

Proceedings
of the 66th
Annual Conference



World Association of
Zoos and Aquariums
WAZA | *United for
Conservation*[®]

Prague
2–6 October
2011

Partnering
for Sustainable
Zoos and Aquariums

WAZA Technical Congress
Presentations only



World Association of
Zoos and Aquariums
WAZA | *United for
Conservation*[®]

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Partnering for Sustainable Zoos and Aquariums

Proceedings of the 66th Annual Conference

2–6 October 2011

Hosted by Prague Zoo

Editorial

Dear Members and Friends!

I would like to start with a big thank you to our host, the Prague zoo! All their staff worked hard to make our conference a big success, in all respects. The perfect meeting venue and the beautiful city of Prague guaranteed a nice and friendly atmosphere for working and socializing at the same time. The 66th WAZA Annual Conference was dedicated to the theme of partnerships and sustainable animal populations. Progress was made in working better together in terms of cross-regional breeding efforts and the first set of global species management plans was agreed. This year much time was devoted to workshop meetings, whereas the first day of technical congress started with two prominent keynotes, followed by 19 papers devoted to sustainable collections, animal welfare and business implications.

We were also happy to welcome a representative of the UN Convention on Biological Biodiversity and finally the membership adopted a resolution in support of the UN Decade on Biodiversity with a view to provide a long-term support for this global endeavour.

The world zoo and aquarium community is getting stronger every year and more visible on the global stage of conservation with a clear focus on species, let's get even more "United for Conservation"!

Gerald Dick
Executive Director

Legend: Conference Documents

| | |
|-----|---|
| DOC | Documents submitted prior to the Conference, like Committee reports, Association reports. |
| INF | Documents presented at the conference without previous documentation, made available after the Conference |
| MEM | Presentations of new members |
| ADM | Administrative sessions |
| COM | Committee meetings at the Conference |
| WS | Workshop results |
| RES | Resolution |

Example

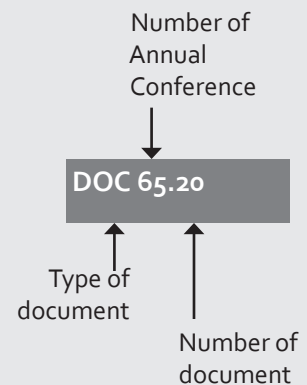


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Welcome Address by the Host

Miroslav Bobek, Director, Prague Zoo

Dear Mr President, dear colleagues,
ladies and gentlemen,

Let me welcome you to the 66th WAZA Annual Conference, held in one of the world's most beautiful cities, in Prague.

I am immensely honored to welcome you in the name of Prague Zoological Garden, and at the same moment thank you that our zoo was entrusted with the preparation of such an important event.

The 66th WAZA Annual Conference is held under the patronage of Bohuslav Svoboda, the Mayor of Prague, whom I am welcoming and I wish to thank him not only for the patronage over the conference, but also for the support of our zoological garden. I am also welcoming and wish to thank the Minister of Environment of Czech Republic, Mr Tomáš Chalupa.

Forty years ago formal director of Prague Zoo Zdeněk Veselovský welcomed our predecessors at the 26th international conference of the directors of zoological gardens.

I am happy that I can welcome you here on the year of the 80th anniversary of Prague Zoo, and open the conference with a short documentary, dedicated also to professor Veselovský. On top of that, I think that it is pre-eminently related to the overall theme of the conference...

Thank you for coming and I wish you successful deliberations!



© Tomáš Adamec
Miroslav Bobek, director of Prague Zoo.

Welcome by the Mayor of the City of Prague

Miroslav Svoboda

Dear friends, honoured guests,
ladies and gentlemen,

Last week, Prague's zoological garden celebrated the 80th anniversary of its opening. The 66th WAZA Annual Conference and Technical Congress is a splendid culmination of these celebrations and it is my honour to welcome you to the Czech Republic's capital city.

In terms of age, the Prague Zoo cannot compare to traditional institutions such as the zoo in Vienna's Schönbrunn Palace; nevertheless, over the course of its existence it has managed to build up an excellent international reputation. One significant factor in this is the unique breeding of Przewalski's Horse. Just last Wednesday we christened the 216th foal born in Prague. But we also take pleasure in the more than 670 other species kept at the Prague Zoo.

I am certain that you will have the opportunity to get to know our beautiful city from many perspectives over the coming days. Aside from the Zoo, our metropolis also offers many other fascinating experiences. Visitors to Prague are often curious as a cat about the local architecture. They are also often busy as a bee trying to visit all of Prague's monuments. And when they are hungry as a wolf after a long day, they stop to try out our local culinary specialities and renowned Czech beer.

If you don't already have a set programme, please take it as a bit of inspiration. I wish you a pleasant stay in Prague.

Thank you.

Welcome Address by the Czech Minister of the Environment

Tomáš Chalupa

Dear Ladies and Gentlemen,

It gives me great honour to welcome you to Prague on behalf of the Ministry of the Environment and address all of you who have come to our beautiful city from all corners of the world – from Argentina to New Zealand, from Canada to Japan, from Sweden to the Republic of South Africa.

We come together in a city which has been the crossroads of various cultures, views and languages since time immemorial. Perhaps that is why it can boast the epithet “mother of cities”. However I am convinced that the beauty and history of our capital city is not the only reason why this year’s WAZA conference is being held here. The reason is Prague Zoo which is celebrating its 80th anniversary this year. Prague Zoo has been developing successfully for 80 years and continues to develop. Today it is ranked among modern zoos. It can boast many breeding successes such as being the first zoo in the world to breed the Andean Condor, the first to artificially breed the polar bear, the first to breed the lowland gorilla, the first for the most productive breeding of the Komodo dragon outside Indonesia and collaborated in saving Przewalski’s Horse.

Prague Zoo is not the only zoo in the Czech Republic which is a small country by its area but has a total of 21 zoos. Eleven of them are members of WAZA. Zoos have a long tradition in the Czech Republic and have been in the limelight of public interest for a long time. Almost 5 million people visited Czech zoos in 2010. This corresponds to half the population of the ten million people who live in the Czech Republic. The high number of visitors is very important, but is not the only force that keeps zoos operating. The operation of zoos in the Czech Republic and in many other countries would be unthinkable without the support and understanding of local self-government and central governing authorities.

The Ministry of the Environment, as the central governing authority for the operation of zoos, has been supporting Czech zoos in the long term in fulfilling the World Zoo and Aquarium Conversation Strategy. The priority is the support of the breeding of endangered species of world fauna and involvement in a number of national and international rescue programmes which are to contribute to the conservation of the biodiversity of animals in human care and in natural habitats.

The protection of populations living in the wild in natural habitats is an activity that is developing in all Czech zoos. This area has met with the growing support of the public and the Ministry of the Environment. The list would be a long one if I were to name all the projects that Czech zoos organise in this area or provide with significant cooperation.

Ladies and gentlemen, in the opening speech of Prague Zoo’s director, Mr. Miroslav Bobek, we saw a short documentary about the transport of four Przewalski’s horses to the countryside in Mongolia. This is a wonderful example as one of many. It was a project which best illustrates the functional link of zoos working together to protect populations living in the wild in their original habitats. The example also illustrates the support of the Czech Republic. It was an honour for me to assume the personal auspices of this project.

The mission of zoos has long been not just to show animals. An integral and very important part of a modern zoo is to educate people, acquaint them in narrow and broad terms with the problems of nature conservation, increase their awareness of the problems of the conservation of species and their natural habitats, and provide them with the opportunity to become actively involved in solving these problems.

Ladies and gentlemen, I wish you a fruitful and successful conference. I hope that in the end you will go home filled with impressions, new ideas and pleasant experiences not just of the conference, but also of Prague Zoo and the Czech Republic!

Welcome to the Region

David Nejedlo, President of Union of Czech and Slovak Zoological Gardens

Dear Minister, The Mayor,
dear colleagues,

Seeing you all present here today, reminds me of all the countries I have had the chance to discover for myself during the period of my zoo directorship, when, like you, I have travelled to WAZA conferences. I have seen the beautiful mountains in Taiwan, the wild coastline of Australia and the rough desserts of south-west America – and I have felt happy everywhere.

However, I have always looked forward to my homecoming, to the green heart of Europe, which is how the Czech Republic is sometimes nicknamed, with a great number of freely accessible natural beauties on one hand, and the footprints of the human history – the old castles, chateaus and churches – on the other hand – they can all be found in our country. Czech towns offer many opportunities for cultural and sporting activities. However, despite all these numerous and easily accessible tourist attractions, zoos are to be found amongst the most widely visited public institutions.

The Union of Czech and Slovak Zoological Gardens gathers together some 19 members and as is the case with free wild birds, mammals and other animals, our collaboration is neither prevented nor restricted by the border which was built between Czech and Slovakia many years ago. The member zoos, in 2 countries, keep and breed nearly 30 thousand animals, in some 3 thousand species, which are visited annually by nearly 6 and a half million visitors. No wonder then, that one quarter of the 20 most visited sociocultural institutions in the Czech Republic are represented by zoos. The first place goes to Prague zoo, which I am sure, you will visit during the conference.

However, I would also like to invite you, on behalf of my colleagues, to other regions of the Czech Republic. Believe you me that in our none-too-large country, that distance is not a limiting factor. Please accept my invitation and set off to the west, to the progressively-changing zoo and botanical garden in Plzeň; or to the south, to the rather small but still nice Ohrada zoo, situated not far from one of the most beautiful Czech chateaus, the chateau of Hluboká. My personal invitation however, goes to the north of Czech, where my colleagues will welcome you heartily to the Zoo-park Chomutov with an abundant collection of Eurasian fauna. In Ústí nad Labem you will be able to see expositions and pavilions situated in a hill over the fascinating canyon of the River Elbe, along which you can shortly get to the rather small but innovative Děčín zoo with its terrarium and educational pavilion 'Paradise islands'. You can finish, or start, your

tour around Northern Czech zoos in our oldest, but still vibrant Liberec zoo, which I have had the honour to run for the past seven years. In the Eastern part of our country, I would also like to draw your attention to the African expositions in Dvůr Králové zoo and to the African village Matongo in Jihlava zoo, surrounded by the expositions of many rare and endangered animals. In Northern Moravia, I would like to point out the nice and dynamic zoos in Ostrava and Olomouc, and the beautiful Lešná zoo, whose modern expositions can be found in a charming chateau park. You must also visit the changing Brno zoo, in the Czech Republic's second city, or, in the south of Moravia, the interesting zoos in Vyškov and Hodonín.

And as for neighbouring Slovakia, well please accept my invitation to the capital city of Bratislava and its much visited zoo; to Spišská Nová Ves zoo, situated near the majestic mountain range of the Tatras; to the beautiful area of a chateau park in Bojnice zoo; or to the romantic valley full of expositions of animals in Košice zoo.

Ladies and gentlemen, it is a great honour to have been able to welcome you to the Czech Republic. To the country where much of the history of human kind has been written, and the country which is nowadays writing, alongside you and together with you, the history of world zoology.

Thank you for your attention.

Welcome Address by the WAZA President

Mark Penning

Your Worship the Mayor of Prague, Mr. Bohuslav Svoboda; Minister of the Environment of the Czech Republic – Mr Tomáš Chalupa; Chairman of the Czech Zoo Association – Mr David Nejedlo; distinguished guests; ladies and gentlemen, it gives me great pleasure to welcome you all to Prague and to the 66th Conference and Annual General Meeting of WAZA.

When we consider the interface between wilderness and so-called civilisation, it becomes clear to us very quickly that we are using our planets' resources at a rate far quicker than they can be replenished. We have millions of people in developing countries desperately needing basic services like water and sanitation, and we're cramming together in enormous concrete jungles which have, at best, only tiny remnants of the natural habitats that once existed there. The Species Survival Commission of the IUCN has told us that one in four mammals species, one in eight birds, one in three amphibians, and one in three corals are at risk of extinction in the wild. We know in which regions these threatened species occur, and we know which species are classified as "data deficient". We must ask ourselves how we as scientists can contribute to the conservation of these species.

Late in 2010, Dr Gerald Dick and myself attended the Conference of Parties COP 10 of the Convention on Biological Diversity in Nagoya, Japan. The conference was attended by 193 signatory parties with over 18 000 registered delegates present. We were very proud to fly the flag for the international zoo and aquarium community at such a high-level and the prestigious gathering. The CBD has adopted as its vision "Living in Harmony with Nature", a maxim that most of us will wholeheartedly support. The meeting produced some very favourable outcomes including a new ten year strategic plan, a resource mobilisation strategy, and a protocol on access and benefit sharing. The new ten year strategic plan is referred to as the Decade for Biodiversity, and conference delegates will hear a lot more about this initiative over the next few days. Some of the specific targets agreed to include halving the rate of loss of natural habitats, including forests, over the next ten years. In terms of protected areas, the targets of 17% land, 17% inland waters and 10% marine and coastal areas were chosen. Furthermore all parties agreed to restore 15% of the degraded landed, and to reduce the pressure on coral reefs.

The outcomes of COP 10 were adopted by the United Nations General Assembly, and include what are now known as the Aichi targets. All signatory parties agreed to the development and implementation of national biodiversity strategy and action plans within two years. During the meeting, no fewer than 34 donor agencies agreed to make funding available for related initiatives, and various business coalitions like the World Business Council for Sustainable Development pledged their support in achieving these targets.

The task we face over the next few days is determining what can we as the International Zoo and Aquarium community can do towards achieving these strategic objectives. The fact that we host some 700 million visitors in our Institutions each year underscores the potential contribution we have to make. During this conference we will be seeking to adopt a resolution in support of the Decade for Biodiversity to serve as an over-arching theme for WAZA activities.

In addition we will be discussing the importance of developing a more robust ethical framework for our organisation and its members, and we will be confronting some of the business realities we must face over the year ahead. It promises to be an interesting conference, and I wish you all an exciting and productive week ahead.

Keynote Addresses

Time Is Running Out!

Leobert E. M. de Boer, former EAZA President

The overall theme of the 66th WAZA Annual Conference is "*Partnering for Sustainable Zoos and Aquariums*", with as sub-themes:

- "Secure long-term animal collections",
- "Animal welfare and public opinion",
- "Business prerogatives: Making money and saving wildlife".

My contribution focusses mainly on the first of these, with an emphasis on "partnering", and will here and there touch on the third aspect (business). It does not present really new information, but merely gives an introduction to the theme and summarises developments in the past decades.

The title of this presentation, "*Time is running out!*", was inspired by two references from the literature. Firstly, the 1993 edition of the World Zoo Conservation Strategy, the last chapter of which called upon the zoos and aquariums of the World to "*help build a time bridge*" for wildlife to survive a critical period of increasing threat caused by human activities. Secondly, the 2010 paper by William Conway in Zoo Biology, entitled "*Buying time for wild animals with zoos*", a paper with the same overall message. Between 1993 and 2010, however, the urgency of this message considerably increased. Although nobody in 1993 was really optimistic about the future of wildlife and natural areas world-wide, meanwhile human pressure on our planet's natural systems has increased tremendously. Habitat destruction accelerated and the percentage of surface area still available for natural life diminishes by the year. Climate change undeniably is progressing. Human over-consumption is rocketing. The end of these developments seems further away than ever. Thus, the time bridge must be built, and we must buy time as rapidly as possible.

Speaking of bridging a critical period for wildlife, the question should be asked "how much time do we need?". In 1986 Soulé, one of the founders of the theory behind small population management in zoos, suggested that a period of some 500 to 1,500 years should be bridged to help wildlife survive what he called: "demographic winter". In the 1980s SSPs, EEPs and other breeding programmes started to plan for a 200 year time-span, as they hoped for stable human population size before the end of that period, after which wildlife might recover again. A few years later, however, SSP/EEP understood that planning for 200 years might be too difficult, so they reduced their target to 100 years, amongst others on the basis of the expectation that gene banks for wild animals would become operational meanwhile. William Conway, though fully advocating the need for long-term planning, always underlined that zoos, simultaneously should also work on short-term (10–15 years) "rescue operations" (bring into captivity, breed, and reintroduce as quickly as possible), that proved to have great potential in saving critically endangered species.

Obviously, in order to play a substantial role in assisting the survival of wildlife, zoos and aquariums need to build up sustainable populations of endangered species. But what is "sustainable" in this regard? As Lees & Wilcken (2009) and others have explained, here we must distinguish between "self-sustaining" and "sustainable". A "self-sustaining" population should remain viable in the long run without any addition from the outside. In order to be "self-sustaining" a population should number at least several hundreds to several, or even many thousands of individuals. A "sustainable" population, on the other hand, can be much smaller (let us say a few hundreds to one thousand individuals), as occasional addition of animals from outside the core population is part of the strategy to keep it viable over a long period of time. Without wanting to go into any detail (there is an abundance of literature on this subject), the required population size in each of the two categories depends on factors such as the generation time of the species under concern, the number of founder individuals that formed the basis of the population, the speed with which the founder population grows towards the final population size, the percentage of genetic variability the program wants to preserve, the length of time during which this should be preserved, the effectiveness of population management, etcetera.

The objectives of sustainable zoo populations (what do we want to maintain them for?) also play an important role. If a species is (nearly) extinct in the wild, there is no choice: we should aim at self-sustainability. If we want to help save threatened species by building up “reserve populations” in captivity, occasional additions from the wild seem fully legitimate, and we could do with much smaller populations. Sustainable zoo populations, however, are also needed in support of other zoo and aquarium conservation tasks, such as education, research, awareness-raising, and raising funds for conservation. In fact: zoos and aquariums need sustainable populations for their own future. There is no future for zoos without animals!

By the way: when discussing sustainable zoo populations, it is often feared that the need for sustainable – read large – populations will unavoidably lead to an overall decrease of species diversity in the collections of the regional/global zoo and aquarium community. The opposite – I believe – is true: the maximum number of species we can all together keep in the future is determined by the degree of sustainability we can realize for each individual population, combined with the best possible joint collection planning (that is how do we, all zoos and aquariums together, assign space to each of the species populations we want to maintain for the future). The less sustainable our populations are, and the less effectively we plan our collections, the poorer they will be turned out to become in the future.

