to sacrifice the bird for the beetle: like throwing out a Rembrandt to make way for an amateur watercolour.”¹⁷ And Jon Luoma mentioned in 1987 the following comments by Tom Foose (then conservation coordinator for the AAZPA—now AZA—and later CBSG Executive Officer):

Indeed, zoos can’t serve every animal, says Foose. They tend, if only for their own economic survival, to focus on creatures that the public finds most fascinating—animals with whatever charisma it takes to propel those visitors through the turnstiles. And that, says Foose, is where zoos can and will concentrate—on the big and attractive animals. He’s fond of using a term that cropped up at a meeting of zoo biologists to describe those target animals: charismatic megavertebrates.¹⁸

In the end, many of the species currently kept by zoos may become threatened, and then zoos could argue that their current decisions in terms of species selection were visionary. However, we should not allow such ecological camouflage to cloud the fundamentally self-serving motivation of zoos: *Zoo conservation is in the first place about conserving zoos, not about conserving threatened species!* If it was all about conserving species threatened in the wild, zoos would focus in the first place on those species that need their assistance right now the most. Moreover, they would return those species as soon as possible to the wild, in order to make space for other threatened species in need of support. However, successful reintroductions (as illustrated by the Arabian oryx and the black-footed ferret) are quite rare.

Eternal Arks?

In 1995, Benjamin Beck (then at the National Zoological Park, Washington) mentioned that about 145 projects are known to have released captive-bred animals in order to reestablish or reinforce the natural population for conservation purposes. Only 11 percent (or sixteen projects) of these contributed to the establishment of a self-sustaining natural population.¹⁹ An analysis from 2007 investigated the origin of released threatened reptiles and amphibians. Out of 38 threatened species, only 10 percent (or four species) came from zoos. The released individuals of twelve species were translocated (moved from one location in the wild to another) and twenty-two species came from specialized facilities of various types.²⁰

Whatever their purpose may be, zoos do not release the animals they breed as soon as possible back into the wild, even though this would be logical from economic, ecological, genetic, and behavioral perspectives. Most species simply stay on the so-called Ark (which should not surprise us, as most of these are not even threatened). Zoos seem to have selected a range of species that they want to keep over the very long term—as mentioned above, their target is 100 to 200 years or longer. Robert Loftin pointed out that even where zoos consider reintroductions, they plan to continue keeping a considerable population in captivity and he used the notion of zoos as “perpetual arks.”²¹ Though the keeping of a captive population as a safety net might sound reasonable, from a conservation perspective it is an unacceptable luxury when taking into account the numbers of species facing extinction.

The idea of a perpetual or eternal ark may be a tricky and untenable one. Zoos tend to keep a large variety of animals and focus in particular on larger, charismatic species. This policy is having very negative effects and is even

undermining the interests of zoos themselves, namely maintaining healthy populations of species in captivity over the long term. According to Anne Baker (The Toledo Zoo, Ohio) the AZA's 2002 *Annual Report on Conservation and Science* provides sufficient information on 95 breeding programs (SSPs and PMPs) to analyze their long-term viability. A good viability means that the gene diversity is greater than 90 percent, the population size is 200 or larger and the population is stable or growing. However, Baker's study indicates that no less than 65 percent of these breeding programs have a low long-term viability. More precisely, 67 percent reported a population size of less than 100 animals and 25 percent stated their current gene diversity to be less than 90 percent. Part of the causes underlying this problem is the failure to make choices, adds Baker. Zoos want to keep too many species and she gives the example of guenons, for which no less than ten species had been recommended for SSP management. However, none of these species have a population above eighty individuals and no target population size is set above 125 individuals. As a consequence, the long-term viability for each species is low, whereas a restriction to only those two species with the largest population size and gene diversity might lead to long-term viability.²²

If zoos would focus on a limited selection of small species with a decent population size, they might do a much better job. However, it seems to me that in many ways so-called modern zoos are still keeping animals as stamp collections (which typically contain just a few items of many kinds)—a picture usually associated with nineteenth-century zoos. Individual zoos tend to have their own preferences about what species they want to keep, and it is apparently most difficult to reach an agreement about priority species. Within this political reality, zoos rather seem to opt for a range of alternative solutions for dealing with their self-generated genetic problems, though these are highly questionable from an ethical perspective (see below).

The Potential Conservation Role of Zoos

In general the question remains whether zoos might offer a desired roadway for supporting species threatened in the wild. Though zoos have reintroduced some species back into the wild over the last decades, there remain considerable disadvantages.

