

Zoos and conservation in the XXI Century: overlooked meeting points between ecology and social sciences?

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ABSTRACT

The traditional role of zoological gardens as temporary 'arks' for threatened animals through captive breeding has been challenged in recent decades. This has led to an increased attention of zoos to 'in situ' conservation activities as a way to fulfil their conservation mission. This polarisation between the two goals may be partially artificial, and captive breeding may still be beneficial to an unknown, but increasing, number of species. Here is proposed that a balanced view to the conservation role of zoos should not only refute a drastic 'paradigm shift', but also include a strong social dimension. Actually, zoos are uniquely equipped to become a living laboratory where to study one of the greatest challenge for this century: how to positively change public attitudes towards wildlife and biodiversity. It is suggested however that zoos should emphasise a personal, first hand experience of wildlife as a major contribution to the formation of ecologically literate urban citizens. Given the dramatic deficit of nature in the urbanised society, zoos must stress direct non-mediated experiences of wildlife by children rather than interpretation. It is suggested that living animals and species diversity however, should remain central themes of modern zoos.

Key words:

Ex situ conservation, biodiversity, children, direct contact with nature.

RIASSUNTO

Zoo e conservazione nel XXI Secolo: sottovalutato punto di incontro tra l'ecologia e le scienze sociali?

Il ruolo dei giardini zoologici e degli acquari come 'arche temporanee' per le specie minacciate è stato messo in discussione negli ultimi due decenni. Come risultato vi è stato un incremento delle attività di conservazione in situ finanziate dagli zoo e strutture similari. Come evidenziato dalle attuali crisi di estinzioni che investe tanti gruppi tassonomici, come gli Anfibi, i programmi ex situ possono prevenire la scomparsa di un numero in continuo aumento di taxa. E' qui proposto che un bilanciato ruolo degli zoo non solo deve rifiutare di adottare un singolo paradigma, ma deve includere anche una forte dimensione sociale alla propria missione. In particolare, gli zoo offrono opportunità uniche per lo studio di una delle cruciali sfide del futuro: come influenzare positivamente l'attitudine del pubblico verso la biodiversità e l'ambiente. In considerazione del grande deficit di natura che si riscontra nelle giovani generazioni, gli zoo devono enfatizzare le esperienze dirette degli animali da parte dei bambini piuttosto che l'interpretazione. A tal fine, gli animali vivi (piuttosto che immagini video o realtà virtuale) e la biodiversità devono rimanere al centro della missione di zoo e acquari.

Parole chiave:

Conservazione ex situ, biodiversità, bambini, contatto diretto con la natura.

INTRODUCTION

In the last four decades of the XX Century, zoos have increasingly recognized the need to contribute to the survival of animal species diversity (Conway, 1969). From then, strategic collection plan at continental level began to maximize zoos contribute to conservation through the active national and international management of *ex situ* populations of selected threatened taxa. In North America the American Zoos Association (AZA) began the SSP's (Species Survival Programs) in the early 1980's. In Europe the number of EEP's (European Breeding Programmes) managed by the European Association

of Zoos and Aquaria (EAZA) had grow from six in 1985 to more than 300 today.

Not surprisingly, zoos contribution to conservation has been traditionally calculated through the number of viable captive populations maintained and of the successful re-introductions achieved (Rahbek, 1993; Ebenhard, 1995). It has been stressed elsewhere that coordinated management of captive populations should not be confused "sic et simpliciter" with conservation (Wiese et al., 1994). Recognition of the many problems associated with the 'zoos as arks' paradigm (Gippoliti, 1994; Snyder et al., 1996) has led in recent years to a shift towards

an emphasis to *in situ* conservation (Hutchins & Conway, 1995; Maunder & Byers, 2005). This trend is officially recognized in the last zoos' blueprint for conservation prepared by the World Zoo and Aquaria Association (WAZA, 2005).

ZOOS ROLE IN BIODIVERSITY CONSERVATION

People generally fail to recognize and appreciate the conservation role of their local zoo and this hamper zoo's evolution. Despite some data supporting the contrary (i.e. Balmford et al., 1996; Balmford, 2000), most visitors still valued zoos on the basis of how many eclatant megavertebrates they find and how much they can interact with animals (Kreger & Mench, 1995; Ward et al., 1998). Often, zoo acquisition and keeping of such species such as elephants, dolphins, polar bears and apes raise hot debates with sectors of the public opinion in the 'developed' world supporting 'animal rights' (Jamieson, 1995). Several zoo-bred animals have been released in the wild as a conservation measure, but some concern arise from the high costs, behavioral competence and genetic background of released individuals (Snyder et al., 1996; Gippoliti, 2004). It should be admitted that a number of thriving captive populations of threatened species will never used for releasing projects (e.g. *Lycodon pictus*, Frantzen et al., 2001), yet their demographic and genetic management will require continue efforts from zoo staff, not to speak of the attention to be spent to achieve the 'psychophysical well-being' of individuals (cf. Young, 2003).