The first cooperative zoo breeding programs were initiated in the 1980s and until today their number and quality increased. The theory of small population management basically is in place, and all required knowledge is available. Data management systems were developed, ISIS, ARKS, SPARKS, ZIMS. The regional zoo and aquarium associations set up professional organisational structures to run regional breeding programmes. Meanwhile the number of successful reintroductions of animals from

captivity into the wild increased, and much knowledge on reintroduction techniques was accumulated. Altogether, the potentials of zoos and aquariums in supporting the survival of wild species by captive breeding became realistic and undeniable.

However, recent evaluations of the performance of breeding programs – after almost 30 years of hard work of hundreds of dedicated zoo and aquarium staff – do not show a very hopeful picture. Both Baker (2007) and Lees & Wilcken (2009) concluded that no more than 50%, or – depending on the criteria used – even far less of the studbook populations currently attained sustainability. And that, while less still than 30% of all zoo populations is managed as a studbook or breeding programme population. Thus, in spite of all efforts, we are doing not good at all. Lees & Wilcken literally concluded that *“the zoo Ark, it seems, is sinking”*.

So what went wrong? All kinds of things, such as lack of breeding success in many species. Lack of space; even if a species is propagating sufficiently, it is often difficult to place the offspring. Inadequate exhibits; many exhibits are perfect for presenting species to the visitors, but often not for optimal breeding and partner choice (e.g. too small groups). Implementation of rules and recommendations of breeding programs often pose problems. Programs, in fact, are run by “volunteers” with a lack of time, whereas especially the complex programs with large populations would require full-time professional management. Effective regional joint collection planning (important for assigning enough space to the selected species populations) in most of the regions so far hardly came off the ground. And, last but not least: zoo and aquarium breeding program success suffers from a lack of partners.

Speaking of partnerships for sustainable zoo collections, I would like to distinguish three categories: 1. Internal partners (partners within your own institution), 2. Zoo network partners, and 3. External partners.

Starting with internal partners: building up and maintaining sustainable zoo collections seems to have become too much a matter of curators only. Unlike 25 years ago, even zoo directors now often hardly want to be directly involved any more. Sustainable zoo collections and all their aims and objectives, however, require the full support and interest of zoo managerial, PR, marketing, educational and financial staff, as well as those of zoo governing bodies (boards, cities, etc.). Admittedly, there are excellent exceptions: examples of zoos and aquariums that have done extremely well in involving all sections of their staff, management and authorities in species conservation, and are performing superb conservation PR and marketing. But overall, it seems that a majority of zoos and aquariums still have much work to do to abandon traditional views of the roles and functions of their institutions. Explaining and marketing the necessities and potential benefits of zoo conservation breeding internally and externally require much attention. In this regard, I want to underline once more that the “recreation/conservation conflict” does not exist! In-house scepticists of zoo involvement in conservation often argued (and still are doing so) that zoo visitors will only want to pay their entrance fees for the recreation they expect in the zoo. They would not want to come to be educated or to learn about conservation. Especially zoo boards, city authorities and zoo marketers frequently adhere this standpoint. Recreation can be commercially marketed. Conservation is idealism that does not bring in visitors, nor money. It even looks as if such sounds in recent years – once again – are more loudly heard. I strongly want to warn against this trend! As already many zoos have demonstrated: recreation, education and conservation can perfectly go hand in hand, and can mutually reinforce each other. Let us be very happy that visitors are coming to the zoos in masses, simply to enjoy wild animals. Their joy is the best possible basis for conservation-mindedness. All the rest is a matter of creative and innovative education, PR and marketing.

The second category of partners for sustainable collections – zoo network partners – comprises particularly the regional associations and WAZA. The regional associations are very able to run and manage their breeding program, and are increasingly also involved in *in situ* conservation activities. Together with WAZA the regions constitute a unique network of professionals. Hardly any other type of institutions has such an intensive, effective and widely distributed network. However, this global network could (and should) even become more efficient after a reconsideration and redefinition of relationships and task divisions between WAZA and the regions. Additionally, WAZA should play a more prominent role in the coordination of global breeding programs. As I said: the regional associations are well equipped to organise their regional breeding program (WAZA could never do that), but an increasing number of species programs requires some level of inter-regional coordination, and that is where WAZA should step in (Figure 1). Inter-regional coordination of species programs does only mean that regional species coordinators should be brought together in order to discuss and plan occasional animal exchanges between their regions (depending on the species, its captive population size and history, no more than one or a few inter-regional exchanges per generation). Not a big task for WAZA, but an important one.

The third category of partners for sustainable zoo collections includes a whole range of external (= non-zoo/aquarium) bodies. CBSG of course, IUCN/SSC, international conservation bodies (WCS, CI, WWF, etc.), all kinds of “trusts” specialised in or focussing on breeding and conservation of specific animal groups (cranes, pheasants, waterfowl, etc.), private breeders with great expertise in the propagation of certain species (take

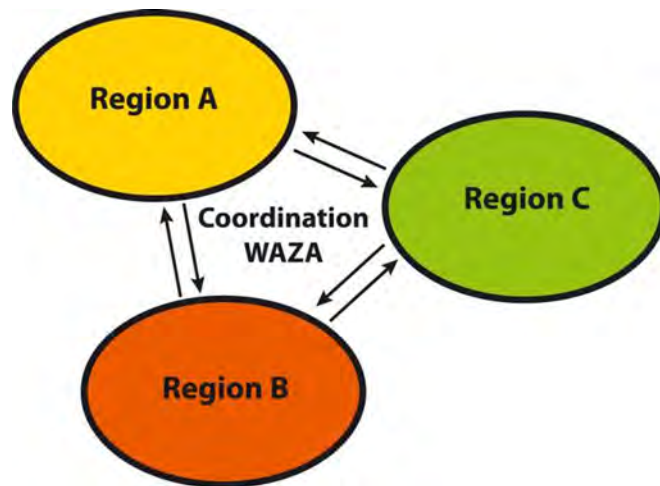


Figure 1.
Regional sub-populations as parts of global programs.

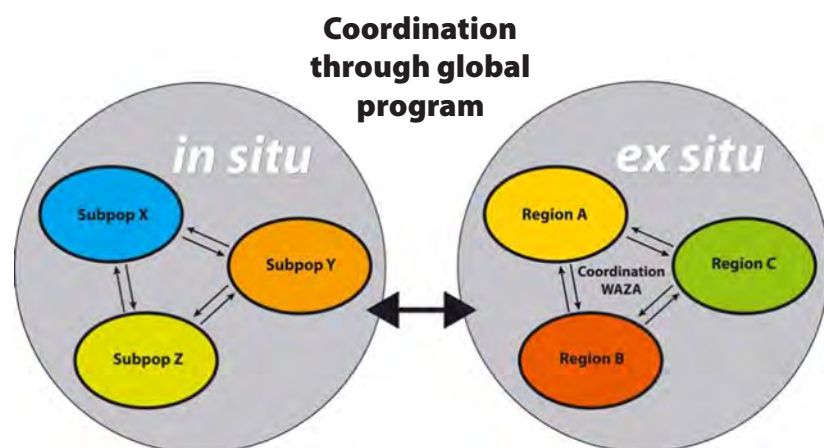


Figure 2.
Ex situ and *in situ* sub-populations as parts of interactively managed meta-populations.

care, however, not to get mixed up with the animal trade!), local, regional and national conservation authorities, and – last but not least – wildlife parks in all countries and corners of the world. Partnering up with the latter will have to be at a species to species basis (at least one partner for every species we want to maintain in the zoo/aquarium community). Consequently, this will require building up a very extensive, global, “parallel” network, connected to, and interwoven with the network of the zoo regions and WAZA.

In regard of “partnering up with wildlife parks” I would like to remind you of the “metapopulation concept”. This concept was already introduced in the zoo species conservation discussion in the 1980s. Have a look at Figure 2. Natural (= wild) populations originally often consisted of two or more geographical subpopulations. Along the boarderlines of their distribution areas some level of genetic exchange took place. Due to human activity, wild subpopulations often became isolated from each other (fragmented). Exchange of genetic material between wild remnant

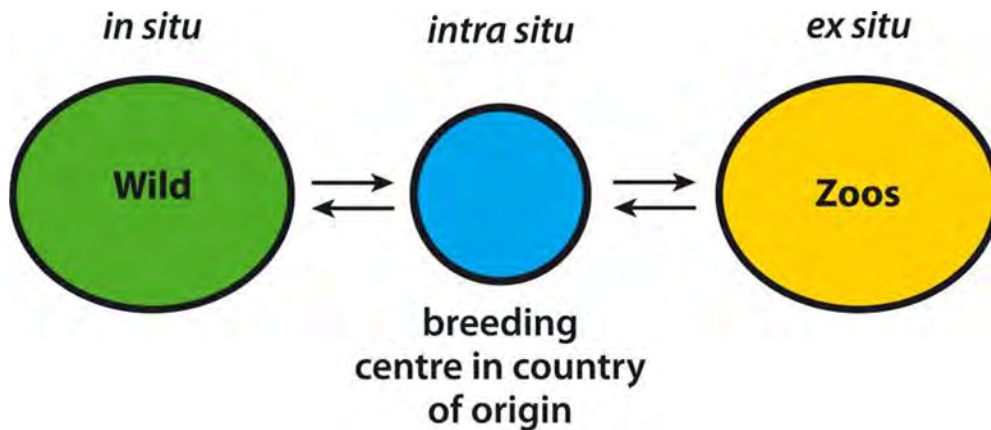


Figure 3.

In-country breeding/rescue centres facilitate interactive management of *in* and *ex situ* populations.

subpopulations therefore nowadays often can only be effectuated by population management in wildlife parks. An increasing number of wild animal populations will require such management. The captive populations of endangered species consist of (regional) subpopulations as well, with some exchange between them (as explained above). Metapopulation management implies that the *in situ* components (Figure 2 left), as well as the *ex situ* components (Figure 2 right) of a given species are considered as part of one entity. *In* and *ex situ* components should be managed interactively, including – when necessary – occasional exchange between wild and captive. Such exchanges (please note that the exchange of one or two individuals per generation is enough to maintain acceptable levels of genetic variability on either side!) would logistically be easier, financially cheaper, and medically safer if there would be something in between of *in* and *ex situ*: e.g. breeding/rescue centres for the species under concern in their country of origin (see Figure 3), such as they exist already for several species.

Zoos and aquariums in fact should once and for ever abandon the traditional “Zoo Ark” concept (Figure 4), and stop promoting the idea that they might be able to save substantial numbers of endangered species by maintaining self-sustaining populations for any length of time in captivity. This concept is unrealistic. The “Zoo Ark” is much too small and much too expensive to safeguard more than a maximum of 1.000 species, while we all know that tens of thousands of species are at risk now, and many more will require assistance for their survival very soon. And even now already, with less than one third of the maximum number of species on board (in the form of stud-book/breeding program populations), the Zoo Ark seems to be sinking..... (Figure 5).

In stead of sticking to the traditional “Zoo Ark” concept, zoos and aquariums should understand that they never can accomplish anything in isolation. Instead of the “Zoo Ark”, an “Ark (k) mada” is needed to save as many as possible species from extinction. A fleet in which the zoos’ ship sails together with those of its partners in conservation: IUCN/SSC, CIBG, CI, WCS, WWF, Trusts, Parks, etc., etc. (Figure 6). Only as part of such a fleet the zoo and aquarium ship makes sense, and can play a role in building the required “time bridge” for the survival of wildlife. Only as part of a large fleet, zoos and aquariums with 500 or even 1.000 ecological key and ambassador species on board, can effectively help saving an equal number of habitats, and a multitude of endangered species world-wide.

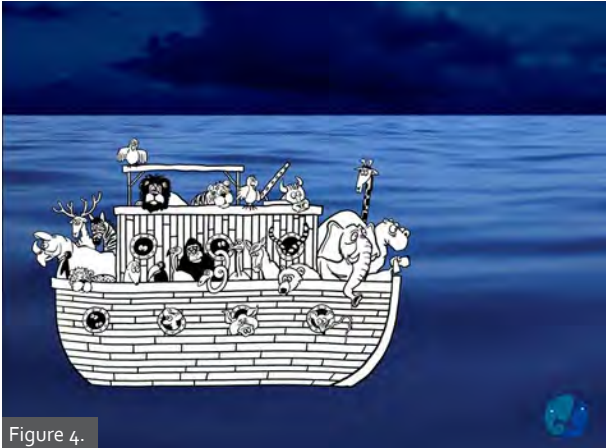


Figure 4.
The traditional Zoo Ark concept.

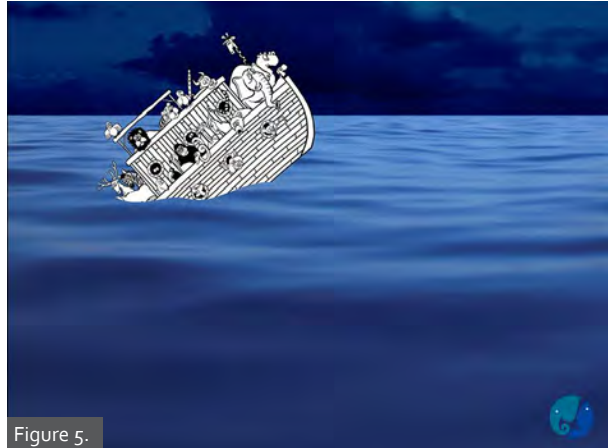


Figure 5.
The Zoo Ark is sinking.



Figure 6.
What we need is an Ar(k)mada.

I would like to conclude this paper with four statements:

1. Zoo populations serve many conservation purposes.
2. None of these conservation tasks can be performed without sustainable zoo animal collections.
3. Zoo populations do not necessarily need to be sustained 100% in-house.
4. If zoo populations are considered as parts of (interactively managed) metapopulations, partnering up with a wide variety of conservation partners is of utmost and urgent importance.

Returning to the title of this presentation – “*Time is running out!*” – my conclusion is that “*buying time for wild animals*” as William Conway called it, is becoming exponentially more expensive by the day. Any further delay should be avoided, and I therefore sincerely hope that the WAZA Prague Conference 2011 will see a major step forward in “*the great mustering of all available forces [as the WZCS-1993 called it]” to man the Ar(k)mada!*”

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Global Species Conservation – The Zoo Community Must Lead!

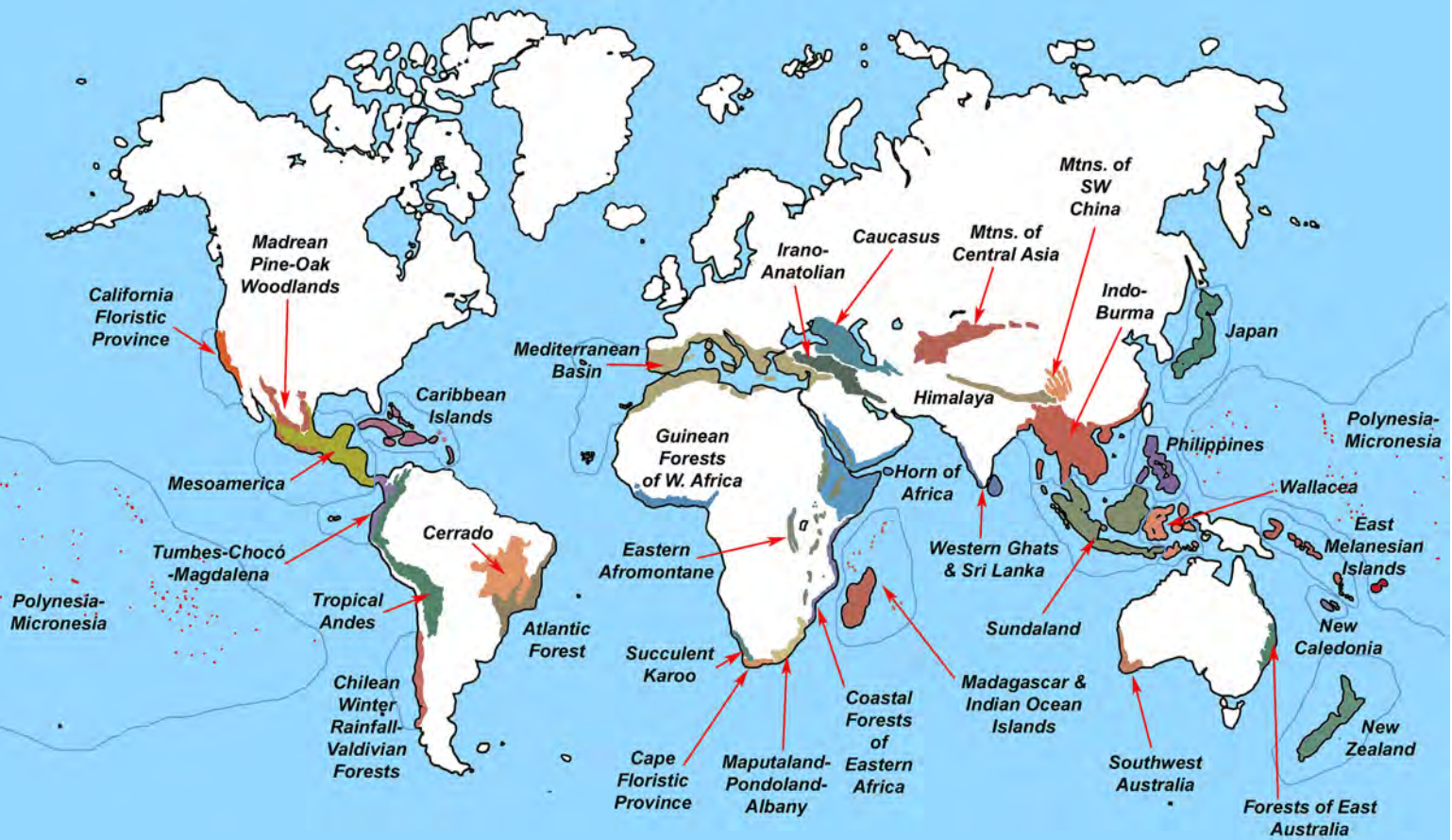
Russell A. Mittermeier,
President – Conservation International | Vice-President – IUCN

Biodiversity conservation, and especially threat of a mass species extinction episode, is one of the most pressing issues of our times. Although it has gotten far less attention than climate change, it remains an issue of great global importance and needs the kind of leadership and sustained attention that climate has received in recent years. Traditionally, much of the work on endangered species has been carried out by major conservation NGOs and by IUCN, mainly through its Species Survival Commission. However, most of the major conservation NGOs have begun to shift focus over the past few years, and are now placing much more emphasis on ecosystem services and human well-being, with biodiversity conservation in general and focused species conservation in particular becoming more and more marginalized. The zoo community has also played a role in species conservation, and its involvement has grown over the past few decades from captive breeding of selected species to increasing support for field projects in other parts of the world. But the time has come for this role to change from significant involvement to full-blown leadership. It is my firm belief that the future of species conservation now lies with the zoo community, and that this large and immensely important community needs to recognize its leadership role and take it on with greatly increased commitment, enthusiasm, and funding if there is to be any hope of success.