Zoos tend to underline their value in supporting species that risk going through a so-called genetic bottleneck in the wild. Even if zoos could deliver sufficient animals with a proper genetic constitution, the fact remains that one should not consider merely the genetic level. Animals in the wild have a rich variety of skills and knowledge. They have learned how to deal with

their environment—there is extensive ethological evidence of information that is passed on from one generation to the next and of variety between populations, indeed of animals having cultures. By taking animals away from their habitats and breeding them for several generations in captivity, zoos are pushing animals through what I call a "behavioral bottleneck." Enrichment can only compensate for this in a very limited way. Stanley Price and Gordon argue that differences in complexity of habitat and learned behavior explain why it is so much more difficult to organize reintroductions for orangutans in comparison with more genetically hard-wired animals such as Arabian oryxes.²³ Hillary Box includes within her list of survival skills the challenge of orientation and movement in space, selecting appropriate food, obtaining suitable places for resting and sleeping, dealing successfully with conspecifics and members of other species (predator avoidance).²⁴

Besides the lack of particular skills, animals in zoos may very well go through a process of unnatural selection. The animals that adapt best to captive conditions (the most docile ones) tend to be the most successful ones, but these may not be the appropriate ones for reintroduction into the wild (due to lack of fear of humans).

Apart from this, maintaining and breeding animals in zoos and the setting up of reintroduction programs are extremely expensive. In 1989, the cost of maintaining a captive population of 550 golden lion tamarins at 100 zoos was estimated at \$911,875 per year and for the period 1983–1989 the reintroduction of tamarins was estimated to be \$22,563 per surviving reintroduced tamarin (that is forty-eight individuals in 1989, namely twenty-seven of seventy-one released animals and twenty-one of twenty-six born individuals). Matthew Hatchwell (Wildlife Conservation Society), Alex Rübel (Zoo Zürich), and colleagues remark that "The costs associated with setting up and running reintroduction projects in developing countries are on a par with those of entire protected areas, which protect many more animals as well as their habitats."²⁵

Even though there exists a huge extinction threat, one should not conclude too fast that zoos are the answer, not even for saving critically endangered species. For example, George Schaller has written that the future of the fewer than 2,000 remaining giant pandas would be brighter if conservation money had been invested in antipoaching and forest protection measures rather than in the construction of captive breeding stations.²⁶ And no zoo has a breeding program for the critically endangered mountain gorillas, even though less than 1,000 animals remain in the wild. Though their area within the Virunga mountains of the Democratic Republic of Congo, Uganda, and Burundi is rather limited in surface and for many decades situated within a turbulent

political region and surrounded by an expanding human population, the mountain gorilla population has remained relatively stable over the last decades and has even slightly grown.²⁷ These critically endangered species do not need an expensive breeding program, but rather appropriate goodwill.

The removal of animals from their natural habitats should be avoided at all costs. Whenever a natural population risks destruction or disappearance due to (genetic) isolation in small island habitats, it is much more desirable to build corridors or to translocate animals to safer areas of natural habitat. Translocations are cheaper and more successful than reintroductions, which should not surprise us given the learning bottleneck in zoos. Griffith and colleagues have estimated the success of translocations at 75 percent, whereas they mention 38 percent for the reintroduction of captive-bred animals (compare with Beck, only 11 percent). Furthermore, beyond conservation and economics, the lower success rate of reintroductions clearly also means paying a higher price in terms of animal welfare.²⁸

But what about an indirect conservation role for zoos? According to this line of thought, zoos might contribute to the conservation of wildlife by raising funds, educating the public, and by sharing scientific and technological expertise that may be useful for conservation efforts in the wild.

First, very few data seem to be available that allow assessing the zoo's indirect conservation role. For example, Sarah Christie (Zoological Society of London) remarks about her efforts to collect data on zoo funding for conservation that "all those who have been involved in collection of such data so far agree that getting blood out of stones is child's play in comparison."²⁹ Similarly, Eleanor Sterling (American Museum of Natural History) and colleagues were asked to evaluate zoo conservation education independently. However, they write that the "dearth of published evaluations prevented us from doing so"³⁰ and suggest that zoos should not only publish results about what works but also about what does *not* work.