Should we need to find a shortcut to make zoos contribution to conservation more efficient in the short term? Certainly no one doubt that *in situ* conservation is biologically and financially the most effective way to maintain biodiversity and ecological processes (Snyder et al., 1996), and this explain current emphasis on field activities by zoos. However, the link between *in situ* conservation and *ex situ* collections still remain to be fully explicated. Generally, zoo animals has been seen as 'ambassadors' for their species and habitats. In recent years, for example, EAZA promoted several specific fund-raising campaign for a number of taxa or habitats (lion tamarins of the genus *Leontopithecus*, tigers, tortoises, rhinos, Madagascar etc.). These operations have been successfull in raising considerable amount of money for conservation programmes (cf. Dean & Bos, 2006). A number of zoos and aquaria have also a long-standing tradition of field conservation activities and research (Frankfurt, New York, Jersey WPT) but this remain the exception more than the rule. Furthermore, *in situ* conservation is not easier than *ex situ* conservation, as the recent extinction of charismatic species such as

the northern white rhinoceros *Ceratotherium cottoni* and the Yangtze river dolphin *Lipotes vexillifer* shows.

In Europe, a EU Directive ask zoos to be involved in researches that "benefits species conservation" but this has been received with some scepticism (Rees, 2005), and it is unlikely that research and conservation will never became the main focus of the majority of existing zoos and aquaria. Furthermore, zoos and aquaria are increasingly put in discussion in developed societies by animal rights groups asking their closure and the cessation of breeding programs, a fact that may be exacerbated by the increase commercialization of the zoo and aquaria sector (Muzar & Clarck, 2001; see also Reichenbach, 2001).

What kind of contribute zoos can give to help reduce human impact on biodiversity and ecosystems? The magnitudine of environmental changes caused by six billions and half of people require a deep reflection concerning biological conservation and, specifically, the conservation role of zoos and aquaria. It is obvious here zoos cannot be serious in their conservation mission if they fail to appreciate the link between overconsumption of natural resources in a part of the world, overpopulation and diminishing biodiversity.

ZOOS AND THE SOCIAL DIMENSION

Despite the fact that conservation biology is increasingly recognized as inexorably tied to social factors, yet there is a failure to produce researchers and practitioners with all the necessary skills to be successful in conservation crisis which involve a human dimension (i.e. Kellert, 1996; Noss, 1997; Jacobson & McDuff, 1998). On the other hand, zoos continue to be seen locally as social institutions and the human factor is of primary concern, as Heini Hediger (1965) recognized long time ago in his classic book on zoo biology. I suggest that this aspect may in fact represent the great potential of zoos in conservation biology. For instance, public preference for some species of large-sized animals (for snakes see Marešová & Frynta, 2008) that create considerable constrains on zoos evolution is also paralleled by biased scientific literature and conservation efforts towards large-sized mammals (Hancocks, 1995; Amori & Gippoliti, 2000). Thus, zoos are (and always have been generally, with a few exceptions) not extravagant institutions run by enlightened personalities but a realistic picture of human-animals relationship in contemporary societies. What we now need is to channel more resources toward the understanding of human perception of other living organism, how we can change it, and how we can produce more ecologically-sounded citizens. This kind of

information can then be transported and integrated to *in situ* conservation activities. It should be noted here that owing to the current increase of the human population and of the extent of metropolitan areas and urban sprawl (Miller, 2005), very often the differences between *ex situ* and *in situ* become vaguer as the education message is concerned (e.g. it is increasingly likely that the urban zoo visitors can be confronted with conservation/environmental problems in which they play an active, often negative, role).

Conceptually, it is time to recognise that there is not a great differences in finding compromises between paying zoo visitor wishes and animal behavioral needs (i.e. Gippoliti, 2006) and working for the conservation of wildlife and biodiversity while encouraging integrate and 'sustainable' development of local communities.