This means much more than captive breeding programs and a selection of field programs in other parts of the world. It means full recognition of the fact that what the zoo community does will ultimately determine whether or not we are successful in biodiversity conservation, and it will require a much more significant worldwide involvement in tropical countries where so much of the world's biodiversity is found, particular in places like the Biodiversity Hotspots. These 35 Hotspots have already lost nearly 90% of their original natural habitat and what remains in them is only about 2.3% of Earth's land surface. Nonetheless, they still harbor more than 50% of all plant and more than 42% of all vertebrates as endemic species found nowhere else, as well as 72% of all CR and EN mammals, 86% of all CR and EN birds, and 92% of all CR and EN amphibians. And its not just species at risk. These hotspots are also the only home to a wide range of unique genera and families representing entire evolutionary lineages that could disappear over the next couple of decades if appropriate measures are not taken. But of course the Hotspots are not the only places of concern. They are clearly the tip of the iceberg, but many other areas and the unique species living within them – terrestrial, fresh water and marine, also require increased attention.

To be truly effective, the zoo community – and the conservation community as a whole – needs to recognize that conservation efforts in captivity and in the wild are part of a continuum, and not just separate *ex situ* and *in situ* domains, and that there must be much more interchange of staff, technical capacity, animals, and financial resources. We also need to see greater effort in education and public awareness, something that zoos have done very well over the past few decades but which needs to be ramped up even more. And we must have a greatly increased commitment of funding to field-based conservation, which among the zoos of the world only the Wildlife Conservation Society has done at a scale that is up to the challenge. The long-time General Director of WCS, Bill Conway, who was honored at the Prague WAZA meeting, recognized this key role of zoos early on, became the most respected figure in the zoo world, and was one of the greatest leaders in the history of the conservation movement as a whole. As a result, WCS investments in field conservation account for \$89 million (81%) of the approximately \$110 million spent on *ex situ* conservation by the 225 members of the AZA. Not all zoos can reach the level of this huge institution, but there is not one that couldn't increase its commitment beyond where it is today.

Hotspots



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Needless to say, the zoo community has unmatched potential to lead on this issue, with more than 700 million zoogoers worldwide and more than 1300 institutions that can serve as vehicles for getting the message out and raising the funds required. Global zoo membership far exceeds that of all the conservation organizations combined, and there is not a single community with a zoo that does not have people interested in conservation with the means to contribute more than they do now to this critically important work. However, at present, field-based species conservation accounts for at best 1–2% of the budget of the global zoo community, and that may be an overestimate.

I firmly believe that the time has come for the zoo community to set a goal of increasing this by an order of magnitude to 10% over the next decade, and to take on the challenge of global leadership on species conservation at a much higher level than ever before. If you can't do it, who will?

WAZA Congress Papers Abstracts

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Collection

Planning in Zoos

Bert E. M. de Boer

The establishment of cooperative breeding programmes in the 1980s was a major breakthrough in the zoo and aquarium community. By the mid 1990s the science, organisational structures and practical requirements for the long-term management of captive populations all were in place, and in the years thereafter the number of species programmes steadily increased. Recent evaluations, however, showed that three decades of continuous effort resulted in a disappointingly low number of sustainable populations in zoo and aquarium collections. This does not mean that all hard work has been in vain. Most probably the current state of our collections would have been disastrous if we had not invested so much energy. What it *does* mean is that we urgently need to reconsider the future of our collections, *and* the future of our institutions, as without sustainable animal collections there will be no future for zoos and aquariums themselves.

Meanwhile – during the same three decades – the world in which we live has changed enormously. Human population has increased by two billions; human consumption and overexploitation of our planet has doubled; undisturbed wildlife areas have drastically decreased in size; global climate undeniably started to change; biodiversity loss became a realistic concern, while the full extent of the effects of the currently already greatly diminished ecosystems still remains to be seen in the near future. Altogether, it never before has been so clear how bleak the future of wildlife in all corners of our planet is!

When we combine these two conclusions – the deep concern about the future of zoo and aquarium collections, and that about the future of wildlife on Earth – there is only one possible solution: we need a new breakthrough, new elan, vision and work power, leading to what the first edition of the World Zoo (and Aquarium) Conservation Strategy (1993) called “a *great mustering of all available powers to give our Earth’s biosphere and all its living elements the best possible chance of survival*”.

For zoos and aquariums this means that they will have to double, triple, or multiply their efforts to partner up internally, as well as externally. Internally, all zoo and aquarium partnership structures at bilateral, national, regional and global level need to be reinforced and intensified. As a result, the effectiveness of breeding programmes, collection planning, and other conservation activities should substantially increase. Externally, our most natural (and hopefully effective) partners are conservation organisations and authorities. In this regard partnering should be carefully planned. WAZA’s role is to partner up with IUCN, WWF, World Bank and other global organisations, in order to help influence global conservation policies and funding. Cooperative zoo and aquarium species programmes should link with conservation parks and their governing bodies to effectuate interactive population management and fundraising. Individual zoos and aquariums should partner with any relevant local, national or species-related conservation body to raise specific funds as well as public awareness. And there is a whole range of possible partnerships in between of these main categories.

In a recent paper in *Zoo Biology* William Conway spoke of “*Buying time for wild animals with zoos*”; the World Zoo and Aquarium Conservation Strategy worded it “*Zoos should help building a time bridge for wildlife*”. We have to admit, however, that time is running out. Zoos and aquariums worldwide indeed have a major role to play, and they have enormous potentials to help save wildlife on our planet. But if we do not act very rapidly to build effective global partnership networks at all relevant levels, we better stop using such phrases.

Species Conservation: the Key Role of Zoos

Russell A. Mittermeier

Species conservation remains the most basic component of the conservation movement, and much needs to be done to prevent a major extinction episode in the next couple of decades. However, many of the major conservation organizations have moved away from or reduced their commitment to species conservation in favour of green economies, climate change, ecosystem services, and other emerging issues. While unfortunate, this is the reality of the day. If we are to maintain a strong focus on species conservation, the zoo community needs to take on an increasingly large role, both *in situ* and *ex situ*. While zoos have done a lot over the past 20 to 30 years, the time has come for the zoo community to assume the mantle of leadership and increase its commitment by an order of magnitude over the next decade. Examples of what is at risk and what can be done are drawn from the biodiversity hotspots, including Madagascar, the Atlantic forest of Brazil and other global priority regions.

Are Zoo Populations Truly Building a Future for Wildlife?

Anne Baker

Zoos have long lauded their cooperative captive breeding programs as contributing to the conservation of wild populations. However, recent analyses of our cooperative programs have demonstrated that the majority of these programs are not maintaining levels of genetic diversity sufficient to classify them as "assurance populations". How then do our cooperative programs contribute to conservation of wild populations? Do we need to change our approach to collection planning to focus more on taxa of high conservation concern? What paradigms might we need to shift if we are to become true partners in the global conservation effort?

Achieving True Sustainability of Species Assurance Populations

Bob Lacy

Presently, our breeding programs are not designed for sustainability – the use of a resource without causing permanent damage to its value. Instead, we accept degradation of populations in our care. For many species, we may need new goals: continually sustaining diversity, resilience, and adaptability. Achieving this will require attention to multiple aspects of diversity, monitoring changes, and exchanges with wild populations rather than reliance on closed populations. This will require that our zoo programs are integrated with other forms of management, will require trust among conservation partners, and will result in zoo conservation programs being part of ongoing species conservation.

Identifying Gaps and Opportunities for Interregional *Ex situ* Species Management

Kathy Traylor-Holzer

Cooperation and management among regional zoo programs may improve the viability of non-sustainable regional populations. A database of 942 taxa with studbooks and/or management programs was compiled to understand the characteristics of currently managed species and as a tool for identifying management opportunities. Threatened species account for 48% of managed species, which focus heavily on mammals and birds. Regional differences exist in number of programs, taxa, and management intensity. There are 77 threatened and 106 non-threatened taxa with multiple regional studbooks that are potential candidates for an international studbook. Similarly, 69 threatened and 16 non-threatened species are intensively managed in multiple regions, and should be assessed for the potential benefits and feasibility of interregional management.

Conservation Centers for Species Survival (C2S2): Breeding Centre Partnerships for Sustainability

Robin Sawyer

C2S2 is a group of five AZA-accredited zoos that collectively manage more than 25,000 acres of land devoted to the survival of threatened species with special needs – large land areas, natural group sizes and minimal public disturbance. By combining scientific and management expertise, these centres excel in studying and creating self-sustaining populations of some of the world's most endangered animals. This talk will illustrate the roles and value of large breeding centres and how collaborating with other institutions helps advance scientific study and species conservation, especially for sustaining populations, both *in situ* and *ex situ*.

Taxonomic Representation and Threat Status of Studbook Species

Markus Gusset

We sought to provide an understanding of the taxonomic representation and threat status of species with a studbook, using data on all studbooks registered in the ISIS/WAZA studbook library and data on threat status from the IUCN Red List of Threatened Species. Studbooks for 1,027 different species are actively updated. The majority of species with an active studbook are vertebrates (96.3%), mainly comprised of mammals (48.8%) and birds (31.8%). There are active studbooks for 1.6% of all 62,574 described vertebrates, including 9.1% of known mammals and 3.3% of known birds. Of those species with an active studbook, 41.5% are classified as threatened (i.e. Vulnerable, Endangered or Critically Endangered) on the IUCN Red List; 17 out of 34 animal species (50.0%) classified as Extinct in the Wild have an active studbook. Of the 989 vertebrates with an active studbook, 42.6% are classified as threatened; 8.6% of 25,780 assessed vertebrates classified as threatened have an active studbook. Without studbooks, it would be virtually impossible to scientifically manage animal populations in human care.

Reproductive Health and Population Sustainability

Cheryl Asa

Although there may be multiple factors responsible for the current unsustainability of many zoo populations, to be sustainable these populations must be able to reproduce. In an analysis of the seven canid species in AZA-managed programs, we found a higher risk of uterine pathology in females not allowed to reproduce regularly. This condition (endometrial hyperplasia) can cause infertility by interfering with implantation or preventing the uterus to support pregnancy. Thus, females not allowed to produce offspring regularly are more likely to become infertile. Endometrial hyperplasia may be widespread in captive mammals as a result of current AZA population management practices.

Addressing One of the Challenges of Climate Change with Sustainable Animal Collections

Dalia Conde

Climate change is one of the biggest challenges we face and its impact on species survival is still unclear. However, for some species it is certain that the outlook is so bleak that captive breeding may be the only short-term solution to ensure their survival. We assessed the number and population structure of species vulnerable to climate change represented in the ISIS zoo network. Sustainable collections that ensure the survival of these species could be a great asset in meeting some of the conservation challenges resulting from climate change.

Methods of Increasing Public Awareness and Support for Conservation: the Example of the Saint Louis Zoo's WildCare Institute

Eric R. Miller

This presentation focuses on various public relation methods, some standard, some novel, that raised the knowledge level of Saint Louis Zoo visitors in regard to zoo-based conservation. For example, in 2005, only 10% of Saint Louis zoo visitors were aware of the Zoo's field conservation programs, however, in 2008, that recognition rose to 69% and has remained at 70%. These methods helped raise US\$ 1,000,000 in donations in that same period. The presentation ends with a 6 minute marketing video that features the Center for Humboldt Penguin Conservation in Punta San Juan, Peru, a cooperative, WAZA-branded conservation program.

Can Mate Choice Improve Reproductive Success of Zoo Populations?

Cheryl Asa

Many zoo animal populations are currently unsustainable. Although many factors may be involved, increased reproductive rates must be part of the solution. Allowing female mate choice has been shown to increase pregnancy rates, litter sizes and offspring survival in numerous taxa, and may be one route to improving breeding success in zoos. We are studying approaches for providing choice and assessing outcomes in several model taxa. A better understanding of mate choice could help population managers achieve goals for viable, genetically healthy populations, reduce selection for behavioural changes to captivity, and provide insight into developing more effective breeding management strategies.

Strategies and Implementation of Holistic Conservation Action through Stakeholder Participation of Threatened Taxa Prioritized by the Alliance for Zero Extinction

Sanjay Molur

The Alliance for Zero Extinction (AZE) represents 67 biodiversity conservation organizations, including Zoo Outreach Organisation and its Indian AZE network. AZE strategies target IUCN Red List CR and EN species occurring in a single location, further prioritized by the AZE principles, vulnerability and irreplaceability. According to AZE there are 950 such species in 612 sites, with 19 species in 16 sites within India. Conserving them will promote zero extinctions, habitat conservation, and local stakeholder participation. AZE targeted species are very fitting for both *in situ* and *ex situ* conservation projects including generation of public support and guidance in local and national legislation.

Wildlife Conservation and Wildlife Welfare – Two Sides of the Same Coin

Sally Walker

Conservation and welfare had been considered two separate disciplines but in the last 5 years numerous publications and symposia have confirmed profound similarities leading to integration of the two fields. This is relevant to zoos, where animal welfare sometimes may seem to conflict with conservation, but is also relevant in the field where the handling of animals trapped for conservation research is not always humane. Zoo Outreach Organisation was one of the first organisations to link conservation and welfare in education, research, field work and animal care. This paper will review activities and output including impact of training in conservation welfare for zoo/field personnel, educators, and academics.

The Elephant in the Room: Elephants, Welfare and Politics

Miranda Stevenson

In 2002 the RSPCA produced a report which severely criticised the welfare and keeping of elephants in UK zoos, which created a lot of media coverage and public interest. BIAZA, meanwhile, had been working with the membership to improved elephant husbandry and management and consequently welfare. A joint project with Defra, the government department responsible for zoos, funded a research project on elephant welfare which resulted in Government requesting BIAZA's assistance in ensuring that welfare is monitored and evidence provided of improvements. This paper describes how good liaison and proactive work on behalf of a zoo association can ensure working with government as a lead body.

Update on the Transport of CITES Listed Species

Andreas Kaufmann

Update on the development of new guidelines for the non-air transportation of CITES listed live animals.

Zoo Culture and Zoo Future – Ideas on the 5th Mission of Zoos

Miklós Persányi

Modern zoos are among the cultural products of the industrial civilization and they are among the common places for interaction of the urban public in its leisure. Addition to the education, leisure, science and conservation missions, a modern zoo has a fifth mission: it is a community cultural centre. A modern zoo can trespass any areas of sciences and arts and it has broad social networks. Addition to all these missions, a modern zoo is an important element of its local economy, providing the community with attractions, employment and significant incomes. A modern zoo also has an essential role in maintaining the traditions and values of community (ies).

Project Ocean: Fish Meets Fashion

**Heather Koldewey
and Jonathan Baillie**

The EDGE of Existence Programme is a highly innovative conservation initiative, which seeks to conserve the world's most Evolutionarily Distinct and Globally Endangered species. EDGE species represent a larger diversity of evolutionary history and include some of the world's most unusual animals. Priority EDGE species need urgent attention but, alarmingly, most are overlooked by existing conservation initiatives. We will discuss how actions are being initiated for EDGE species (mammals, amphibians, corals), including building conservation capacity in the regions where they occur. We will also explore how EDGE can be effectively integrated into zoo and aquarium collection plans and conservation programmes.

Luxury department store Selfridges and ZSL have embarked on a groundbreaking partnership to bring attention to the crisis facing the world's oceans: Project Ocean was launched in May 2011 with a huge 'retail activism' campaign, including dedicating its famous window displays to marine conservation. This truly collaborative initiative involves 22 NGOs, as well as many other sectors. Selfridges switched to sustainable seafood, produced a seafood guide, and hosted a month of activities in its restaurants and foodhalls. This new approach to raising funds includes an interactive digital window and implementing a marine reserve in the Philippines.

Zoo Conservation and the Species Dilemma

Gordon McGregor Reid

There is a crucial need in the international zoo and aquarium world to better understand, manage and breed sustainably the (usually) small populations of wild taxa held. There is much confusion over species concepts. Recent surveys in Europe and North America indicate that only a relatively few vertebrate taxa are managed on a genetically sustainable basis for the longer term. This issue is compounded by a general lack of taxonomic sophistication in breeding programmes, with many (probably most) species/specimens kept never having been subject to rigorous taxonomic and genetic identification and evaluation processes. Their potential conservation value is thus compromised

Forging Public Opinion or Influencing the Legislator?

Joanne Lalumière

Opposition groups mastered the art of forging public opinion. In doing so, they also tend to influence the legislators. Animal welfare groups are no exception. In doing so, they undermine the experience and expertise that lie in our community of zoos and aquariums. The 2011 International Zoo Marketing Conference covered topics related to the promotion of conservation actions by zoos and aquariums. This paper will share some results and explore ways to influence public opinion and legislators beyond keeper talks and education programs.

Effecting Strict Quarantine of Sand Tiger Sharks to Meet a Specific Set of Import Criteria

Forrest Young

Many insular regulatory authorities enforce strict standards for importation of non-native species into their jurisdiction. Hawaii, Guam, Australia and New Zealand all have very exacting standards for non-native wildlife importation. The authors caught and provided quarantine for five sand tiger sharks, *Carcharias (Odontaspis) taurus*, 1.6 to 2.2 m, under the auspices and supervision of the USDA and the New Zealand Ministry of Forestry and Agriculture. Prior to shipment, the five individuals were given a complete veterinary work up including oral and bucal examinations on two separate occasions, to remove ecto-parasites. Prior to shipment, blood samples were analyzed by a pathologist to prevent passage of non-native hemo-parasites that could infect local NZ populations. The five sharks also underwent chemical treatments that will be described in detail to further remove any parasites that may have been missed by the exams. Incoming water for additions following backwashes and maintenance were treated with high dose chlorination that will also be described to maintain strict quarantine conditions throughout. All five sharks were safely transported to New Zealand by a proprietary closed container shipping method.