Second, available information on fundraising and education by zoos is not particularly impressive. Though individual zoos such as the Bronx Zoo (WCS) have for many years given support to a large variety of conservation programs, most zoos donate very little. Zimmermann and Wilkinson refer to an AZA study of 2000 by Bettinger and Quinn, which indicates that zoos spend only 0.1 percent of operating budgets on conservation and this already includes staff time and zoo-based research.³¹ In connection with education, zoos are proud to indicate that they reach some 600 million visitors each year.³² Given these numbers, the lack of evaluations of educational impact is indeed most remarkable. And the results of the few evaluations that are available may explain why zoos don't prioritize evaluating their education

impact—those studies point toward visitors being motivated in particular by fun and family enjoyment, little interest in learning, few people reading zoo signs, not staying long at enclosures to observe animal behavior, zoo visits increasing feelings of superiority toward nature, stimulation of the anthropomorphizing of animals, and even a decrease in knowledge scores after zoo visits.³³

Third and perhaps most important, any meaningful indirect contribution by zoos to the conservation of wildlife could also be obtained when working from an entirely different kind of zoo philosophy, as I'll argue throughout the remainder of this chapter. This brings us to the question regarding the value of species.

Species versus Individuals?

What is the value of species and are species more valuable than individuals? Within conservation discourse it is often taken for granted that species are more important than their individual members. However, the conservation of species never can have as its ultimate motivation the interests of these species as such. Certainly, one may build an argument about the need to conserve species because of their aesthetic, economic, scientific, ecological, or spiritual value. However, these are not intrinsic but instrumental values in the sense that they are related to the interests of other beings, namely humans. Ultimately, *we* appreciate the beauty of species, *we* benefit from their economic value, not species themselves and as such. Apart from these anthropocentric interests, the conservation of species may also be advocated because of the interests of their individual members. The concept of a species as such and that of its individual members are two very different things, as philosopher Dale Jamieson explains in a clear way: "Individual creatures often have welfares, but species never do. The notion of a species is an abstraction; the idea of its welfare is a human construction. While there is something that it is like to be an animal there is nothing that it is like to be a species."³⁴

Whether the conservation of species takes into account or is even based upon the aim to protect the welfare interests of (all of) its individual members makes an enormous difference. This becomes clear when one applies the concept of sustainable use to the conservation of species. This concept has in particular become popular with organizations such as the IUCN, WWF and UNEP since the early 1990s.³⁵ The idea behind it is that we may use natural resources at rates within their capacity for renewal. Though this is a most important concept, by itself it contains no guarantees at all for the welfare of individual animals. Within this view, one may utilize animals as long as the

species itself does not suffer from it—that is, as long as a sufficiently large population remains in order to guarantee the continued existence of the species. For example, on such a view it is fine to kill whales, shoot elephants, and hunt seals, as long as this happens within certain limits that assure the total population remains stable. Trophy hunters could shoot every year a very limited quota of gorillas, as long as this doesn't harm the overall continued existence of the species—they might, for example, compensate by paying a considerable amount of conservation dollars or euros. In this sense a view of *sustainable use* becomes one of *sustainable exploitation*. One may prune away the profits or interest, as long as the capital remains intact for future exploitation.

Such a view is unacceptable for anyone who is sensitive to how much we have in common with other animals. Indeed, imagine applying the concept of sustainable use to humans. There would be no concern about killing many human beings, as long as the species *Homo sapiens* remains unthreatened. Moreover, this concept might appeal for drastically reducing the human population *in whatever way*, as our current population numbers are unsustainable and threaten not only the continued existence of humanity, but that of many other species and entire ecosystems as well. Any sensible person would disagree with inhumane solutions to human overpopulation or with sustainable exploitation of humans—and rightly so.

Such a position would also in all probability make reference to the mental characteristics of members of *Homo sapiens*. A similar logic applies to many nonhuman animals. Though species differences are real, many animals have rich mental lives, are sensitive beings with welfare interests as well. Aiming to protect their welfare interests may be a strong motivation for conserving species. Certainly, even when one is driven by respect for animals as individuals, considering the species level nevertheless remains very important—as, for example, fragmentation of species over isolated island habitats may lead to decrease of genetic variability and ultimately result in populations no longer being viable. A philosophy based upon respect for individual beings should thus never lose sight of the species level. Before considering the implications of this conservation view (based on respect for individuals) as the course to be followed by zoos, I will first make some remarks about the welfare of animals living in zoos.