In the meantime however, zoos and aquaria can provide factual experience of the real world to graduate students having little training in social sciences and communication skills. Our species seems unable to solve problems at the root. As we spend billions in research against cancer and tumors without reducing levels of pollution, we are also trying to reduce environmental stress without alleviating our pressure to the biosphere. It is not conservationists duty to find easy shortcuts to environmental problems but to present society with an objective picture and possible solutions which necessarily includes a radical change of attitude toward the environment. The over-abused and fashionable concept of "sustainable" or "compatible" use in biodiversity conservation is increasingly debated by biologists (Kramer et al., 1997; Oates, 1999; Redford & Ritcher, 1999; Terborgh et al., 2002) but widely accepted by economists and developers. It is extremely urgent that the whole conservation movement re-think this principle as human activities have been usually destructive of biodiversity even in prehistoric times, and given the poor results of several billions dollars spent in "sustainable development" projects in recent years. This is not to deny the need for so called 'community-based' conservation, but to stress the need to adopt a long-term, ecologically measurable approach to conservation problems

Conservation conflicts often born out from different values inside and among societies and cultures. If environmental awareness have to be expanded, messages should mainly be directed toward the part of society not sharing our conservation ethic. This request zoos (and the entire conservation world) adopting a respectful attitude when dealing with problem-bearing sectors of the society, so that we not only are "preaching to the choir" but are also reaching the unconverted. Otherwise, we risk to build up a western 'urbanized' conservation

philosophy, strongly influenced by animal rights sentiments (Rowan & Hoage, 1995), not only of little help for resolving conservation conflicts with local communities across the world, but also overlooking the role of metropolitan areas themselves in the appropriation of environmental services worldwide. Discussion of foreign conservation problems is an hot issue too which zoos have to deal with. Often the full responsibility of species extinction is given to local communities (and governments), while the wealthy western world is presented as the only hope for species survival (Van Reybrouck, 2004). In the long-term, this forced polarization of the zoo message (dramatically of similar style to those sent by the animal rights groups!) may result in insulting local traditions and cultures and in the loss of support and prestige of the zoo community (and conservation movement) internationally. It is thus suggested that advocacy by zoos should be coupled with a respectful attitude towards those communities not sharing our environmental ethic and concern.

The complexities of environmental questions should urgently require zoos becoming informative centers of conservation biology explaining the basic philosophy and fundamentals of this scientific discipline and trying to highlight the ultimate factors causing species' decline. This it is possible through a deep reflection which led each zoo to develop its setting and collection with the aim to present the conservation message to visitors, as has been done by some institutions (Kelly, 1997; Durrell & Mallinson, 1998). This is not an easy task, however. In one of the most conservation-oriented zoos of the world, at least 39% of visitors were not interested to receive any information on animals and conservation (Louch et al., 1999) and it may be speculate that generally, not more than 20% of visitors saw a zoo visit as a cultural event. Furthermore, given the low "holding power" of educational signs, it may be useful zoos rethinking the current trend to present a large amount of information on signs. It should be preferable, instead, to choose carefully the main message(s) of any exhibit and of the whole zoo, and carefully eliminate factors which may convoy contradictory messages at the informal level. First of all, people should be informed about the ethical fundamentals of conservation biology, as only ethical arguments make red squirrel more valuable than introduced grey squirrel in Europe and Lake Victoria cichlids more important than the introduced Nile perch (Noss, 1997), and even worthwhile maintaining wild animals in captivity for education and conservation purposes (cf. Norton et al., 1995). It should be noted that nowadays zoos tend to highlight ethical arguments when they are dealing with animal welfare only (i.e. WAZA, 2005), implicitly



Fig. 1. Naturalistic realism reach a peak at the Disney Animal Kingdom in Orlando (Florida) (photo S. Gippoliti).

neglecting the ethical roots of the conservation movement they contribute to create about one century ago and assuming conservation biology as a purely scientific discipline. It should be remembered that conservationists are not only scientists but also practice advocacy as is common in applied scientific fields.

The scientific arguments that make sustainability of man activities on the planet and biodiversity conservation essential to the long-term well-being of our own species should be also clearly presented. In this context, it is extremely important that commercial activities inside the zoos adhere first to these principles, for instances avoiding use of throw-away plastic objects and encouraging differential litter gathering or the use of solar energy.

If we wish biodiversity conservation became a stable and respected political issue, knowledge of its principles and practice among the society represent the single main goal of any conservation institution. Despite recent positive improvements in the exhibit philosophy of living animals, there are still many gaps in the zoo underlying philosophy. As Prescott (1993) rightly stated, many zoos made little progress in the field of "museology" and interpretation, differently from natural history museums worldwide, where new spectacular exhibits are created and focus shifted from systematic to ecology and conservation. On the contrary, many zoos still rely mainly on the power attraction of living charismatic mega-vertebrates and most of them pay still little attention to enhancing visitor experience through an organic general plan, carefully planned landscape (not only exhibit)

design, and attention to species-specific habitat features, behaviors and social systems. Here I can only agree with most of the statements of Hancock (2001) about the potentialities of the "landscape immersion" approach (fig. 1, 2) as firstly pioneered in Seattle's Woodland Park Zoo and the poor (and costly) imitations realized in many first-class zoos.