The Travelling Sex Show: Creating Sustainable Zoos by Creating Exhibits that the Public Will Pay to See

Bernard Harrison

The Travelling Sex Show can be a profitable, business prerogative, communally funded by a consortium of zoos which can travel to each for a 6 month season, making money which can be earmarked for saving wildlife. *The Travelling Sex Show* is a hypothetical travelling zoo exhibit which consists of a range of live exhibits, graphics, video, virtual reality, and motion based theatre and the like – to tell the story of sex, which starts with microscopic exhibits of asexual reproduction in bacteria, amoeba and hydra and moves through displays of reproduction in simultaneous hermaphroditic earthworms and sequential hermaphroditic clownfish. It touches on parthenogenesis in whip lizards, hammerhead sharks and komodo dragons, looks at the need for males, and at their few ventures at raising young with displays of the midwife toad and Dayak fruit bat. It also displays examples of adultery and prostitution in the animal world. It closes with two displays: for chimpanzees and bonobos, contrasting the dramatically different social behaviours of our two closest relatives. The final exhibit of humans, reviews our sexuality and social structure, gives examples of cloning and haploidization and speculates on Oxford geneticist Bryan Sykes's theory of a world without male humans.

Received Full WAZA Congress Contributions

Identifying Gaps and Opportunities for Interregional *Ex situ* Species Management

Kathy Traylor-Holzer – Senior Program Officer for the IUCN/SSC
Conservation Breeding Specialist Group

Abstract

Cooperation and management among regional zoo programs may improve the viability of non-sustainable regional populations. A database of 942 taxa with studbooks and/or management programs was compiled to understand the characteristics of currently managed species and as a tool for identifying management opportunities. Threatened species account for 48% of managed species, which focus heavily on mammals and birds. Regional differences exist in number of programs, taxa, and management intensity. There are 77 threatened and 106 non-threatened taxa with multiple regional studbooks that are potential candidates for an international studbook. Similarly, 69 threatened and 16 non-threatened species are intensively managed in multiple regions, and should be assessed for the potential benefits and feasibility of interregional management.

Introduction

Biodiversity is being lost at an increasingly alarming rate. About one-fifth of the 33,468 vertebrate species on the 2010 IUCN Red List are classified as Threatened (IUCN 2010), and each year about 52 species of mammals, birds and amphibians move one Red List category closer to extinction (Hoffmann et al. 2010). As wildlife populations decline in size and become more fragmented and isolated, they also become more vulnerable to extinction risks. There is an increasing conservation role, and responsibility, of zoos and aquariums to manage species in an appropriate and effective manner to contribute positively to their conservation in the wild.

Global Management

However, recent evaluations indicate that most regional zoo populations are not self-sustainable and cannot meet the common goal of retaining 90% gene diversity for 100 years as closed populations under current management strategies (Barlow and Hibbard 2005; Lees and Wilcken 2009; Leus et al. 2011; Long et al. 2011). The growing concern over the sustainability of *ex situ* managed populations was the focus of the recent issue of the WAZA Magazine (Vol. 12, August 2011) as well as the theme of this annual WAZA conference symposium.

Alternative management strategies provide several options that can increase the viability and sustainability of zoo populations. One promising option is the potential for increased population viability through interregional or global management. Examples include the recently established WAZA Global Species Management Plans (GSMPs) for the Javan gibbon and Sumatran tiger, as well as other species that have been successfully managed across regions such as lion tamarins and okapis. Well planned, coordinated animal exchanges between regional populations can increase viability through improved demographic stability and genetic status. To contribute most effectively to conservation, such meta-population management should include an intensive managed population in the species' range country.

But what is the current potential for interregional management? Which species currently have, or have the potential to develop, multiple well-managed *ex situ* populations that would benefit from coordinated management? What criteria should be used to prioritize such species for global management?

In order to address these questions, a database of managed programs was compiled for 942 taxa managed by the following zoo associations:

- European Association of Zoos and Aquariums (EAZA);
- Association of Zoos and Aquariums (AZA);
- Zoo and Aquarium Association (ZAA);
- Japanese Association of Zoos and Aquariums (JAZA);
- Chinese Association of Zoological Gardens (CAZG);
- Southeast Asian Zoo Association (SEAZA);
- Central Zoo Authority of India (CZA);
- African Association of Zoos and Aquaria (PAAZAB);
- Latin American Zoo and Aquarium Association (ALZPA);
- Mesoamerican and Caribbean Zoo and Aquaria (AMACZOOA);
- World Association of Zoos and Aquariums (WAZA);
- Plus programs organized under the Amphibian AArk (AArk).

For each taxon, the database included the IUCN Red List level of threat, information on any existing international studbook and/or global management plan, and level of management intensity (studbook only, basic management, or intensive management) for each zoo association. Species can be filtered by taxonomy, threat level, region, management program type, and/or the number of managed programs. For example, it is possible to quickly determine those bird species that are Endangered or Critically Endangered and are currently managed in at least two regions, or identify which species are managed by both JAZA and ZAA, or other such data subsets of interest.

This database is also useful to examine trends in species population management. Management programs vary across taxonomy and level of threat. Mammals and birds comprise the majority (76%) of the managed species: mammals (44%); birds (32%); reptiles (10%); amphibians (7%); fish (7%); and invertebrates (<1%). Threatened species (Extinct in the Wild, Critically Endangered, Endangered, or Vulnerable) account for 47% of managed taxa. However, zoos still hold and manage only a fraction of threatened species. Of the 4,733 IUCN-assessed threatened vertebrate taxa:

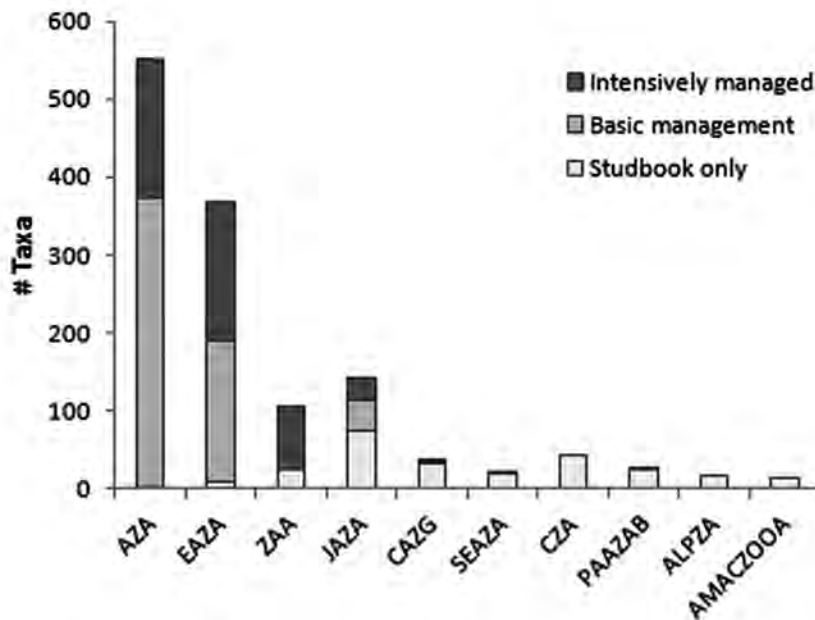
- 14.7% are held in ISIS zoos (Conde et al. 2011);
- 8.9% have studbooks;
- 7.7% are managed to some degree (data analysis and recommendations); and
- 5.4% are intensively managed (detailed breeding and management plan).

Not all threatened species are appropriate for *ex situ* management – the potential benefits, risks and feasibility of *ex situ* management varies among taxa and should be considered carefully, as outlined in the new IUCN Technical Guidelines on the Management of *Ex situ* Populations for Conservation (currently under revision). However, there is likely the potential, and the need, for zoos and aquariums to increase the taxonomic diversity of their collections and to expand their efforts to encompass a greater number of threatened species under their protective care.

Most taxa (70%) are managed in only one region. There are 278 species that have studbooks in two or more regions (30% of the taxa in the database); 224 species are managed at the population level in more than one region (24%); and 97 species are managed intensively in more than one region (10%). Of these 97 intensively managed species, 69 species are threatened and have no recognized inter-regional coordination between management programs.

There is increasing interest in inter-regional and global management and the potential role it may play in improving population viability and conservation value. A workshop on the Future of International Studbooks and Global Management was convened by WAZA in April 2011 to address issues related to the use of international studbooks for inter-regional management. At this workshop WAZA's Committee for Population Management (CPM) used this database to identify six candidate species for new GSMPs (two each by EAZA, AZA and ZAA). CPM is currently developing criteria for identifying priority species for global management, including data that can be gleaned from this database.

The number of studbooks, and especially management at a population level, varies substantially among regional zoo associations. Most of the currently managed taxa are managed by AZA (n=552) and EAZA (n=368). Although ZAA has a smaller capacity, it also manages a large number of taxa (n=107). JAZA is quickly developing management programs as well. There are currently few management programs in the other regions. This is not surprising, as AZA, EAZA and ZAA have a history of developing strategies and tools for population management, provide regular training courses for their members, and have population management advisors to assist species coordinators in population planning.



In contrast, if this distribution of regional *ex situ* management programs is compared to Hoffmann et al.'s (2010) geographic distribution of the global patterns of threat to species, there is little overlap. North America, Europe and Australia have comparatively low biodiversity threat levels, while regions such as Central and South America, Africa, South and East Asia, and especially Southeast Asia have high levels of threat. It is in these regions that many threatened species first come into captivity from the wild. The quality of the husbandry, record-keeping and breeding management here, in the first generations from the wild, can have a great impact on the retention of genetic diversity of the founders and on the quality of the pedigree information. This affects the viability and conservation value not only of these range country populations but often also of populations managed outside of the range by AZA, EAZA and ZAA.

Building capacity in studbook keeping and population management in other regional zoo associations should be facilitated and supported as a way to promote the viability of populations within range countries, and ultimately globally through increased opportunities for effective population management. Recent training efforts in these regions by CBSG, ISIS, EAZA and ZAA include population management training for ALPZA (Panama, 2008;

Argentina, 2010); SEAZA (Singapore, 2008); Taipei (Taiwan, 2009); CZA (India, 2010); CAZG (China, 2009 and 2011); PKBSI (Indonesia, 2011); and JAZA (2008 and 2010). As a result of previous training activities, JAZA now conducts regular basic studbook and population management courses for its members, and an advanced training course by CBSG is scheduled for early 2012.

As the conservation need for well-managed, viable *ex situ* populations increases, it will become more important to look beyond closed regional populations and take advantage of the opportunities for increased viability through effective inter-regional and global collaboration and management.

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The Conservation Centers for Species Survival: Breeding Center Partnerships for Sustainability

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Abstract

C2S2 is a group of five AZA-accredited zoos that collectively manage more than 25,000 acres of land devoted to the survival of threatened species with special needs – large land areas, natural group sizes and minimal public disturbance. By combining scientific and management expertise, these centres excel in studying and creating self-sustaining populations of some of the world's most endangered animals. This talk will illustrate the roles and value of large breeding centres and how collaborating with other institutions helps advance scientific study and species conservation, especially for sustaining populations, both *in situ* and *ex situ*.

Conservation Need

One-fifth of all known animal species on the planet are threatened by extinction (Hoffmann et al 2010). Historically, approaches for preserving biodiversity have centered on saving habitat and, by default, protecting species living in these native environments. However, the magnitude of the species crisis now means that all conservation options deserve consideration, including those that can be contributed by our zoological community. Zoos, of course, are active forces for species conservation through (1) animal exhibits and education programs that improve public awareness, (2) raising and distributing funds for conservation, (3) conducting research, (4) providing security (insurance) populations for wild counterparts and (5) participating in reintroduction efforts. Successes highlighting these efforts have included the California condor (*Gymnogyps californianus*), whooping crane (*Grus Americana*), golden lion tamarin (*Leontopithecus rosalia*), black-footed ferret (*Mustela nigripes*), Przewalski's horse (*Equus ferus*) and scimitar-horned oryx (*Oryx dammah*), among others. Every one of these stories depended on intensive collaborations. This is no business for 'lone rangers' or the faint of heart. The effective and efficient recovery of rare animals requires the equally rare capability of resolving enormous complexities – from understanding the often odd and mysterious bio-

logical specialties of each species to having the ability to establish and sustain viable populations. Taking on these challenges requires distinctive resources, especially wildlife experts and scientists, space and a commitment to collaboration.

Managers of animals in zoos and aquaria are confronted with a unique dilemma -- their collections have a finite shelf life, and there is a constant need to perpetuate each species. To be truly successful, zoos need to maintain living collections that are able to withstand or avoid the potential hazards of fluctuating birth and death rates, sex-ratio skews and inbreeding. Almost 30 years ago, zoos pioneered the 'Ark' paradigm where select species would be intensively managed in small, but connected groups until they could be reintroduced into restored wild habitats. The overall aim was to create sustainable *ex situ* populations by institutions sharing and moving animals (sometimes over long distances) to make the best use of available space resources while maintaining a targeted amount of gene diversity. This philosophy led to the development of 'Species Survival Plans' (SSPs) and 'Taxon Advisory Groups' (TAGs), cooperative zoo breeding management programs that eventually expanded to Europe and Australasia.

However, many of these managed programs have failed to become self-sustaining (Lees and Wilcken 2009), an issue that has become a top priority for the Association of Zoos and Aquariums (AZA) and its Sustainability Task Force (AZA 2009). More in depth assessments indeed have revealed that the zoo community has a real and growing problem with its capacity to maintain genetically vigorous and demographically stable living collections. Populations are not always reproducing to replacement levels, and gene diversity is not being retained at recommended thresholds. While the causes are complex, many of the problems appear related to most zoos only having the space to manage a few individuals of a given species. To meet genetic goals, program success generally relies on frequent transfer of animals among institutions for breeding. The expenses and logistical challenges associated with moving stress-sensitive wildlife often over long distances can result in non-compliance with transfer and breeding recommendations. Even in cases of successful translocation, designated mates can be behaviorally or socially incompatible, infertile or unexpectedly die. And, most species are being managed in restricted spaces that are substantially different from conditions found in nature, which can limit development of normal coping and breeding behaviors.

These challenges and opportunities were the major reasons for the formation of *Conservation Centers for Species Survival* (also known as C2S2).

What is C2S2?

Established in 2005, C2S2 is a group of conservation centers that collectively manages more than 25,000 acres of land devoted to the survival of threatened species with special needs (including those requiring large land areas, natural group sizes and minimal public disturbance). By combining their scientific and management expertise, these centers excel in studying and creating self-sustaining populations of some of the world's most endangered animals. Currently

the five participating facilities are the Fossil Rim Wildlife Center, San Diego Zoo Global, Smithsonian Conservation Biology Institute, the Wilds and White Oak Conservation Center. Projects have been developed to take advantage of the consortium's resources, while linking activities to target species in nature. Specific projects involving collaborative research, including the sharing of trainee staff, and cooperation with the U. S. Fish & Wildlife Service can be found at www.conservationcenters.org.

Here, we also briefly share three emerging projects led by C2S2 that may partially address the sustainability crisis for the zoo community.

Cheetah Sustainability and Conservation Program

With the well-recognized need for more space overall, the AZA Sustainability Task Force has challenged C2S2 to explore other management scenarios for wildlife. Working closely with the AZA's Conservation Directorate and Cheetah SSP, C2S2 has committed to examining novel 'models' on how a consortium might help achieve sustainability. One target is the cheetah (*Acinonyx jubatus*), long popular with the public as an exhibit and ambassador for generating funds to support *in situ* conservation. However, the SSP cheetah population is not self-sustaining, in part, because the species best breeds when managed in larger numbers in spacious enclosures. Evidence for this is illustrated within C2S2 which holds approximately one-third of all cheetahs in North America and has produced 55% of the cubs in the past decade.

Discussions are ongoing on how to develop a win-win model, whereby interested AZA institutions make membership donations to a new AZA Cheetah Sustainability and Conservation Program. Those joining this program select a level of membership matching their budget and institutional goals for conservation and sustainability recognition. Different membership levels provide a range of services that meet institutional needs and offer the opportunity to directly support different types and levels of *in situ* cheetah conservation as well as *in situ* or *ex situ* research, all while building a cheetah population that is sustainable for more than one hundred years. Prime breeding animals are beginning to be moved to breeding centers where the chances of reproduction are high, and then cheetahs would be distributed to participating institutions through the SSP. Program members would be assured of continuous access to cheetahs for exhibition and education. Portions of donations would be used to support *in situ* conservation and priority research (identified by the Cheetah SSP), thereby allowing all participants conservation creditability. The balance of the donated funds would be used to partially recover species management costs incurred by the breeding institution. This will begin to address a long-ignored, but serious topic – the 'real costs' of creating sustainable programs for conservation.

Creating sustainable herds sustainably

Because C2S2 institutions have large barn complexes and spacious pastures, we became interested in the value of alternative management scenarios for space-loving hoofed species, especially antelopes. This also seemed timely because ungulates appear especially vulnerable to current zoo breeding programs. First, there has been a loss of nearly 1,000 spaces in AZA zoos for antelopes since 1999, and this decline is projected to continue. Secondly, many of these ungulates live in polygamous herds or harems in nature where one male mates with multiple females. Offspring develop in herds, an adaptation that not only assists in survival, but likely confers social, behavioral and reproductive benefits to young and the population as a whole. This is contrary to most zoo collections that maintain only pairs or a few individual animals/species. Thus, maintaining ungulates in more naturalistic groups may help produce behaviorally-adaptable offspring that can thrive in captivity as well as in the wild after reintroduction. Antelopes, in particular, are at risk. According to the IUCN, one-fourth of all antelopes are threatened with extinction (IUCN 2010). Therefore, it appears timely to examine how managing animals as larger groups, rather than as individuals, influences not only genetic variation, but also the biological quality and robustness of individuals. This project is designed to take a step beyond traditional pedigree based analysis to identify and explore other biological traits, including behavior, health and reproductive factors that contribute to adaptability and resiliency and ultimately population sustainability.