Some Welfare Problems in Zoo Enclosures

Within the zoo world and perhaps even beyond, the single most famous animal of 2007 was without doubt the young polar bear Knut, who was

born December 2006 in Berlin Zoo. Within the first 50 days that he went public, Knut attracted no less than 500,000 visitors. The visitor flood and a wide array of merchandise earned Berlin Zoo about five million euros (or \$7.87 million) in 2007 alone. Knut got on the cover of *Vanity Fair*, starred in a book and movie, inspired Knut-mugs, Knut-candy, and Knut-toys. The market shares of Berlin Zoo jumped from 2,000 euro to 4,820 euro. Knut has become a logo (Respect_Habitats.Knut) and this label will be used to approve of sustainable projects. Companies may buy a Knut license and profits will be used to fund conservation projects.³⁶ Knut is an excellent example of what has been called a charismatic megavertebrate, or what I would rather name a “charismatic fundraiser.”

This huge public fascination for Knut is not new; zoo visitors have felt strongly attracted to cute white polar bear cubs for a long time. For example, in 1950 London Zoo reached its highest number of visitors ever—3,100,000—and according to Solly Zuckerman this was in particular due to the birth of a polar bear cub.³⁷ Several zoos are clearly inspired by the success logged by Berlin Zoo and are trying to follow suit. The Nürnberg Zoo, for example, is attempting to reach similar success through the female polar cub Flocke (or Snowflake). Though zoos are often critical about what is called a sentimental focus on individual animals, they obviously can't resist the opportunities associated with such an appeal to young animals. And why not? What's the problem? Isn't it already difficult enough to raise conservation funding?

The problem is with the polar bears themselves—the stories aren't as bright as they might seem to be. Knut was rejected by his mother briefly after birth and needed to be hand-raised in the sole company of zookeepers. His twin brother died a few days after birth. Flocke was taken away from her mother Vera for hand-rearing as well. A movie fragment by Reuters on YouTube shows how Vera leaves her den with Flocke—where both should have stayed several months—and how Vera repeatedly drops Flocke from her mouth on the ground and down concrete steps. The zoo comments that Vera seemed agitated and disoriented for whatever reason and that she wanted to carry her cub to safety in another part of the enclosure. The day before, another polar bear mother—Wilma—had eaten both her twin cubs in Nürnberg Zoo.³⁸

All this should have come as no surprise at all. The keeping and breeding of polar bears in captivity has always been problematic and zoos that opt to do so are responsible for allowing a disastrous welfare experiment to take place. In *The Welfare Ark* I referred to a zoo article by a conservator of Antwerp Zoo, who wrote in 1980 that all polar bear cubs born at the zoo died due to maternal neglect or because their mothers killed them. The mothers

took the cubs in their mouths and walked anxiously around with them, just as if they wanted to hide them somewhere. The conservator attributed this behavior to a lack of privacy, disliking the nesting boxes, and negative climatological conditions. Three decades later, zoos continue to struggle with the same kinds of problems, though some of them—such as Antwerp Zoo—have fortunately stopped keeping polar bears. I noted that of the more than 50 polar bear births reported to the *International Zoo Yearbook* in 1995–1996, no less than 73 percent of the cubs had died, whereas a UFAW study mentioned a mortality of up to 38 percent in the wild.³⁹

Privacy and the cubbing den seem to be important factors. In nature, the mother stays in her den from October to February or April. She is very choosy about the spot and the kind of snow used. She may walk many miles and dig several test pits, before choosing a final location. The den is continuously adjusted during the confinement, in order to regulate the supply of fresh air and the temperature for her cubs. Sometimes, cubs may be eaten in nature as well, e.g., when the mother is malnourished or when she smells or hears the threat of a male polar bear. Digging the den in a more remote place, away from the sea, usually prevents cannibalism by male bears.⁴⁰

In captivity male bears may be around, visitors may cause disturbance and stress (they make a lot of noise on the YouTube video showing Vera and Flocke), the breeding space may be inappropriate, the mother may have no experience in caring for young ones (behavioral bottleneck), and her mental state may be questionable, as indicated by stereotypical behavior. In Berlin Zoo, the father of Knut—Lars—was not only around, but he reportedly tried to attack and eat his son several times.⁴¹

Polar bears are prone to stereotypical behavior in zoos—such as pacing to and fro, head-bobbing, and swimming incessant figure eights. Ros Clubb and Georgia Mason (University of Oxford) mention a stereotypy frequency of around 40 percent and infant mortality of around 65 percent for polar bears in zoos. Moreover, their research of carnivores shows that problems correlate with the size of their natural home range and conclude that these stem from constraints imposed upon their natural behavior. A typical polar bear enclosure is only one millionth the size of its minimum home range.⁴²