HOW EMPHASIZE BIODIVERSITY? ZOOS VS. PAROCHIALISM

Zoos and aquaria differ considerably from other places dedicated to wildlife conservation visitors are likely to see in their country or abroad, such as national parks or private reserves, in exhibiting species from every angle of the world. Zoos are therefore optimally suited to affront the theme of biodiversity loss world-wide. However biodiversity has often been popularly synonymized with areas with great numbers of large eclatant vertebrates. If we want to direct conservation efforts toward the most threatened biodiversity "hotspots" or ecoregions, zoos should emphasize, through a greater focus on endemic taxa (Gippoliti & Amori, 1998), those regions of the planet which lack the charisma of African savannas but suffer massive habitat destruction and species extinction. Incidentally, even small investments in these regions by zoos can result in high cost-effective conservation benefits. There is here also an huge opportunity for urban zoos - and museums - to involve foreign ethnic groups in a better appreciation of their native country biological diversity.

Some of these regions are internationally recognized tourist localities, and appreciation of their biological richness even in the developed world may help to alleviate pressure on remaining natural areas by sensible tourism companies, and encourage a sustainable tourist industry. Eco-tourism is often viewed as an instrument for solving the problem of under-financed protected areas in poor countries. Zoo marketing of the natural richness of little-known protected areas in the tropics may effectively encourage eco-tourism and enhance the economic viability of protected areas. Zoos should also promote in the public the adoption of behavior that minimize threats to free-ranging wildlife deriving from ecotourism. Therefore, zoos should also review their exhibits and public policies to be sure their messages are consistent with the above concern (Gippoliti, 2006).

Another field of interest for zoo exhibitry is through the emphasis of "keystone" species role in maintaining local biodiversity (Hutchins et al., 1995). Especially when a keystone is also a charismatic large animals, it is crucial that its role in shaping the habitat and the presence of other species is highlighted. Otherwise obscure species may then acquire an entirely new dimension if correctly included in the appropriate ecosystem. In this context, particular relevance should be given to explain the ecological relationships between different species. There are an increasing number of conflicts due to management choices for conservation reasons, such as the eradication of introduced exotic species or the control of overabundant ones and the real need exists to explain the ecological mechanisms which force conservationists to intervene to assure the maintenance of biodiversity in disturbed ecosystems. The science of ecology had a fundamental shift in its perception of ecosystems from static entities in equilibrium to complex systems that may be dynamic and unpredictable across time and space (Wallington et al., 2005), with considerable influence on conservation strategies. Yet, this shift is still unappreciated in societies and zoos should greatly advantage conservation if they introduce to the public the new paradigm of ecology. The latter, incidentally, with a greater emphasis on active management due to the presence of disturbance processes, indirectly recognize the importance of such an extreme form of management such as 'ex situ' maintenance of animal populations. It has been rightly stressed the importance to include local fauna and habitats into zoo collections (Gippoliti & Amori, 1998; WAZA, 2005) also to highlight local conservation concerns and action. However, it is fundamental zoos are not distracted by parochial conservation activities but maintain a global approach to environmental problems that

must necessarily be increasingly tackled at a broader scale.

EDUCATION OR CHANGING ATTITUDES?

Education (both formal and informal) is rightly recognized as one of the main aims of zoos (IUDGZ & CBSC, 1993; WAZA, 2005) and an important contribute to environmental awareness. Conway (2003) call for a more direct education process toward those people in the strongest position to affect the future of wildlife. However, as pointed out by Rivas & Owens (1999), there is not proof that lack of knowledge is the cause of man-caused environmental damage. These authors pointed out the need to direct education efforts towards children, and lament scarce interest in this field by the academic world. Even Reading and Kellert (1993) do not noted significant different level of knowledge between groups having different attitudes toward prairie dog conservation. Packard (1992) find that a strongly committed conservation exhibit at the Monterey Bay Aquarium produce a positive response by visitors even if this exhibit did not contribute significantly to their knowledge. It is reasonable to suppose that environmentally-friendly political decision being taken only if there is large



Fig. 2. Part of the gorilla exhibit at the Paignton Zoo Environmental Park, UK, an excellent example of landscape immersion reached without high economic costs but with enough available space (photo S. Gippoliti).