Our targeted species designated for study include: the addax (*Addax nasomaculatus*), addra gazelle (*Nanger dama*), scimitar-horned oryx (*Oryx dammah*) and sable antelope (*Hippotragus niger*). The species were chosen because (1) the conservation priority for them is high, (2) current ex situ populations are not self-sustaining and (3) available zoo spaces for these species are declining. For instance, only a few hundred individuals remain of both the addax and the addra gazelle, making ongoing conservation action a real priority. Using stocks produced by zoos, reintroduction programs for addax and addra gazelle are in place or in discussion for Tunisia and other locales. Similarly, the scimitar-horned oryx was extirpated in nature in the 1990s. Captive born scimitars have already been released into Tunisia, Senegal and Morocco with all these efforts often led by, or aligned with the Saharan Conservation Fund (Iyengar et al 2007). Currently, there is keen interest in reintroducing sable back into Southern Africa. But for these reintroductions to be successful, animals of sufficient quality and quantity must be produced. Working in partnership with the Antelope TAG and respective PMP/SSPs (for breeding recommendations) and 10 other AZA zoos (that will be providing 'control' data), the goal of C2S2's big herds project is to determine the biological quality, cost benefits and resources used when managing these species in large versus small groups. C2S2 institutional space will be used to develop and monitor breeding herds with 'rotating' males as well as bachelor and bachelorette groups for surplus individuals. We are especially keen to determine if a herd management system is better at producing more animals that also are more socially and behaviorally competent, healthier, adaptable and more suitable for reintroduction.

Crane sustainability

Using concepts and aspects of our Cheetah Sustainability and Conservation Program, C2S2 is now collaborating with the AZA Gruiformes TAG, program leaders and interested AZA-accredited interested institutions to provide leadership, scientific management and capacity building to ensure the sustainability and conservation of cranes. Cranes, like cheetahs and most ungulates, are charismatic, iconic species with populations that are not self-sustaining. C2S2 will be focused on two species, the wattled crane (*Grus carunculatus*) and the hooded crane (*Grus monacha*). Similar to the cheetah program, the crane program will allow these species to be managed in a sustainable fashion while generating support for research and *in situ* activities, although not production. We envision various opportunities for 'crane partners', including: (1) direct training to staff from participating zoos in crane management (including assisted breeding), husbandry and research; and 2) advice and guidance about the value and complexities of breeding centers.

Our facilities as conservation landscapes for sustaining native biodiversity

C2S2's focus for managing and recovering endangered species includes maintaining its own landscapes for native and regional biodiversity and wisely managing natural resources. C2S2's collective 25,000 acres includes a portfolio of unique habitats – ecosystems of the longleaf pines and wiregrass in Florida, the chaparral in Southern California, the scrub prairie in Eastern Texas and the eastern hardwood forests and open fields in Southeast Ohio and Northern Virginia. The matrix of pastures, shrublands and old fields for nurturing these endangered species is a significant natural resource in its own range. From its onset, C2S2 has been committed to a collaborative effort of land stewardship that incorporates science based research and education. C2S2's lands are already dedicated for conserving endangered species, and manipulating habitats to enhance the conservation of local biodiversity is a natural extension of the mission.

While used for the maintenance, breeding and recovery of endangered species, these lands also serve as critical habitat for local wild animals and plants. Like many habitats around the world, C2S2's properties are under threat, largely due to habitat fragmentation and invasive species. With a common theme of protecting and restoring indigenous wildlife populations, each C2S2 institution has been conducting a series of land-based and outreach projects in partnership with the National Fish and Wildlife Foundation. Activities have been geared at testing and implementing respective invasive species control measures, monitoring critical 'backyard wildlife, building public awareness about the threats of invasive species and providing information about enhancing native biodiversity. This project is serving as a model for North American landscapes by demonstrating how scientific inquiry can be integrated with endangered species management programs, all while increasing public awareness.

Looking ahead

As demonstrated by our diverse and growing sustainability program portfolio, C2S2 is committed to using its space and experience to explore how priority species can be better managed both biologically and economically, and in ways that complement the interests and responsibilities of traditional zoos. In essence, C2S2 wants to become a means for a national examination of the value of not just the 'breeding center concept', but an assemblage of cooperating, expansive areas across the USA and potentially, around the world. While C2S2 already has a growing portfolio of projects and successes, the consortium is committed to extending its partnerships. Even greater cooperation with other institutions – in the U. S. and abroad – could compliment, not replace the interests and responsibilities of traditional zoos. Wild areas around the world are continuing to shrink, so the skills developed and experience gained at the C2S2 facilities in caring for more intensively managed populations will become increasingly relevant for managed parks in the future. With ever-increasing species needs and ever-decreasing budgets, the timing seems perfect for exploring new ways of working together towards more efficient wildlife sustainability on both a local and national level.

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Reproductive Health and Population Sustainability

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Abstract

Although there may be multiple factors responsible for the current unsustainability of many zoo populations, to be sustainable these populations must be able to reproduce. In an analysis of the seven canid species in AZA-managed programs, we found a higher risk of uterine pathology in females not allowed to reproduce regularly. This condition (endometrial hyperplasia) can cause infertility by interfering with implantation or preventing the uterus from supporting pregnancy. Thus, females not allowed to produce offspring regularly are more likely to become infertile. Endometrial hyperplasia may be widespread in captive mammals as a result of current AZA population management practices.

The problem: Unsustainable populations

Many captive populations are not reproducing at sustainable rates (Lees & Wilcken 2009, Baker 2007). In the U. S. efforts to address the problem have focused on re-structuring AZA-managed programs to facilitate animal management, transfers, etc., to increase breeding success. These factors have undoubtedly contributed to the failure of programs to reach their goals. However, the fertility of animals in these managed programs has not been addressed. Reproductive biologists have the ability to assess fertility and to monitor reproductive processes, but most AZA programs do not incorporate these measures to support breeding recommendations. Instead, programs typically are "outcomes based". That is, young are either born or they are not. If a pair is unsuccessful, new partners are sought rather than working to identify causes of reproductive failure.

Role of the AZA Wildlife Contraception Center

We monitor reproductive health in non-contracepted as well as contracepted animals, to better assess effects of contraceptive treatment. Because contraceptives should be reversible, we also study factors related to fertility. Zoos in the U. S. and around the world report to us about contraceptive use and about any potentially associated problems. It was in response to such reports that we initiated a study with canids in AZA-managed programs, after several zoos contacted us about female red wolves, African wild dogs, and Mexican wolves being diagnosed with pyometra, a potentially fatal uterine infection. Typical treatment for pyometra in the U. S. is surgical removal of the reproductive tract, so even if the female is successfully treated, she is removed from the breeding population. Thus, the condition is extremely serious, regardless of outcome.

What we know about pyometra

The primary contributing cause of pyometra, which is well-described in domestic dogs, is progestin exposure (Noakes 2001, Smith 2006). The source of progestin may be elevated natural progesterone during the luteal phase of the reproductive cycle of a female that has not conceived or from progestin-based contraceptives, such as melengestrol (MGA) implants or Depo-Provera® injections. The risk of pyometra in the domestic dog increases with age, especially in females that experience exposure to progesterone during repeated non-conceptive cycles. Pyometra is more likely to be diagnosed in females 8 years or older, and the rate in dogs 10 years and over is 25% (Hagman 2004).

Precursor condition for pyometra: Endometrial hyperplasia

Normal growth of the uterine endometrium prepares the uterus for implantation and to nourish the embryo. At the end of a pregnancy, the endometrium is shed during parturition; this process can be thought of as resetting the endometrium to “zero”, in preparation for the next cycle. In non-conceptive cycles, the endometrium regresses following withdrawal of hormonal stimulation (estrogen and progesterone), but it may not regress completely. Thus, during successive non-conceptive cycles, there can be incremental, cumulative endometrial overgrowth (hyperplasia).

A progestin-stimulated endometrium, prepared to nourish embryos, provides an ideal growth medium for bacteria. Most cases of pyometra are probably preceded by endometrial hyperplasia (EH); the difference may just be whether bacteria gain access.

Our first concern is for the health of the female, and EH is an established risk factor for pyometra. However, female fertility is also important for inclusion in breeding programs. Data from domestic and lab species show that EH can interfere with implantation and pregnancy maintenance. So, although the original objective of our investigation was to determine whether contraceptive treatment might contribute to the incidence of pyometra, we included an analysis of the incidence of EH in the study to better understand its possible role in reproductive failures.

Survey of AZA Canid SSPs for incidence of EH and pyometra

Species in the study included fennec fox, African wild dog, bush dog, Mexican wolf, red wolf, maned wolf, and swift fox, representing the seven AZA canid SSPs. We requested medical records and pathology reports for all females in these programs. Although the programs had been in existence for varying times, data requests went back at least 20 years. A multivariate analysis of factors possibly associated with uterine pathology was run, assessing in particular female reproductive and contraceptive histories. Contraceptive products used in females in the analysis included MGA and deslorelin (Suprelorin®) implants; some females treated with Suprelorin® also receive megestrol acetate pills (Ovaban®) for two weeks around the time of implant insertion.

The resulting model of relative risk for endometrial hyperplasia or pyometra showed that the highest risk was associated with the number of years treated with deslorelin alone. Intermediate risk was associated with the number of years a female did not reproduce and was not contracepted (i.e., separated from males) and with the number of years treated with MGA implants. Lowest risk was associated with the number of years giving birth (i.e., going through pregnancy and parturition) and with the number of years treated with deslorelin plus megestrol acetate to prevent the deslorelin stimulation phase.

We knew that progestin contraceptives (e.g., MGA implants) can cause uterine disease in felids and likely in other carnivores because of the earlier studies by Dr. Linda Munson (2005). Based on that research, we have been recommending against the use of MGA and other progestins in carnivores for about 10 years. The current contraceptive recommendation is for deslorelin, which was developed for domestic dogs (Trigg et al. 2001).

As a hormone agonist, deslorelin first stimulates the reproductive system before the suppressing it for 6 months or more, depending on formulation and dosage. That initial stimulation can result in ovulation followed by two months of elevated progesterone in canid species. The stimulation phase can be prevented by giving megestrol acetate (Ovaban®) pills for one week before and one week after deslorelin implant insertion (Wright et al., 2001; for more detailed information see the AZA Wildlife Contraception Center webpage at www.stlzoo.org/contraception). As our results showed, although deslorelin alone increases the risk of uterine pathology, prevention of the initial stimulation phase seems to eliminate that risk, presumably by preventing the two-month period of exposure to progesterone that would follow the stimulated ovulation.

Not surprising was the increased risk following treatment with MGA implants, since MGA is a synthetic progestin that can stimulate the carnivore endometrium (Teunissen 1952). However, separation of males and females to prevent pregnancy carried the same risk of uterine pathology as treating with MGA implants.

Perhaps the most important result was that the lowest incidence of either endometrial hyperplasia or pyometra was found in females that gave birth more frequently or that were treated with deslorelin plus megestrol acetate to prevent the initial stimulation phase. However, these approaches are not equivalent, because time to reversal for deslorelin has not been well established and is being studied. Thus, deslorelin treatment may suppress reproduction in some females beyond the desired interval, interfering with the timing of breeding recommendations.

Frequency of reproduction and fertility in other species

Endometrial hyperplasia and leiomyomas (non-cancerous uterine growths) have been documented in female elephants and rhinoceros that have experienced multiple non-conceptive cycles (Hildebrandt et al. 2000; Hermes et al. 2004; Agnew et al. 2004). Similarly, number of non-reproductive years has been associated with uterine pathology and lower reproductive rates in female cheetahs (Crosier et al. 2011, Wachter et al. 2011). In all-female colonies of Seba's bats, that would have undergone repeated non-conceptive cycles in the absence of males, a high prevalence of EH and uterine adenomyosis have been found (Napier et al. 2009).

AZA SSPs and reproductive management

A typical AZA SSP program starts by breeding as many females as possible until carrying capacity or the target population is reached, then reproduction is stopped through separating males from females or by using contraception. Also typical is to delay first reproduction to increase generation time which retains gene diversity, yet both practices may be contributing to infertility in those females. Thus, current management policies may be inadvertently increasing female infertility by not allowing early and regular opportunities for pregnancy and birth.

What we are doing to address the problem

The Contraception Center's Advisory Board is working to select representative species from other major taxonomic groups for similar study to determine how the uterine endometrium of other taxa respond to the cumulative effect of either natural or synthetic hormones. For species identified as being at risk, preventive measures or treatment might be given. However, to assess the efficacy of potential treatments requires methods for diagnosing EH. We are working on a method for minimally invasive, transcervical endometrial biopsy, by adapting a technique successfully used for intra-uterine insemination. If the biopsy technique is successful, we will begin testing treatments in females diagnosed with EH that might cause regression of the endometrium and restore fertility. Meanwhile, ideal reproductive management should space pregnancies to reduce successive, non-conceptive cycles.

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Public Relations for the Saint Louis Zoo's WildCare Institute

R. Eric Miller – Saint Louis Zoo, Director of the Saint Louis Zoo's WildCare Institute

Formally launched in 2004, the Saint Louis Zoo's WildCare Institute is dedicated to creating a sustainable future for wildlife and for people around the world. Initially, the WildCare Institute greatly expanded the Saint Louis Zoo's field conservation activities and has resulted in approximately \$1,000,000 US/year being spent in field programs. These funds came from two sources, a generous endowment from the Saint Louis Zoo Friends Association (now the Saint Louis Zoo Association) and approximately \$350,000/year from the Zoo's Conservation Carrousel. Twelve areas of conservation focus that we call "Conservation Centers" were identified and each was sponsored by a Saint Louis Zoo curator, veterinarian or researcher.

A decision was made early on "brand" the WildCare Institute as part of the Saint Louis Zoo in order to take advantage of the Zoo's 90+ years of history, image and reputation. The WildCare Institute was "launched with a press conference and an interactive exhibit at the Zoo.

Two major concerns arose: 1) that the WildCare Institute would not detract from the Zoo's ongoing activities, and 2) that no tax money was spent outside of the region (which is illegal under our taxing structure). Both questions could be addressed by noting the discrete funding sources – The Zoo Association and the Conservation Carrousel.

A feature of the WildCare Institute's philosophy was collaboration with others, and within 2 years, the Institute had over 180 partners including other zoos, universities, and governmental and nongovernmental conservation organizations. That was also featured by playing active roles in collaborative conservation efforts such as the Madagascar Fauna and Flora Group, the Sahara Conservation Fund and the multi-zoo partnership that maintained the Punta San Juan Reserve for Humboldt penguins.

Marketing the WildCare Institute to members and employees was done in several ways including:

- Stories in each edition of the quarterly zoo magazine that has a 40,000 circulation.
- The WildCare Institute was featured on the Zoo's web site or on its own at www.wildcareinstitute.org. There have been an average of 55,000 "hits"/year for information.
- The WildCare Institute was included on the Zoo's Facebook page which has 135,000 "friends."
- The WildCare Institute was a regular feature on the Zoo's Saturday morning television show.
- An hour long prime-time television special on Grevy's zebra and community conservation work in the Samburu region of Kenya.
- Three short (6-8 minute) videos by a local film company (Beyond Motion) on the conservation and research efforts with avifauna in the Galapagos, mountain vipers in Armenia and Humboldt penguins at Punta San Juan, Peru (the latter one was show as part of the presentation). The film WildCare Institute donated their travel, and Beyond Motion donated their film and production time.
- Signs on the Zoo's grounds were placed in front all exhibits that have animals related to our Conservation Centers. These signs are concise, uniquely shaped so as to be readily recognizable, and talk about what the Saint Louis Zoo and its partners are doing to help protect these species and habitats.
- Each Conservation Center hosted a dinner for donors and featured major speakers from the field in that area. These often coincided with other conservation meetings in St. Louis. Each dinner cost approximately \$15,000. Attendance ranged from 120 for American burying beetles and horned guans to 200 for Grevy's zebras and hellbenders.
- A monthly electronic newsletter was sent to all employees, boards and WildCare Institute Advisors.
- Print materials were produced in the form of a 3-fold brochure, a magazine format, and 1-page hand outs.

Interestingly, our initial concern was that “charismatic megavertebrates” such as cheetahs and zebras would gain the attention and donations for “smaller” species such as hellbenders and American burying beetles would not. However, the latter two Conservation Centers are 2 of our 4 largest Centers for receipt of donor funds (\$100,000+ for hellbenders, \$125,000 for American burying beetles). We strongly believe that in telling an engaging conservation story, we have and can make those species “attractive” to donors and the general public.

In our initial, scientific surveys of the public perception, only 10% of the public was aware that the Saint Louis Zoo was synonymous with the WildCare Institute supporting and performing field conservation. However, by 2008, after the question was reframed to “Does the Saint Louis Zoo do conservation work in other parts of the world?,” the results in all years were that 70% of the Zoo’s 3,000,000 annual visitors were aware. Their stated source of information was signs in the Zoo (60%), Zoo Friends membership (9%), shows on television (8%), “just assume that they would” (7%), and word of mouth (6%). Our initial concern about public awareness of the WildCare Institute’s funding sources were now addressed as only 9% of respondents thought it came from tax funding (the leading answer was private donations at 75%).

In the summary, we hope this presentation will provide assistance to others as we all work to increase the recognition of the field conservation efforts of the world’s zoos. If we could reach 70% of the estimated 700,000,000 visitors to the world’s zoos; that could provide a base of 490,000,000 visitors who would be more likely to pay closer attention to conservation issues and hopefully support them through our institutions or other agencies.

The author wishes to thank Janet Powell, Director of Public Relations and Amy Niedbalski, Manager of Audience Research at the Saint Louis Zoo for their contributions to and support of this presentation.

Alliance for Zero Extinction (AZE) & its Elegant Strategy

Sanjay Molur – Executive Director, Zoo Outreach Organisation, Tamil Nadu, India

Abstract

The Alliance for Zero Extinction (AZE) represents 67 biodiversity conservation organizations, including Zoo Outreach Organisation and its Indian AZE network. AZE strategies target IUCN Red List CR and EN species occurring in a single location, further prioritized by the AZE principles, vulnerability and irreplaceability. According to AZE there are 950 such species in 612 sites, with 19 species in 16 sites within India. Conserving them will promote zero extinctions, habitat conservation, and local stakeholder participation. AZE targeted species are very fitting for both *in situ* and *ex situ* conservation projects including generation of public support and guidance in local and national legislation.

Introduction

The Alliance for Zero Extinction is a relatively new organisation, set up in 2000 and by 2005 was launched internationally. The organisation is composed of nearly 100 NGO's whose goal is to avert extinctions of species. Many organisations claim the same goal but AZE has a unique and elegant system or formula for targeting priority cases.