Stereotypical behavior is generally associated with poor welfare, monotonous environments, lack of autonomy, frustration, stress and/or boredom. It has been suggested that the repetitiveness of stereotypies may increase the release of opiates and thus have an analgesic effect in order to cope with poor welfare conditions that are otherwise beyond the animal's control. Some video footage suggests that Knut as well may be developing stereotypical behavior—namely pacing to and fro a part of his enclosure.⁴³

Because of these welfare problems, some zoos have stopped keeping polar bears—but others continue with this experiment, even when it means breeding young cubs for hand-rearing in isolation from conspecifics. It is doubtful how successful they will be. The captive population is small—ISIS mentions less than 200 individuals: 86 males, 97 females, 1 with unknown sex, and only 8 births at the time of consultation.⁴⁴ Given the lack of reproduction, zoos will become more and more challenged by an aging polar bear population. In 1993, already 35 percent of the female polar bears were older than twenty years.⁴⁵ This means that zoos will more and more depend upon breeding with older individuals. Indeed, Knut's thirty-two-year-old grandmother Lisa has received the company of ten-year-old Yoghi from the Hellabrunn Zoo in Munich—both zoos hope that the bears will reproduce. (The two-year-old Gianna, who was apparently under threat of being killed by Yoghi at Hellabrunn Zoo, has been introduced to Knut.⁴⁶)

The example of polar bears shows some of the welfare problems that may occur in zoos. A major problem is what I've called the lack of "welfare autonomy." Animals with welfare autonomy have the possibility to live according to their own needs and preferences. This requires (i) a rich and stimulating environment, (ii) an environment which fits their needs (usually this will be their natural habitat, the environment to which they've adapted over millions of years), and (iii) the possibility of making their own choices. Lack of welfare autonomy may result in frustration (e.g., no suitable cubbing den), stress (e.g., noisy visitors), and boredom (monotonous environment).⁴⁷ These problems may lead to undesirable behavior such as stereotypies, increased aggression, or passivity (which may actually be a kind of learned helplessness toward their inescapable environment).

Just as there exist excellent conservation reasons for keeping small animals in particular (see above), there is also a strong welfare logic for shifting from large animals to smaller ones. In 1996 Trevor Poole and Graham Law (Universities Federation for Animal Welfare or UFAW) suggested that if an enclosure cannot meet the demands of a large animal, it may be worth considering that it be converted into an enclosure for smaller species.⁴⁸ The same enclosure may indeed be more spacious for smaller animals. For example, an enclosure once used for polar bears may be turned into one for small primates, such as golden lion tamarins. Concrete platforms can be replaced by grassy hills and space may be increased by using the third dimension through the planting of trees (thus offering climbing opportunities). Also, keeping smaller animals better allows meeting demands for composing a more suitable social group. Though all this is by itself no guarantee for a positive welfare situation, it is quite likely to mean an improvement in terms

of animal welfare. Unfortunately, many zoos seem to believe that they must follow a stable course in displaying many species of large charismatic mega-vertebrates.

Similarly, zoos might easily increase opportunities for more welfare autonomy by offering animals the opportunity to have more privacy via withdrawal from the sight of visitors. However, many zoos either prohibit access to indoor enclosures during the day or offer visitors the possibility to see animals both in their outdoor and indoor enclosures. This indicates that the priority of many zoos seems to be having animals on display—even though observations of, for example, primates have shown that the presence of visitors may lead to a significant increase in aggression as well as to a significant decrease in affiliative behavior such as grooming.⁴⁹

Structural Animal Welfare Considerations

Welfare problems are not limited to what happens inside a zoo enclosure. One should also take into account the structural welfare policy by zoos, and here it is important to return to some conservation considerations made above and especially to the challenge that zoos face to maintain sufficient genetic variation. It has been noted that zoos want to hold a large variety of species and that they tend to keep (large) mammals in particular. Both choices are clearly questionable for the maintaining of populations with sufficient long-term genetic variation. Recall that this is a very serious challenge for zoos, as a 2002 study showed that 65 percent of 95 breeding programs with sufficient data of the AZA (namely SSPs and PMPs) turned out to have a low long-term viability. What can one expect zoos to do within the constraints of their own species preferences?

First, breeding programs demand a regular exchange of animals between zoos for breeding purposes and to avoid inbreeding. However, animals are taken away from their social group, strong social bonds may be broken, social stability may be disrupted, and transferred animals don't choose where they're going (they simply, all of a sudden, end up in a completely different physical and social environment). During their lifetime animals may have to live in many different zoo enclosures and this may have a stressful rather than an enriching impact.