public support. Zoos can play a relevant role in creating a sympathetic attitude toward species and habitat conservation. To achieve this goal and become modern proactive conservation centers (Conway, 1995) they need however to be seen not merely as playground for children or an entertainment park, but as an 'authoritative', cultural centre. Visitors have to be confronted not only with idealized natural habitats and their high biodiversity, but also with the dramatic effects of human misuse of natural resources. Accordingly, more awareness can be gained if natural and man-made habitats are compared (i.e. exhibiting a primary forest before and after logging), and long-term local (i.e. desertification) and planetary (i.e. global warming) effects emphasized. Will zoos attain the necessary status to make such proactive approach possible and real? As in many other fields of conservation, it may depend mostly on leaders skills and vision.

THE IMPORTANCE OF URBAN ZOOS

Beginning after World War II, a tendency to create new zoological parks in the countryside is observed. Boom of private transport and sometime the wish to give adequate spaces to animals conjured to reinforce this trend. In Italy, for instance, only two "classic" urban zoos are still in function while most

are situated in the countryside or near small cities, and the same trend is observed in the United Kingdom. The effects of this, often overlooked, trend is that zoos are now more far away than in the past from their visitors, in particular from children. Most of people that is fascinated from animals were in fact regular zoo visitors, or had other wildlife experiences, when children. This opportunity is now denied to a large part of the populations and the effects of such a trend should be carefully considered by the zoo and the conservation community at large. Disconnection of the urban population (now nearly half of world population) from the natural world and biodiversity is now recognized as one of the principal problem in increasing environmental interest and awareness (Miller, 2005). Certainly, limited spaces and historical building protection conspire to prevent most urban zoos to reach the high exhibition standard the most inspired planners are calling for (Hancocks, 2001). Yet, I suspect that the greater obstacle is still imitation of other zoos standards, importance given to the number and 'rarity' of species held, intellectual indolence or scientific illiteracy. Hopefully, more and more institutions will achieve the goal of having imaginative, naturalistic exhibits representing a selected set of habitats while in the meantime remaining a popular recreational and cultural



Fig. 3. The excessive use of windows in modern zoo exhibits often recall our computer and TV screens rather than a truly wildlife experience in the field (photo S. Gippoliti).



Fig. 4. Zoo exhibit may provide memorable personal experiences (photo E. Angelini, Giardino Zoologico di Pistoia)

resource for their community. It is in urban areas, furthermore, that more opportunities exist to create a more holistic approach to nature exhibition through the biopark concept promoted by Robinson (1995) that foresee a strong collaboration between zoos and other institutions such as museums and botanical gardens. The management and welfare issues of small urban zoos have been often solved with the creation of extra-urban large zoological facilities (London, Antwerp, Washington, San Diego) but without closing the original urban zoo. The growing disconnection between the new urbanized generations and nature is an alarming issue not only for conservation biologists (Miller, 2005) but for humanity at large (Louw, 2005). This is another good reason to have urban zoos that are easily accessible through public transport and at low cost so to combat scientific and conservation illiteracy among the society, especially in the poorer or among ethnic minorities. Zoos are places where people still experience wildlife first-hand. We should care that current emphasis on interpretation does not transform them in another media like television or internet. Regrettably, it is even more common to see in our zoos new exhibits with viewing areas similar to mega-screens (fig. 3) where, at specific times, a keeper give a talk while feeding the lemurs or the armadillos. It seems to me that many zoos are

mimicking television programs rather than a true wildlife experience. For the dangers posed by what has been defined 'videophilia' to both childhood development and biological conservation, see the essay of Zaradic & Pergams (2007). Zoos must remain places for personal experiences in a world where all became standardised and commercialised (fig. 4). Only distancing themselves from current media experiences zoos can escape the definition of "educationally redundant" (Margodt, 2000) when compared to other media.

CONCLUSIONS

Traditionally, reasons to conserve wildlife have been rooted in utilitarian or aesthetic arguments, but nowadays most people is unaware of his dependence on natural services and, in the meantime, have little chances to experience the beauty of natural landscapes or wild animals. Zoos, especially in metropolitan areas, have an important role in enhancing opportunities for people to confront wild creatures but also to be explained of the services nature furnish humanity and hence of the utilitarian side of conservation. In the meantime, zoos should be considered also as social institutions. As such, it should be crucial modern zoos (particularly those in urban areas) recognise their important role as social

places for the family. Furthermore, zoos must also serve as substitute of seminatural areas, that are increasingly remote from new urban generations.

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