AZE works to ensure the conservation of species with the highest risk of extinction found in a single location. This is achieved by identifying and monitoring of the site that hosts certain IUCN Red List generated EN and CR species. These species have been prioritized by using the IUCN criteria of irreplaceability (options in space for conservation) and vulnerability (options in time). Priority species have both high irreplaceability and high vulnerability along with the aforementioned single site and therefore take precedence for conservation. The IUCN Red List is used to assist in these assessments.

More about these selection criteria for the site:

- **Endangerment.** An AZE site must contain at least one Endangered (EN) or Critically Endangered (CR) species, as listed on the IUCN Red List.
- **Irreplaceability.** An AZE site should only be designated if it is the sole area where an EN or CR species occurs, contains the overwhelmingly significant known resident population (>95%) of the EN or CR species, or contains the overwhelmingly significant known population (>95%) for one life history segment (e.g. breeding or wintering) of the EN or CR species.

- **Discreteness.** The area must have a definable boundary within which the character of habitats, biological communities, and/or management issues have more in common with each other than they do with those in adjacent areas.

Over 600 AZA sites have been identified of which only 250 qualify as protected areas: in these sites 950 species have been identified comprising mammals, birds, amphibians, some reptiles and conifers. The sites must also be homogenous and manageable for conservation. AZE will develop a "Candidate List" for any areas that are narrowly disqualified or unclear for inclusion. Examples include sites that do not quite meet the irreplaceability criteria, that are not quite threatened enough (VU and DD species) but which are restricted to one or a few sites, unevaluated species, and species with taxonomic uncertainties (including un-described and newly described species). This list will be periodically reviewed so that the best judgments can be made in cases of uncertainty.

There are great advantages in investing in AZE species. We are most likely to lose these species next. We can prevent the extinction crises most effectively. It is the most cost effective way to proceed.

Membership in the Alliance is open to any non-governmental environmental organization that has as a primary purpose the conservation of biological diversity. Zoos should consider taking membership in AZE – it is a “win-win” for zoos. The AZE method is a natural for selection of conservation projects undertaken by zoos, which are changing the image and meaning of zoos. Moreover the data collected through supporting project will add to the global database.

Indian case study

Zoo Outreach Organisation (ZOO) has set up an Indian AZE and is encouraging NGOs in key areas such as the Western Ghats to take up some of the AZE identified species of fish and aquatic plants which were recently assessed under IUCN criteria. ZOO has also taken up a Project.

Zoo Outreach Organisation hosts the IUCN SSC Primate Specialist Group in South Asia, e.g., South Asian Primate Network. There are 43 taxa of Primates in the region of South Asia. Of these, the Himalayan Grey Langur, *Semnopithecus ajax* Pocock, 1928 has a narrow distribution and restricted to a single location, e.g. Chamba Valley of Himachal Pradesh and Jammu & Kashmir in the northwestern Himalaya in India. *Semnopithecus ajax* occurs in pine and alpine cedar forest from 2,200 to 4,000 m. It is folivorous, diurnal, and mainly arboreal (Molur et al. 2003).

Himalayan Grey Langur has been assessed as Endangered by the IUCN Red List of Threatened Species based on its highly restricted distribution (single location), its population size of less than 250 mature individuals and due to threats from human activities in the area. (Groves & Molur 2008). Grey langur is reported to be hunted by local communities and hunting parties from neighbouring areas. The

species is very shy unlike other langurs, due to its avoidance behaviour in human presence, perpetuated by hunting with guns. The species is listed on CITES Appendix I, and Schedule II Part I, of the Indian Wildlife (Protection) Act, 1972 amended up to 2002. The IUCN Red List of Threatened Species recommends that urgent action be taken for conserving this species and paying particular attention to the following areas: survey and establish distribution range, population monitoring and public education. Other priorities include community participation in protecting the species and working with the state forest department to implement holistic conservation management plans for the species and the site.

The Himalayan Grey Langur is one of the 19 species identified by the Alliance for Zero Extinction (AZE) in India. AZE's primary objective is to ensure conservation of species with the highest risk of extinction found in a single location. The IUCN Red List categories of Critically Endangered and Endangered provide important information on the risk of extinction a species faces in the wild. AZE species are those prioritized from within the CR and EN species that are restricted to a single location. These species exhibit the classical combination of characteristics, e.g., irreplaceability and vulnerability, which determine high priority among threatened species that require urgent conservation actions. *Semnopithecus ajax* fits this requirement and due to its dwindling numbers and highly restricted distribution, is a species that requires immediate attention for conservation action.

Of ZOO's several taxon based South Asia Networks the Amphibian Network and the Bat/Rodent Network have selected one amphibian species and one small mammal species that need urgent conservation action, e.g., *Indirana gundia* and *Millardia kondia*. *Indirana gundia* is a small rock frog that occurs only in the Gundia/

Kempholey forest of Karnataka State. *Millardia kondia* is a rat with soft fur restricted to Sinhagad Plateau/Fort in Maharashtra state. Both of these species have a very restricted distribution and are not recorded from any other location. Both are CR according to IUCN Red List criteria. These two lesser-loved species are excellent AZE examples that require urgent conservation efforts that include stakeholders such as locals, forest staff, temple authorities, and many others. Lesser-known small fauna face higher threats due to neglect, which occurs due to their non-charismatic qualities and human ignorance. There are hundreds of such neglected species and projects out there. As zoos have so dramatically improved their image with the enormously successful *in situ* conservation projects, perhaps species such as these have a much better chance of survival.

AZE also runs national alliances in Colombia, Mexico, Brazil as well as India. Read all about AZE at www.zeroextinction.org

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Wildlife Conservation & Animal Welfare Need One Another ... Hence, “Conservation Welfare”

Sally Walker – SAZARC

Conservation biology & animal welfare were once considered two separate disciplines, but in the last few years several symposia and publications have suggested more integration of these two topics. Some examples are:

Symposia / Publications

| Organisation | Event | Publication(s) |
|---|---|---|
| Peter Wall Institute & Universities Federation for Animal Welfare | Interdisciplinary Workshop; Vancouver, Canada, 16–18, Nov. 07 www.interaction.pwias.ubc.ca | Sp. Issue Animal Welfare Journal, May 2010, UFAW, UK |
| Chicago Zoological Society, Institute of Animal Welfare. | 2008, International Workshop zoo and animal welfare scientists | Sp. Issue Zoo Biology Journal, 28:501–506 |
| WildCru, Oxford / Born Free Foundation | Animal Welfare in Conservation Practice, Oxford, UK, 1–3 Sept 2010, | “e-proceedings” on website all PPTs in PDF, http://compassionateconservation.org |
| AZA Welfare Committee | White paper approved | AZA, 2010 |
| Zoo Outreach Organisation | Multiple education workshops over two decades in thousands of schools, zoos, ngo’s, etc. | Educational packets, posters, booklets, Power-point presentations on the topic since about 1989, www.zooreach.org |

Several papers delivered at the workshop held in Vancouver, Canada in 2007 were published by UFAW in the Animal Welfare Journal, May 2008. It was a special issue entitled “Conservation and Welfare” comparing and synthesizing the two fields. Fraser, in an overview article, commented that the output of the UFAW workshop “... showed that many research problems and practical interventions (of wildlife conservation) would benefit from involving animal welfare and recognizing animal welfare concerns.” He also said “...for animal welfare scientists and advocates, the papers call for an expansion of concern to include the vast number of free-living animals whose welfare is adversely affected by human action. He stated that until date, animal welfare scientists had paid little attention to the welfare of free living wildlife”... yet routine forestry, agricultural, pest control measures gravely impact the welfare of wild animals.

Also in 2008, the Chicago Zoological Society Center for the Science of Animal Welfare conducted an international workshop intended to bring zoo and animal welfare scientists together and to promote investigation and assessment of current zoo welfare research. The focus was how the understanding of wild animals could improve zoo animal welfare. The papers from the workshop were published in Zoo Biology.

1–3 Sept 2010 WildCru, University of Oxford and Born Free Foundation organized a 2-day International Symposium entitled “Animal Welfare in Conservation Practice” to debate animal welfare issues in conservation, examine potential synergies, look for practical outcomes and promote dialogue in Oxford, UK. www.compassionateconservation.org

Very recently, July 2011, the American Zoo Association’s Welfare Committee brought out an excellent White Paper entitled “White tigers, lions, and king cheetahs: welfare and conservation

implications of intentional breeding for the expression of rare recessive alleles.” The paper is striking because it unapologetically combines welfare and conservation in its title and throughout the document. This paper makes such a good case against intentional breeding for rare recessive alleles that it has been possible to use it to break through the mind-set of some Asian zoo personnel where the white tiger has been deified both for its godlike whiteness, its uniqueness and (perhaps more than anything) the “heavenly” price it brings on the market.

So there have been enough gatherings and publications about animal welfare and conservation to create a dialogue and extension of the utility of this concept. In October 2010 the Conservation Breeding Specialist Group entertained two sessions of a working group on the need for the welfare group in CBSG, and this was followed in 2011 by the creation of a Task Force on animal welfare under its auspices.

Education & training material

There is plenty of education and training material on conservation for youngsters as well as adults but much less so welfare literature and precious little on this relatively new concept of "conservation welfare". Youngsters need to learn to be kind to animals from toddler to teen and beyond. They need to learn from actual reasons and facts and not just because "it's a nice thing to do." If they learn when they are young and if the reasons for protecting and not persecuting free ranging animals, as well as pets, it has a good chance of sticking to them as they grow into adulthood. One often hears that serial killers tortured animals when they were kids. That alone should justify a mighty effort to instill adequate respect for Life of any and all creatures.

At present the write could turn up NO educational literature at all on conservation welfare except what has been brought out by Zoo Outreach Organisation (Z. O. O). Z. O. O has been bringing out educational literature using the synthesis of conservation and animal welfare as a teaching and training tool to stimulates new thinking about both animal welfare and conservation, as well having the capacity to bring about changes human attitudes and behavior. Suzie Boardman, Director of Twycross Zoo and a well-known animal welfare advocate credits the author and ZOO for first using the term "conservation welfare".

Zoo Outreach Organisation (ZOO) based in India was founded to help Indian and later South Asian zoos improve, including zoo staff and visitor attitudes and behavior towards the captive wild animals. ZOO grew out of Friends of Mysore Zoo (FOZ) founded 1981. Some of the first teacher training, educational literature and educational signage the FOZ developed carried the seeds of conservation welfare. ZOO was

the first to use the terms "wildlife welfare" and "conservation welfare" and to use them in a series of educational booklets, toys, packets and handouts. These have been supplied to hundreds of zoos and NGO's who wanted to educate their visitors and improve animals' conditions. Similar educational materials continue to be evolved, produced and distributed widely in South Asia. Some examples will be discussed further on in this paper.

Intersection of conservation and (animal) welfare

What are the ways that conservation and animal welfare intersect? Some quotes from the symposia, publications and education/training materials are helpful in establishing this.

From the UFAW Symposium published in *Animal Welfare* 2010, 19, ISSN 0962-7286

In preparing captive living animals for life in the wild, concerns for welfare and conservation may collide.

B. Beck, 1995

Since reintroduction programs involve moving animals from captive or wild environments and releasing them into novel environments, there are sure to be challenges to the welfare of the individuals involved.

RR Swaisgood, The Conservation-welfare nexus in reintroduction programs, 2010.

Conservation biology and animal welfare science... many areas of existing or potential overlap. Policies and practices targeting either conservation or animal welfare may not work unless they take account of both areas of concern.

D. Fraser, Toward a synthesis of conservation and animal welfare science, 2010.

From the symposium of WildCru and Born Free, Compassionate Conservation Symposium 1–3 September 2010, Oxford: Animal welfare in conservation: working towards a common goal

Macdonald, et. al. makes a case for animal welfare in conservation in discussing ethics in conservation and describing "the great divide" as Welfare including the welfare of the individual and its right to live and Conservation as conservation of the population (many individuals) and their right to be left alone. Finding common ground will lead to a common goal. David Macdonald, Sandra Baker
Merryl Gelling & Lauren Harrington, September 2010.

Do the means justify the end?
Welfare and the kangaroo harvest

The mission is to foster understanding amongst Australians about kangaroos in a sustainable landscape, through critically reviewing current kangaroo management practices and exploring non-lethal management methods that are consistent with ecology, animal welfare, human health and ethics.
Dror Ben-Ami, 2010

Dealing with interspecies conflicts in wildlife conservation
What measures can be taken to minimize risks to welfare (in conservation)?
The author refers the "Three Rs" or principles of humane use of animals in scientific procedures and suggests two of them for conservation interventions, e.g., Refinement – of protocols and methods in order to minimize adverse welfare consequences and Reduction – involving no more (nor fewer) animals than required in order to achieve the conservation objective.
James Kirkwood, 2010.

Animal Welfare in Zoo Education

Zoo education seems to have steered clear of animal welfare except in very uncreative, repetitious, brief and subtle ways. This is hard to understand because there are so many opportunities at the zoo for a child or adult to have fun messing with the animals and harming them, intentionally and/or unintentionally. Teasing animals, feeding, pretending to attack, shouting, throwing harmful items inside the enclosure or cage is rampant in many zoos. Signage alone is not sufficient to insure these practices stop; youngsters need to be guided before they will willingly give up such a treat as tormenting animals. Combining welfare and conservation can often create a rationale that reaches older youngsters. Even human-animal conflict can be very effectively addressed with conservation and welfare for both human and animal. Some examples follow. The Appendices contain the text of three documents and one document containing a list of topics covered.

Daily Life Wildlife is a concept meant to inspire kids to adopt kindness to the animals which hang around their home, school, roadside, ponds, etc., instead of tormenting them for entertainment. We don't think of what killing flies, torturing frogs, and lighting fires on cat's tails might be doing to kids in the long term. In some countries, even adults don't take it seriously, and the result is kids who grow up thinking that is "right behavior". "Daily Life Wildlife" addresses all minor and some major cruelties perpetrated by so called innocent youngsters on animals we encounter on a daily basis. "Daily Life Wildlife" has been the most popular packet for the longest duration of any ZOO has developed in the last two decades. See **Appendix I**.

Monkey Manners confronts the issue of invasion of monkeys from destroyed forests and barren lands into villages, towns and cities, schools, hospitals, etc. ... where human beings eat and or throw leftovers away. Monkeys quickly become accustomed to this life and morph into very bold and pugnacious creatures that cause enormous angst, as well as a range of

injuries, etc. Human beings cause this monkey mischief ... in countries where locking up garbage and trash is not practiced and rotting food and leftovers are left outside houses for dogs or flies to eat, and they attract monkeys. The Monkey Manners literature explains the mistakes made by human beings and also warns children not to fight the monkeys if they snatch food, or to run from the animals as that will incite the monkeys, and to take responsibility for the problem since the monkeys cannot be expected to do so. Learning how NOT to be attacked by a monkey, how NOT to attract them with food, etc. creates a vacuum in which monkeys hopefully find other forests where they may feed on wild fruits, bark, etc. See **Appendix II**.

Human Elephant Conflict HEC → Human Elephant Coexistence HECx. Much like the Monkey Menace, human beings cause much of the injury and death from elephants themselves. The elephants have been squeezed out of their large range and also done out of their watering and grazing areas. People become enraged at the behavior of the elephant and forget the strength and fury of the elephant. Ultimately human beings, aided by forestry officials, prevail with the elephants getting the worst of it. Many elephants are maimed or killed! Many are killed trying to find water or food. Over all, it is both a conservation and animal welfare issue, despite the fact that human beings are also harmed. Elephant Etiquette explains what human beings should do and not do in cases of marauding elephants. See **Appendix III**.

Conservation Conscious v.s. Conservation Careless. This packet is a complicated one about zoos, differentiating between "conservation conscious" and "conservation careless" zoos. The packet is designed with the idea of teaching people in a wide range of ages to appreciate a zoo, what to do if the zoo is not good. A collection of a dozen large "cards" explains almost everything one should know about a zoo, in order to behave well in it, or to help it as a volunteer, to respect a good zoo, etc. Frequently Asked Questions (FAQs) about different aspects of zoos are frank and to

the point and a card on how to really help a zoo that wants to improve. Only the FAQs are included in the Appendix due to the size of the packet. See **Appendix IV**. ZOO also has brought out a wide range educational material on sloth bears who are used as entertainers by their owners and live horrible lives tramping the hot roads and streets of city and country in India including a teaching manual.

Welfare is no less than the "well-being" of wild animals. The welfare/well-being of wild animals either captive or wild is essential to conservation of wildlife. This is so simple and obvious that it literally goes without saying. Wildlife conservation, however, requires a different kind of welfare than domestic animals – it requires "conservation welfare" which involves a heavy measure of "leave them alone", as well as certain necessary welfare actions. Good zoos and conservation biologists or field practitioners routinely use welfare practices in their keeping, breeding (or not breeding), catching, handling, etc. Ironically "welfare" is still not wholly welcome by all people in the context of conservation, and "conservation" is not welcome to all in the context of animal welfare. *This anomaly can be mitigated if a clear distinction between Conservation Welfare and Animal Welfare is established.*

Good practice

- Good practice of welfare both in the field and captivity is desirable for ethical and humane reasons.
- Good practice is necessary for wildlife conservation which requires physically and psychologically fit animals.
- In the final analysis, what's good for the health and well-being of either captive or wild animals seems good also for their conservation.

Conservation ... saving species, populations, and individuals ... is welfare plus benefits!

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Appendix I

Wildlife Welfare in Daily Life (illustrations removed)

Produced and published by Zoo Outreach Organisation (ZOO) Sponsored by Chester Zoo and UFAW, Text by Sally Walker, Education booklet No#14/2006

What is “Wildlife”?

Definition: “Wildlife” refers to (wild) animals which are not domesticated (in case of plants, not cultivated)

- When we think of “wildlife”, we think of animals that live in the wild or away from human habitation.
- But any free-ranging non-domesticated animal is wildlife (except feral formerly domestic animals).
- Examples are tigers, lions, eagles, butterflies, fish, rodents, bats, lizards, snakes, etc., that one sees in the forest.

What is Captive Wildlife?

- Animals kept in zoos are wildlife, even though they live in captivity.
- Temple animals, although domesticated perhaps, are still wildlife – elephants, monkeys, bats!
- What about frogs, insects, house geckos, lizards, spiders, snakes, crows, etc. that we see around our house and compound. There are also wildlife. We call it “*daily life wildlife*”.