Second, breeding programs define which animals should reproduce with whom and how many young ones they may have. Once this target has been reached, the breeding animals become "surplus." It is important to understand that so-called surplus animals are not necessarily the result of zoos being deficient in terms of having well-organized breeding programs—avoiding

"surplus" animals is not only about applying contraception. Quite on the contrary, "surplus" animals are inherent to breeding programs directed at maintaining maximal genetic variation. Animals may be young and healthy, yet redundant for a breeding program and—worse—they may take up space and resources useable for other animals. The challenges that zoos face to assure long-term viability for their preferred species puts an enormous pressure on zoos to get rid of so-called surplus animals. There are not many options for putting animals outside of the structure of organized zoos, so that they no longer negatively influence space and resources within a given zoo community. These animals may be sent away to substandard places or they may be killed—zoo people prefer to speak of "culling."

One should not underestimate the numbers of healthy animals rendered useless within a breeding program. We must recognize that with each generation there is some loss of genetic variation, as each parent only passes half of its genes. In practice this may be compensated for by having large populations, but small zoo populations are vulnerable to this reality. In order to reduce the risk, breeding programs should make the generation time as long as possible—this means making the interval between each generation as large as possible, so that the loss of genetic variation is spread over time.⁵⁰ In practice this may mean allowing a female tiger to have several litters of cubs over the years, to kill all of these except the last litter and finally only to allow these last-borns to reproduce. As a consequence, only the last-borns pass on their genes. By prolonging the interval between each generation thus, the loss of genetic variation can be slowed down. Given this situation and the economic appeal of breeding young ones for attracting visitors, it must be tempting indeed for zoos to consider breeding and killing animals in such a way. Though highly problematic from an ethical perspective that takes the welfare of individual animals into account, it makes perfect sense within the logic of a well-organized breeding program and within the context of sustainable use.

In general, zoos tend to remain vague about the killing of healthy zoo animals; and whenever they are under fire, they tend to shift the debate to animals who are old, ill, or have only negative welfare prospects (such as being excluded from their social group). However, some zoo people (such as Robert Lacy of the Brookfield Zoo, Chicago) don't play this game of hypocrisy and openly and consistently defend the killing of healthy animals no longer useful for breeding programs.⁵¹ Donald Lindburg (San Diego Zoo) and Linda Lindburg (managing editor of the journal *Zoo Biology*) have commented: "A representative statement of the position of zoos is provided by Lacy (1991), who advocates euthanasia for all individuals classified as surplus, irrespective

of their state of health. Lacy's position, while not the official policy of AZA, is widely embraced by its membership.⁵² During a zoo congress held at Rotterdam Zoo, nearly all 100 zoo practitioners approved (in small workshops of ten people each) the killing of healthy animals—this wasn't seen as a problem at all according to the congress organizers. Such killings were considered to be preferred above the sending of these animals to substandard enclosures (read behind-the-scenes enclosures) or substandard zoos.⁵³ Apparently, few zoo people considered *both* scenarios unethical and avoidable.

Third, the most convenient way for maintaining genetic variation over the long-term may be to get at regular intervals new animals with fresh blood on board the Zoo Ark—in other words capturing animals in the wild. This is precisely what several zoo people (such as William Conway from the Bronx Zoo) are proposing, namely the creation of “zoo reserves” or “extractive reserves.”⁵⁴ This concept refers to financial support for local communities in order to conserve species and to harvest wild animals for export to zoos. Such an “extractive reserve could provide a legal and sustainable source of animals for zoo collections as well as for commercial exports.”⁵⁵ Can you imagine zoos providing funding for the protection of gorilla habitat in Congo and to receive every now and then a shipment of a gorilla family in return? No doubt, the suggestion of capturing animals in the wild will be considered by many people—including many zoo visitors—to be an unacceptable and controversial proposal. However, zoo personnel probably realize that it may be an invaluable and inevitable outcome for keeping their Eternal Zoo Ark afloat—a situation that shows how conserving wildlife helps the conservation of zoos themselves.

The Wrongness of Captivity

I've questioned the conservation policy by zoos and pointed to some of the welfare problems that zoos may face. However, does this mean that keeping animals in zoos is always wrong? Are zoos fundamentally immoral?

In an historical article, originally published in 1976, the moral philosopher James Rachels raises the question of the right to liberty for animals. Rachels argues that the right to liberty is derived from a more basic right of not having one's interests needlessly harmed. Applying this idea to the institution under consideration, can we truly say that the interests of all animals kept in zoos are by definition harmed? Is this because keeping animals in captivity is *fundamentally* wrong? But if so, what about animals living elsewhere in captivity, such as pets? And what if it turns out that some animals live in a positive welfare situation in zoos, that they are leading happy lives? Rachels

writes that we have to distinguish both the kinds of animals involved and the degree of freedom required for their interests not to be harmed. He adds that lions may need to be completely free in order to thrive, whereas this “is not to say that the interests of chickens can be satisfied only in a state of total freedom: I can see no harm that would be done to their interests if they were kept captive while being allowed freedom to roam a large area, where they could do the things just mentioned [dust-bathing and building a nest].”⁵⁶

I think that both criteria suggested by Rachels—kind of animal and degree of freedom—are important when considering holding animals in captivity. These apply when comparing the interests of pets and those of animals living in zoos. First, due to the long domestication process, pets such as dogs and cats have become more suitable for keeping in our societies than the animals typically kept in zoos. (This does not mean that I think the domestication process was justified.) Second, many dogs and cats may lead richer lives and have a larger degree of freedom than zoo animals. (Imagine that your dog or cat would be placed for the rest of her or his life into a zoo enclosure.) However, this does not mean that the welfare of pets is always better than that of animals living in zoos. There are many examples of bad and therefore unacceptable welfare circumstances of pets and other captive animals. Third, whereas we may have alternatives for animals living in zoos, there is no option of sending dogs or cats to the wild due to the domestication process.

Rachels's nuanced distinctions about kinds of animal and degree of freedom also hold for animals living within zoos. There may be a huge difference between on the one hand keeping frogs in a spacious green enclosure with ponds for swimming and on the other hand attempting to offer reasonable welfare conditions for polar bears, tigers, gorillas, or dolphins within a zoo setting. Still, the natural environment normally allows far more welfare autonomy because it's a richer environment, is better suited to animals' natural welfare needs, and offers them more choices. It is sometimes remarked that wildlife parks verge on the status of megazoos and that zoos approximate conservation parks, but the difference between both remains vast. Even a relatively small wildlife park such as Gombe (Tanzania) allows chimpanzees to roam over several square kilometres of rainforest, which is many times more than the largest zoo enclosure for chimpanzees (at best a few acres). Similarly, Gombe is far more complex and better meets the natural demands of chimpanzees than zoo enclosures might ever do.

Sure, animals in the wild may have to pay a price for the freedom to make their own choices. Nature certainly contains risks—e.g., in terms of food scarcity, disease, or predators. Still, the advantages of a life in nature may be worth taking these risks. In addition, zoos have their own risks and animals

in zoos may have less control in dealing with these (such as having no means to escape from aggressive conspecifics or noisy, stress-inducing visitors). We should not underestimate the welfare problems in zoos. Besides this, we have to see the flaws in the contention that animals are lucky to have food “offered on a plate.” It not only makes them dependent, but research shows that many animals actually prefer working for their food instead of taking it directly from an available food-source. Even in the presence of free food, rats and pigeons will spontaneously learn a behavioral task to obtain food.⁵⁷ They have inquisitive minds and prefer to control events in their lives, to have welfare autonomy.

However, is it never desirable to put animals in zoos, no matter how grim their prospects in the wild may be? Is it better to vanish in the wild than to lead a less rich life in captivity? What if we know that all chimpanzees in Gombe surely would become victims of the bushmeat trade over the next five years and that there is no way to avoid this, besides putting these chimpanzees in a captive setting for their own safety? Would it be more desirable to die free rather than to live in captivity? I’m not convinced that the first option would be the one to be preferred, or the one opted for by the chimpanzees themselves if they were to have a choice. Fortunately, the actual picture is not such a black-and-white one. Even were we to know that a particular area would certainly be destroyed, there are still in-between options—such as translocating animals to safer ground in the wild or to place them temporarily in a large sanctuary within their natural habitat (like the Jane Goodall Institute’s Tchimpounga sanctuary in Congo Brazzaville). These considerations bring us to my suggestion for a renewed policy for zoos.

Conclusion: An Ethical Course for The Zoo Ark?