What is “Daily life wildlife”?

- “Daily life wildlife” is a term created by Zoo Outreach Organisation to draw attention to the animals that live close to us that we all take for granted.
- We consider these animals so common that we treat them like objects, as if they didn’t have feelings.
- Youngsters may get a habit of mistreating animals by being careless with the feelings and lives of these animals they encounter on a daily basis.

What is “animal welfare”? Welfare means “well-being”.

Wildlife welfare therefore means the well-being of wild animals *both* in wild and in zoo

Well-being means

- to be free from neglect, abuse, stress, distress and deprivation.
- to have basic needs satisfied, & even to have comfort, happiness, contentment, and general good...

Human Welfare

- Humans give a lot of importance to their own welfare.
- For our own welfare, we often harm other life forms unknowingly and unnecessarily.
- Captive wild animals i.e., animals in the laboratory, zoos, pets often have a hard time when human beings are insensitive.
- Free-living animals also deserve kind treatment to the extent possible.

Why learn about wildlife welfare?

- Wildlife is important to our survival, even daily life wildlife.
- You kids are tomorrow’s adults.
- Good values will not let you down. Practicing good values makes us feel good.
- Learning to be kind to all animals builds good values and prevents other bad habits.

Human activities affect welfare of wild animals in forests:

- Destruction of habitat
- Introduction of diseases through domestic animals
- Hunting / trapping / poisoning
- Disturbance caused by tourism (firing crackers in forest)
- Introduction of inappropriate animals
- Release of chemical pollutants

Cruelty in Daily life

- Killing household insects that could be scooped up and set free.
- Killing or injuring animals that come in or near the house but are harmless (such as frogs, garden lizards, insects, birds, bats, shrews, etc.)
- Torturing animals just for entertainment
- Such animals are not just harmless ... most of them are helpful to us!
- Some animals like mosquitos are pests due to their impact on human health, but they are few compared to the number of useful animals.

Daily life mistakes!

Many of the animals people kill or shoo away play a beneficial role in our lives...

- Frogs, snakes, bats control insect and rodent populations.
- Many insects and some bats are pollinators. They are responsible for one-third of the food we eat and also for flowers and some trees.
- Shrews and other small rodents spread seeds and also eat up grasses that clog waterways.
- Worms break down living material for enriching the soil.

Check your Habits!

- These are bad habits. We just don't think!
- Common sense applies. No need to be fanatical! (You can swat mosquitos).
- Sometimes we just don't know what animals are harmless.
- Cultivate investigation, rather than careless habits.

Daily life wildlife as pets?

- Wild animals — even daily life wildlife should not be kept as pets.
- Not every animal can adapt itself to humans' conditions.
- All animals have some basic requirement that a captive situation can't provide.
- Many wildlife pets become upset and even die of stress and trauma.
- Keeping wild animals can sometimes be dangerous to humans because of their unpredictable nature or disease.

Watching daily life wildlife

- Daily-life wildlife doesn't have to be kept. You can watch them from a distance like a naturalist studying wildlife in the wild.
- Keep a record of the behaviour of a familiar gecko. Does it come in the same room daily? Does it like the wall or ceiling better?
- See how many frogs come into your bathroom in a month.
- Watch ants troop up the wall to get a dab of jelly or other sweet stuff.
- Count the kinds of birds in your compound.

Since we are talking about wildlife... when you go to the zoo

- Don't tease animals in the zoo; they also have feelings.
- Don't throw stones, or paper, or sticks or stones.
- Don't feed zoo animals your food. It is not good for them and could make them sick.
- Watch wild animals at the zoo like you watch daily life wildlife

Appendix II

MONKEY MANNERS! Misplaced Monkey Mischief – How to Handle

Concept and text by S. Walker with help from J. Lenin, S. Paul, S. Molur

Sponsored by Awley Wildlife and People (www.awley.com) and Apenheul Primate Park (www.apenheul.nl)

Published by Zoo Outreach Organisation/South Asian Primate Network

Education booklet number 18/December 2007

Hello! Will you answer some questions? Just answer “yes” or “no”.

- Do you have wild monkeys roving] your neighborhood doing bad things?
- Have you ever had wild monkeys come home, steal food & make a big mess?
- Have you ever been bitten by a wild monkey in a public locality?
- Have you ever met a wild monkey in a park and felt scared?

If you have replied YES to even one question, you need to learn some “Monkey Manners!”

But what ARE Monkey Manners?

Monkey Manners are NOT the bad manners of monkeys, described before.

Monkey Manners are a set of behaviors or actions to be learned by YOU and your friends and family, so that you will be safe from these mischievous relatives of mankind. That’s what this booklet, and this whole packet is about.

“Mind your monkey manners” means] you will NOT act in ways that make monkeys mean.

The monkey problem is NOT because monkeys are mean. It is because human beings are short-sighted. Human beings have not managed other humans, forests and wildlife in such a way that there is enough space for all.

It is now high time we human beings learned *our* “Monkey Manners!”

What are Monkey Problems and their cause?

1. Today – modern times – there is less space between wild animals like monkeys and where people live. Monkeys find it easier to raid crops and eat garbage around homes and other human habitations, in villages, towns and cities, than to forage in a shrinking or crowded forest. Therefore there are a growing number of monkeys coming into human localities.

2. Some places like temples and tourism sites encourage the feeding of monkeys for sake of pilgrims obtaining blessing and for entertaining tourists. Today there are just too many monkeys, and they have learned bad habits.

3. These monkey groups thrive on the easily accessible, rich food and their numbers increase, thus increasing the problem. So Monkey Manners Rule # 1 is Don’t feed monkeys or leave food where monkeys can get it easily.

4. Mischievous monkeys are not popular. Sometimes people try and solve the problem themselves by killing them regardless of their unique type. It is not good for the maintenance of biodiversity as some of the rare unique ones are being killed and shifted in addition to the numerous common ones.

5. Mischievous monkeys destroy crops, creating hardships for farmers and their families. Government panics and uses wrong method to control them, which makes the problem worse.

6. The longer the problem persists, the bolder the animals become through familiarity.

7. Disease can be passed from people to monkeys to people. Such diseases are called “zoonoses”. This is very bad for both people and monkeys.

Things to do as a student, as a family member, & as a concerned citizen

At home, offer to be “garbage monitor”, insuring that garbage cannot be accessed by monkeys or other animals.

At school make signboards telling how destructive it is to feed monkeys and places around areas where this happens.

Encourage your parents, teachers, & their clubs to support the city government purchasing incinerators so that they get rid of garbage entirely instead of simply moving it from one area to another. Also good for controlling rats and other pests.

Things that your government authorities should be doing

Legislators should pass a legal ban on public feeding of monkeys

Municipal authorities should create an action plan for combating monkey menace without harming the animals.

Forest authorities should provide training to wildlife staff to handle monkey menace

Sanitation authorities should check that the garbage is being removed every day.

Temple authorities should find other ways for devotees to satisfy the need to feed monkeys without creating problem monkeys.

Monkey Drama

You can get your neighborhood together on what to do about the monkey problem by conducting a drama or a series of dramas with other kids. Get together as many of the kids in the neighborhood as you can. Divide them into two groups: householders and monkeys. Conduct a drama a day for several days. Use this method to teach the adults what they can do about the monkey problem. Here are some samples... make your own dramas from what you learn in this book.

Day 1: Demonstrate what happens when house-holders are careless with garbage or put out food for stray animals to eat. Show the monkeys demanding more and more food and becoming more and more aggressive. Show them entering houses where the shutters have been carelessly left open.

Day 2: Demonstrate how to wean the monkeys away from living off human houses. You can show monkeys hanging around the trash bins piteously begging and householders acting strong and refusing to give food.

Day 3: Demonstrate how kids should behave around monkeys. Show what happens when you ignore them and what happens when you tease them and give them treats.

Day 4: Conduct a debate between householders and monkeys. Let each give their point of view and figure out what to do.

Day 5: Bring government officials, animals welfare enthusiasts and forester and wildlife officers into the debate.

Monkey see... monkey do... monkey do's... monkey don'ts.

MONKEY-DO's

1. Make a system for holding garbage away from home, so it doesn't attract monkeys.
2. Report destructive monkey individuals and troops to your wildlife department and animal welfare society
3. If a wild monkey troop habitually visits your neighborhood, make your house secure.
4. Avoid being close to any wild monkey or monkey troop.
5. Avoid confrontation for both your safety and that of the monkey

MONKEY- DONT's

1. Don't feed wild monkeys or eat in front of them... in parks, road, at home... anywhere.
2. Don't smile or show your teeth to monkeys – it means “danger” to them.
3. Don't taunt or tease wild monkeys anywhere (ex. offering food then pulling it away).
4. Don't run from wild monkeys... if it threatens, stand your ground with a threat pose.
5. Don't ever try and fight if a monkey grabs something out of your hand.
6. Don't look monkeys directly in the eyes; that can be interpreted as a threat by them.
7. Don't snarl or even smile at monkeys – showing teeth means “hostile” to monkeys.
8. Don't act afraid... that is interpreted as weakness, meaning you are safe to attack.
9. Don't go close to them; don't run up to them or run from them.
10. Don't tease them... for any reason anywhere.

Appendix III

Elephant Etiquette

Compiled and designed by Sally Walker | Illustrations by Shajee Chelad

Sponsored by US Fish and Wildlife Service, Elephant Family, Twycross Zoo, Columbus Zoo, and Schonbrunn Zoo. Typesetting, proofreading and other assistance – ZOO staff
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Lets Look at our Elephant Etiquette for the well-being of elephant and man

Who has not heard of “man-animal conflict” these days? The newspapers are full of reports of domestic cattle lifting by big cats, depredation of crops by wildpig, monkeys invading orchards, etc. The conflict between human beings and elephants has become so pervasive that it has its own acronym, HEC – Human Elephant Conflict.

More attention is given to HEC in rural areas because elephants having been deprived of habitat and food by developmental works, are entering villages and agricultural fields to find eatables in kitchen gardens and fields.

In some countries, however, captive elephants even in cities and towns have their own problems with human beings — in zoos, temples, public roads, etc. Some people don't know how to behave around them, sometimes resulting in injuries or fatalities though no fault of the elephant. The elephant may be punished however.

So, in this booklet, when we talk about Elephant Etiquette, we include all instances of human elephant contact: rural, city, captive and wild. Elephants are big and powerful. Don't risk either injury to yourself or putting the elephant into trouble.

Learn some rules and principles of Elephant Etiquette.

Elephant etiquette means appropriate behaviour with elephants... avoiding confrontations, refraining from annoying them, from exciting them, from goading or tempting them... to put you and others in danger.

Elephants, as such, once lived in completely different parts of the world and in a very different form. They were from Primelephas that will include Loxodonta, mammothus and Elephas. Instead of warm tropical forests their habitat was cold tundra such as in northern North America and northern Eurasia. These elephants have been extinct since 2000 BC and are called Woolly Mammoths. They existed as long as 20,000 years ago.

Elephants today are the subject of much scientific research. Like monkeys, our closest relatives, elephants have very interesting and intelligent minds, with thought and behavior processes which defy explanation.

Today's elephants have many problems.

Human Elephant Coexistence HECx

Many rural people that we met while assembling this booklet seemed to be more “successful” in dealing with HEC. These were people who had adjusted to the elephant presence, who willingly coexisted with the animals and accepted them as part of life. These people seemed to have no more and possibly many less irrevocable tragedies, such as loss of life or limb, than people whose way of behavior was fighting the elephants.

We sympathise with both people and animals in nature, so we adopted human elephant coexistence as our direction in education and philosophy. We have titled our programme “Getting Along with Elephants” meaning Human Elephant Coexistence, HECx.

This booklet is about HECx and the well-being of both human beings and elephants. We do not mean to belittle or dismiss the suffering or seriousness associated with crop and home loss or of the inconvenience and aggravation that adjustment often carries. We simply want to focus on minimizing the loss of life and limb. That is why we include people living in cities where they come across captive elephants at zoos, temples, circuses, etc. Injury and loss of life happens to them also when they behave foolishly around elephants.

Etiquette means manners or people's customs of being polite, or what we call civilised. We don't break the queue; we don't push and shove; we try to be on time for engagements; we don't break our word; we try to speak nicely, etc.

When we speak of elephant etiquette, we don't mean good manners for elephants! We mean good manners, eg. correct behaviour of humans toward elephants. And we define “correct” here as whatever will help you stay alive and in one piece and also keep elephants out of trouble.

Elephant etiquette helps both man and animal to survive. Elephant etiquette is when you agree NOT to act in ways that frightens or angers elephants, tempting them to misbehave.

This is for your well-being and for the well-being of elephants.

Etiquette for Elephants?

Elephants, as are all wild animals, are very unpredictable. Wild animals believed to be tame sometimes injure or even kill their trainers or owners, who trusted them. This is always because, although we know we mean the animal no harm, and the animal may return our love and trust, we can never know what in the immediate environment frightens or threatens the animal. As wild animals, they have a strong survival instinct which kicks in quickly, as if the animal were living in the wild.

Reports of elephants killing people for seemingly small offences don't give the whole picture... the whole picture includes what the elephant sees and does... For example, the elephant may be warning his wayward mahout with a 'slap on the wrist' but – because they don't realise their strength, a slap could hurt or maim.

Fast movements are believed to frighten elephants... it may be the reason behind the belief that elephants are afraid of mice. Rats and mice move extraordinarily quickly and this is probably the reason for the stories of elephants seeing a mouse and running amok.

This information should be useful to us... we should be careful not to make fast or suspicious movements, or sharp loud noises when around elephants, even when they are securely tethered.

Elephant Quiz for people living in elephant areas. Just answer "yes" or "no"

1. Do you like elephants? Can you imagine what it would be like to be an elephant?
2. Do you ever get hungry?
3. Can you imagine what it would be like NOT to have anything to eat in your area?
4. Would you go to nearby areas and try to find food?
5. If people tried to keep you away from food when you were very hungry, would you be angry? Would you fight with them?

Thanks for taking this quiz. Now, if you replied "yes" to any questions 2–5, how do you think an elephant feels?

Elephant Quiz for people living in cities. Just answer "yes" or "no"

1. Would you like to be an exhibit in a zoo, or circus, or temple, to be restrained by a chain or cage and dependent on others for food?
2. Would you like to have people throwing peanuts at you? or to have people pointing and laughing at you? or offering food to you then pulling it back when your reach for it?
3. Do you like it when people deliberately try and upset you to see your reaction?
4. When your schoolmates tease you, or throw things at you, do you simply stand down?

Thanks for taking this quiz. If you replied "no" to these questions, how do you think an elephant feels?

Well, we don't know but it is likely that an elephant may not be able to empathize with a human being or to follow the Golden Rule of "Do unto others as you would have them do unto you." You, as a human being, have an advantage ... you can empathize with humans or animals... if you want to.

Even the most uneducated villagers in some villages we surveyed, empathized with elephants. Several villagers said: "the elephant has a very big stomach but we people with our small stomach get so hungry... they (the elephants) need more food than us. They have to eat." The villagers thus "forgive" the elephants for trying to raid their crops. This is how they adjust.

What causes elephant problems anyway?

1. In contemporary South Asia, there is less space for animals, particularly in rural areas near to forests, where people live. Elephants have been displaced by development... clearing forests by humans. There is less forage and fruit for elephants because human beings are gathering for themselves and their livestock. Elephants maintain their family ties, living in large herds. It takes a big area of forest to provide them with sufficient food and "breathing room" to survive.

2. People have infiltrated forests and collect forest delicacies for sale, reducing the variety and nutritional content of available foods for elephants.

3. The lure of “easy food” from crops, domestic stores, rural markets, etc. is overpowering to the hungry and frustrated elephants.

4. Elephants sheer size and the complexity of their social behaviour cause tremendous difficulties in finding a place to settle. In any case elephants move around a lot but now there is scant space to do so. In zoos and other captive situations, elephants really suffer.

5. Elephants are much more sensitive than people think, in captivity as well as in the wild. Many a visitor to a zoo or other captive elephant site has unwittingly provoked an elephant with some silly behaviour resulting in injury, death or a very bad scare. In the process sometimes the elephant, who just behaved like an elephant, is punished.

Who causes elephant problems?

Some of you might be thinking: “it’s not fair! its not fair for us to have to adjust to elephants. They should adjust to us. They come in our living and work areas and take what they want. It is their fault...” Well let’s look at that.

The problem of HEC is not because elephants are greedy, or stupid or mean. It is because human beings have been shortsighted. We have developed most of the world with houses, industry, public services, etc. so that it is not habitable by large animals. Forests have shrunk because of human beings, not because of tigers or monkeys or elephants. Their number is growing smaller while our numbers are increasing.

We, who as a species had the intelligence to take over the Earth, do not have the intelligence or farsightedness to see that it was wrong. We went on breeding and building. Now we are in trouble. So how is it “not fair” really? If elephants could talk they would say we were at fault... aren’t they right, in a way? If elephants could read history and talk, they could say a lot about that.

Elephant gods and work horses – Temple, camp and farm elephants

Throughout Asia elephants are utilised for temple duty and also heavy duty forest and farm work. Temple elephants are often taken to beg for alms by temple mahouts. Often they are out in hot part of the day without access to sufficient water. As one can imagine, elephants need a lot of water!

Elephants in forest department-owned elephant camps seem to get a better deal than privately owned work elephants. For one thing they live in camps or near the forest and are generally better treated than privately owned elephants. Privately owned work elephants may be used like a tractor without much concern for their welfare. Some of these may be owned by large farms, timber companies, and other commercial entities.

You may come into contact with temple or forest camp elephants. Although chained, they are still big and powerful. Be careful around any elephant.

Entertainment elephants – Zoos and circuses

There are thousands of elephants owned by zoos and circuses. Many of these elephants have very hard lives. Elephants are social, smart and energetic. In nature, they move with a herd and interact with other elephants. They also have challenges such as finding food, dealing with carnivores and man. They spend a lot of time moving around, gathering a variety of foods, bathing, taking care of young, etc.