Numerous animals are living in deplorable welfare conditions in captivity—in substandard zoos, as (exotic) pets, in circuses, animal factories, or laboratories. A real solution for these problems is to be expected only from more stringent welfare laws, and these are urgently needed. However, as I suggested in 2000 in *The Welfare Ark*, the only ethical course I see for the Zoo Ark is in becoming a Welfare Ark for individual animals in need of help, and so for zoos to become sanctuaries. An example of an EAZA zoo that is fulfilling a sanctuary role is the primate rescue center Monkey World in the United Kingdom. This sanctuary has offered a new life to dozens of chimpanzees who were abused by photographers (along the Spanish coasts), as exotic pets, as circus animals, or in laboratories. Several of them had to work long days, were regularly beaten, had their teeth pulled out, or were put

on drugs. In Monkey World these chimpanzees learn to live in social groups in green enclosures with a variety of climbing opportunities. In Hohenwald, Tennessee, The Elephant Sanctuary offers a new life to African and Asian elephants coming from zoos and circuses. The elephants can roam in herds through enclosures that count several hundred acres of pastures, woods, and streams.⁵⁸

Such Welfare Arks may not only bring an invaluable contribution by helping individual animals in their care, but may also play an important indirect role of support to the conservation of threatened species in the wild by informing the public, raising funds, and sharing technical experience (such as sedation methods for translocating animals in the wild).

Just taking into consideration the many animals in need of help might already result in a policy of not allowing these animals to breed. This would require that zoos give up the idea of assuring their own future through the breeding of nonthreatened species, but would also allow for far more flexibility in helping animals. And welfare considerations would mean that animals be allowed more privacy and visitors stay more at a distance (though this does not necessarily imply no visitors should be allowed at all).

Given the values of zoos, we should be aware that some zoos might aim to offer sanctuary to animals coming from the wild in order to pursue their ambition as eternal arks populated with popular species with sufficient genetic variability (see above on the suggestion of extractive reserves). Why would it not be a good idea to transfer, for example, potential victims of the bushmeat crisis to zoos in the North? First, sanctuaries in the country of origin tend to suit the welfare needs of the animals much better—they are larger, more complex, and situated within their natural habitat. Second, such transfers to the North might result in stimulating creative yet unethical ways to obtain new “gene suppliers” for zoos or any other animals eagerly wanted by zoos.

The Taiping Four saga seems to illustrate this point very well. Early in 2002 four young gorillas—three females and one male—were sent from Nigeria to Malaysia’s Taiping Zoo. Their import documents turned out to be falsified—the so-called captive born gorillas turned out not to originate from Nigeria’s Ibadan Zoo but to have been wild-caught in Cameroon. Though the authorities of Cameroon asked to send the gorillas back, they stayed for two years in Taiping Zoo and were in 2004 shipped to Pretoria Zoo, South Africa. Pretoria Zoo undertook considerable efforts to permanently keep the gorillas, who were placed into a newly created enclosure. Executive director Willie Labuschagne was quoted as saying that “we will most definitely use the gorillas as part of a national and international breeding program” and was also cited as saying that “his greatest wish is to secure a safe gene pool for

gorillas.”⁵⁹ After much political pressure by governments and organizations such as IPPL (International Primate Protection League) and IFAW (International Fund for Animal Welfare), the Taiping Four gorillas returned in November 2007 to Cameroon, more precisely to the Limbe Wildlife Centre sanctuary. We thus have to be aware that a sanctuary role by zoos as Welfare Arks should never serve as a cover to deliver animals to serve the self-interest of zoos as Eternal Arks.

The change of policy proffered here may not look very appealing to many zoos, as their current policy and values are so different from what I am recommending. However, this seems to me the only justifiable course for zoos and it deserves to be given far more serious consideration. The zoo people who are in support of such a sanctuary role should not let themselves be overshadowed by those who promote a sustainable-use philosophy. This alternative position would allow for zoos a course that has the support of many people and organizations, because it combines the aim of protecting the interests of individual animals (both in captivity and beyond) with that of conserving species in the wild. Such a “welfare ark” course would have far more credibility than the current one of zoos as eternal arks populated with mostly nonthreatened, but highly charismatic and financially rewarding animals.

Notes

1. These variations in percentages are due to the limited number of listed species whose status has been evaluated and a bias toward evaluating particular species that are thought to be threatened. The first percentage refers to the percentage of listed species considered threatened and the second number to the percentage of evaluated species that is threatened.

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9. See www.iucnredlist.org/details/22563, www.iucnredlist.org/details/141921, and www.iucnredlist.org/details/141926 (October 31, 2008).

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12. Mark R. Stanley Price and John E. Fa, “Reintroductions from Zoos: a Conservation Guiding light or a Shooting Star?” in *Zoos in the 21st Century*, 160–161, 165.

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14. Wilson, *The Diversity of Life*, 168–170, 309.

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