In a zoo or circus they are normally chained, and in many cases, they are all alone. So from a very rich life of interpersonal relationships and activity, they are lonely, bored and lethargic. Sometimes their mahouts mistreat them, as if standing chained in one place was not enough punishment. Elephants normally live a very long time and it is not unusual to hear of an elephant having spent half a century chained in a small stall or behind a building. Some zoos have seen the light about elephants and as a policy will not even keep them. Other have improved their standards of care quite a lot. Still, elephants on display for our pleasure have had to give up a lot. We owe it to them to behave in their presence and avoid irritating them.

Some Elephant Etiquette (rules) for being “near captive” elephants

Visiting a zoo or circus

- don’t go close to the elephant
- don’t try to give food to moving elephants
- don’t give them food directly; give to their mahout
- don’t touch elephants unless their mahout or keeper is there
- don’t make threatening gestures near elephants
- don’t ridicule or laugh at elephants in their presence
- don’t make loud noises or fast movements in presence of elephants
- don’t run in front of elephants

Visiting a temple

- don’t harass chained elephants; it is a cruel
- don’t try to feed the elephant by offerings. Let the keeper do it.
- don’t go too close or stay too long
- don’t do any of the “visiting a zoo” “don’ts”
- don’t burst crackers at a temple or anywhere near elephants

Encountering elephants in city traffic (Sometimes we see elephants on city roads. Their Mahout or “driver” has to obey traffic rules. If you are also in traffic, think!)

- don't put your hand outside car/bus window to wave to the elephant
- don't try to attract the attention of the elephant from a two-wheeler
- don't offer the elephant food in traffic even if the Mahout say you can
- don't do anything that might frighten or anger the elephant
- don't rev up your engine loud close to the elephant
- don't blow your horn loudly around the elephant
- don't cut in front of the elephant
- don't go close, either back or sides

Suggestions for people in elephant areas from people living in elephant areas

- If you are habituated to doing some activity, and elephants start coming there at the same time, stand down! Do it some other time.
- Don't keep water, smelly food or garbage or fermenting liquors out in the open.
- Villagers of Anaikati village in India say “Don't talk ill of elephants, at least within their hearing. They can *feel* your bad words.”
- Don't leave high smelling garbage around your home.
- Some villagers in Nepal, India and Bangladesh recommended fire to discourage elephants, particularly fire that produces much smoke.
- Other villagers at West Bengal (India), Nepal, Bangladesh said they had various ways of making noise at elephants, such as shouting, whistling, clapping, etc.
- Some Nepalese sing hymns, conduct worship, etc which makes them calm in their mind which also affects the sensitive elephant.
- Villagers in West Bengal, India changed all their habits... they planted paddy during the night, harvested paddy very quickly, and stopped planting corn.

- If you find elephants trashing your house or garden, think before you act. They are bigger and stronger. You can't win a fight. Stand down.
- If elephants are taking something from you, think of its value!. Is it worthwhile to risk your life or your well-being for a basket of coconuts?
- There are many, many suggestions and rules for avoiding or minimising conflict with elephants in villages. The main one is to try and stay out of the way, no matter what.

Give up your rights!

All human beings are very attached to what they perceive as their “rights”. Sometimes if we are very stubborn about our “rights”. It leads us to do foolish things.

Demanding our rights when dealing with elephants is like shaking our fist at a tsunami or tornado, or terrorist attack. In some situations you have to do what is wise and what will help you survive, not what you think you are entitled to!

Imagine a man holding a coconut nearby an elephant. The elephant reaches for the coconut and the man hits out at the elephant, and the elephant hits back. Now, see the man in hospital, bandaged from head to toe still holding his coconut saying “I won!”

Giving an elephant the right of way is usually wise. Demanding your rights in some situations may cost you your life, or your backbone, or your leg.

What good are your rights then?

Appendix IV

Conservation Conscious/Conservation Careless Zoos (Contents only)

1. Why We have Zoos
2. Conservation-Conscious Zoos v.v. Conservation-Careless Zoos
3. Zoo Inspection: Improve Your observational Skills
4. Improvement, not Closure of Zoos
5. Reasons NOT to close a Zoo
6. How to Help? What YOU can do.
7. Pro's and Con's of Zoo Volunteers
8. Principles for Positive Action – How to be a GOOD Zoo Volunteer
9. Drama at the Zoo including Sample dramas
10. Frequently Asked Questions and Honest Answers!

Transport of CITES Listed Species

Andreas Kaufmann – GoWILD KG Zoo & Wildlife Consulting Services

A quick review at the beginning

- CITES entered into force in 1975. Countries adhere voluntarily to CITES but once they do, it is legally binding on them.
- CITES aims to safeguard species from overexploitation and ensure their survival by regulating and controlling the trade in wildlife.
- To move a CITES listed animal from one country to another, one has to obtain an import-, export-, or re-export permit from the respective CITES authorities prior to shipment. The permit serves as proof of a legal transaction.
- However, as a condition of issuance CITES requires animals to be so prepared and shipped as to minimize the risk of injury, damage to health or cruel treatment. The permit is only valid when animals are shipped in compliance with applicable transport regulations.
- Transport regulations want to ensure the animal's welfare while being in transit and avoid high mortality rates.

Are there high mortality rates and if, where do they come from?

According to reports high mortality figures are inevitably related to illegal trade and smuggling of live wild animals. Over a dozen birds from Vietnam were confiscated at Los Angeles airport after airport staff noticed bird droppings on a passenger's socks, and it was only last week a man was caught in French Guiana smuggling live hummingbirds in his pants. Last year a woman tried to smuggle a two month old tiger cub among tiger plush toys from Thailand to Iran. A box full of Kinixys tortoises – although correctly packed – were seized as no import permit had been obtained prior to the import. As we see it works both ways: failing to comply with transport regulations invalidates the CITES permit, and a shipment without a CITES permit invalidates the shipment even if you do comply with transport regulations.

Perfectly legal movements that comply with regulations and standards can also raise issues!

IATA LAR is deemed to meet CITES air transport requirements and shall also be used as a reference for other modes of transport "... where appropriate". Unfortunately it doesn't say when it is appropriate and when it is not! There are still the CITES guidelines for transport and preparation for shipment of live wild animals as a second standard. Needless to say that having two potentially appropriate standards for non-air-transport, leaves you at risk with the inspector's interpretation and preferences. You can't get it right!

There has to be one global standard! The CITES transport working group believe that only the IATA Live Animals Regulations (LAR) can be that one standard.

As the LAR are primarily aiming at air transport, we need amendments, exceptions, deviations,... in some taxa for non-air-transport, and these exceptions need to be compiled into an addendum to the LAR. The respective taxa like elephant, hippo, rhino, ratites,... have been identified, and I'd like to take the opportunity to thank the European Association of Zoos & Aquaria (EAZA), the Alliance of Marine Mammal Parks & Aquariums (AMMPA), the San Diego Zoological Society, the International Elephant Foundation, the Pet Industry Joint Advisory Council (PIJAC), the US Fish & Wildlife Service, the American Zoo Association (AZA), WAZA, and the Austrian Government for their valuable input, help and support!

This addendum might finally become regulations, might become the law!

What do we need these regulations to be? Certainly we do not need the new edition of the 1981 CITES guidelines! As we all know things change, and the first version of the addendum to the LAR cannot be the last one! This is a dynamic process! We need regulations that stay flexible and can be amended and improved easily according to the best knowledge. In order to achieve flexibility you want to use a reference that is under constant revision. So here we are back with IATA LAR! It is the only available transport standard today that is under permanent revision. And everybody can take part in this process. Instead of complaining about regulations there is finally a chance to do something good and right for yourself and the animals in your care.

In case you have complaints about the LAR or find them inappropriate in one respect or another: come up with something better! The Live Animals & Perishables Board (LAPB) of IATA – in charge of the LAR – meets twice a year, and they have even a template for “Agenda Item Submission” which allows you to describe the problem along with the proposed solution. Add some data that support your proposal and mail it to the LAPB Secretary in time. You can even participate in LAPB meetings and champion your proposal that will be discussed in the forum.

There are so many obstacles in the way when shipping animals! Did you plan your shipment thoroughly? Do you have all the required documentation? Various authorities from various countries have requirements of various kinds in you. Given that you can't be prepared for everything, you must be prepared for the obvious and plan your shipment to the best knowledge. There is no excuse for not being informed about weather conditions along the way! There is no excuse for not having an alternative route when traffic is congested! There is no excuse for not having looked up the phonenumbers and contact details of other zoos along your way who will be able to help when things get tough, who can provide shelter, food or medical care when animals get sick!

Did you choose an appropriate transport crate? Can you provide appropriate care, food and water along the way? Will your container actually contain the animals inside? Does the container fit the animal's size? Is the transport safe for animal and attendant? Did you choose an appropriate vehicle for the particular animal(s)? Are your access roads adequate to the size of the transport vehicle? Are all the required equipment for loading of the animals in place and functional? Will all the equipment needed for unloading be in place and working? Will staff be there to help? If you don't know in advance, don't ship! You are under surveillance, and you do get the attention from the public! And you do get the attention from the media! And you do make a lovely story when everything goes well! But, you make it right to the front page when something goes wrong!

On the other hand: if you did not devote your time and attention to the professional planning of the transport, did not double-check and reconcile with authorities, did not check conditions along the way and thus cause a disastrous outcome – you should be on the front page!

The transport working group is still collecting information for non-air-transport, and I encourage you to work with the CITES transport working group! Share your experience and expertise! Share your good and your bad experience! This is the only key to improvement!

Set up a transport working group with your regional zoo organization, have regular meetings where you discuss problems and find solutions. Work with the authorities! Be proactive! Come up with suggestions for amending the IATA LAR and we can accomplish the best possible standard that serves the animals and the industry!

Keep in mind: in the end regulations do not tip the scales and make your shipment a success or a failure. Your actions do!

Project Ocean: Fish Meets Fashion

Heather Koldewey and Jonathan Baillie – ZSL

Abstract

Luxury department store Selfridges and ZSL have embarked on a groundbreaking partnership to bring attention to the crisis facing the world's oceans: Project Ocean was launched in May 2011 with a huge 'retail activism' campaign, including dedicating its famous window displays to marine conservation. This truly collaborative initiative involves 22 NGOs, as well as many other sectors. Selfridges switched to sustainable seafood, produced a seafood guide, and hosted a month of activities in its restaurants and foodhalls. This new approach to raising funds includes an interactive digital window and implementing a marine reserve in the Philippines.

Introduction

Project Ocean saw The Zoological Society of London (ZSL) embark on a ground-breaking partnership with luxury department store Selfridges to bring attention to the crisis facing the world's oceans to new audiences. This conservation-communication experiment involved celebrities, scientists, royalty, youth-group leaders, parliamentarians, heads of state, leaders from the fishing industry, artists and fashion designers. Events ran for over a month and ranged from political forums to live music, celebrity chef demonstrations and children's theatre. This truly collaborative initiative involved 22 NGOs and launched the concept of 'retail activism'.

Project Ocean had three clear objectives:

1. Raise awareness of overfishing
2. Change people's buying and eating habits
3. Raise money and awareness for marine reserves

For the first time in its history, Selfridges committed to stocking their shelves with only sustainable fish. Based on the Marine Conservation Society guidance with support of ZSL and a technical working group of expert NGOs, Selfridges conducted a complete audit of 46 different suppliers and 434 product lines, removing all non-sustainable species by the launch of Project Ocean. A simplified seafood guide was produced which was given away as a booklet in store as well as developed into an iPhone app which incorporated recipes and information from Fish2Fork which georeferences you to the nearest sustainable seafood restaurant. In-store cooking demonstrations and a variety of new dishes in the Selfridges' restaurants encouraged customers to try new, sustainable species and diversify their fish consumption. In collaboration with Fish2Fork, Sustain and Greenpeace, we established the concept of the 'Oxford Street Marine Reserve'. This involved an initial seafood audit of all 150 eateries on Oxford Street and information and support to encourage a transition to sustainable options. At the same time, ZSL did a complete seafood audit and strengthened its sustainable seafood procedures (established in 2007). This was particularly important as the new Penguin Beach exhibit opened during the same period.

The Project Ocean advertising campaign reached a national audience through a wide variety of print and other media. Across London adverts featured on the underground, bus shelters and on the main arterial road into London from the west. A spectacular launch combined Selfridges' quirkiness with some hard-hitting messages, notably the opening speech from HRH Prince Charles surrounded by frogmen with placards and walking balloon art sculptures. A celebrity launch party included a performance by the band Noah and the Whale with sustainable seafood canapés and Project Ocean cupcakes.

The 12 windows along Selfridges' famous facade formed one of the highlights of Project Ocean. Over the main entrance, a slogan developed by Katherine Hamnett of 'No More Fish in the Sea?' was a gathered crowd and generated discussion. The focal messages for each window were developed through brainstorming sessions with ZSL staff and the Selfridges' creative team. Simple interpretation within our zoos is hard enough, but to capture a serious marine conservation message in a shop window for someone who may be walking past chatting on their mobile phone, or glimpsing from a bus was extremely challenging but ultimately effective. One of the most striking windows was a giant panda 'swimming' next to a southern bluefin tuna with the message 'You wouldn't eat a panda'. This illustrated that this tuna species is more endangered (Critical on the IUCN Red List) than the giant panda (Endangered), important when most fish are considered food and not wildlife.

Another window engaged the public in a text petition to change European policy on discards in conjunction with 'Hugh's Fish Fight' campaign (run by celebrity chef Hugh Fearnley-Whittingstall). In terms of impact, 12 million people exposed to the advertising, 4 million people saw the windows on Oxford Street and more than one million people experienced Project Ocean in the London store. In addition, media coverage in over 37 countries reached over 400 million people, with an estimated value of £4million. In addition, the effectiveness of Project Ocean's communication was measured by an MSc student from Imperial College London.

The marine theme extended throughout the store. Consistent messaging on 'Don't eat endangered fish' was used throughout, meaning that people were exposed to Project Ocean whether they were popping in for a new lipstick in a lunchbreak in the beauty halls, or purchasing fresh fish from the fish counter in the foodhalls. A number of artists produced some extraordinary marine-themed art, including a light art installation by Chris Levene and plankton-like balloon sculptures by Jason Hackenwerth. A stunning display of ocean-themed fashion through the ages – including Lady Gaga's famous lobster hat – was curated by Judith Clarke against a backdrop of dead coral skeletons. These corals were part of a 16 tonne Customs confiscation from the early 1990s which has been stored at ZSL London Zoo ever since. The exhibition highlighted the threats to corals through this trade through graphics, a dedicated staff member working on the exhibit and a beautifully illustrated guide.

The focal point for Project Ocean activities was in the Ultralounge. This special exhibit area was used as a flexible space with two permanent installations – a film exhibit by Beth Derbyshire and a stunning collection of 20 live coral exhibits designed, installed and managed by the ZSL London Zoo Aquarium team. Over a two week period, the entire exhibit was constructed including tanks, fil-

ters, theming and the associated infrastructure to the highest standards. The animals displayed showed the beauty, diversity and fragility of corals in a completely novel way, with clever use of lighting and custom-built perspex stands meaning they appeared to float. All were Customs-seized animals that were already part of the ZSL Aquarium collection.

The Ultralounge hosted a variety of NGO events, including diverse events organised by ZSL that profiled our conservation projects (Tidal Thames, Project Seahorse, EDGE Corals) and through partnerships: A youth declaration event with ClientEarth saw school children marching with placards around the store calling for governmental action on biodiversity conservation. With Greenpeace and the Earth Security Initiative, we hosted fishing leaders from the UK, Senegal, Mauritania, Cape Verde and the Pacific Island nations in a discussion evening on the impact of EU fishing fleets on local fisheries. In addition there was a regular series of events each week, with high profile panel discussions each Thursday, bands playing at the Dive Bar each Friday, children's events on Saturdays and film showings each Sunday. The finale, on World Ocean's Day saw ZSL and GLOBE International work with European environmental legislators to produce the Selfridges' declaration to support reform of the European Common Fisheries Policy.

As with the sustainable seafood initiative, Selfridges led by example in promoting marine reserves as its third key objective. Working with the Project Seahorse team in the Philippines, a 50ha marine reserve was implemented by the community of Matabao and endorsed by the local government prior to the May launch date. The team continue to develop this community-managed marine reserve, including constructing a guardhouse, conducting in-water surveys and building community management capacity.

The focus of the activity for marine reserves during Project Ocean was to raise money. Fundraising was achieved through the sale of dedicated products including designer slogan t-shirts, wristbands and pins. A bucking bronco whale ride provided a highly entertaining way to attract donations! One of the store's windows used touchscreen technology to raise funds through text donations that resulted in an egg being laid which hatched into a fish with the name, Twitter and Facebook tags of that individual. This was also hosted on the Project Ocean webpage and iPhone app and gave a running total for donations. Through these mechanisms, £120,000 was raised during the one month Project Ocean launch period. These funds were given to ZSL for collaborative projects that strengthen existing or support new marine reserves. To date, funds have been used to train emerging marine conservationists from the Philippines, Malaysia and Indonesia at our first EDGE Coral Reefs training course. One of the most exciting initiatives emerging from Project Ocean was the initiation of the Marine Reserves Coalition (ZSL, Greenpeace, Marine Conservation Society, ClientEarth, Blue Marine Foundation, Pew Environment Group) which launched a manifesto for marine reserves. In 2012, funds will be used to progress marine reserves in the UK and Overseas Territories through this Coalition, support an expedition to develop the management plan for the Chagos marine reserve (British Indian Ocean Territory), and improve the implementation and enforcement of new marine reserves in Sierra Leone through the Environmental Justice Foundation.

Selfridges' and ZSL have an ongoing commitment to Project Ocean and plans for 2012 are under development.

Forging Public Opinion Or Influencing the Legislator?

Joanne Lalumière – Executive Director, Granby Zoo, Québec, Canada

Abstract

Opposition groups master the art of forging public opinion. In doing so, they also tend to influence the legislators. Animal welfare groups are no exception. In doing so, they undermine the experience and expertise that lie in our community of zoos and aquariums. The 2011 International Zoo Marketing Conference covered topics related to the promotion of conservation actions by zoos and aquariums. This paper will share some results and explore ways to influence public opinion and legislators beyond the keeper talks and education programs.

Legislators are linked to public opinion

It is well known that legislators in a democratic regime are deeply influenced by public opinion on a number of topics and translate a favourable opinion into voting support on elections day.

Opposition groups have mastered the art of communication for a long time and often hold in their ranks skillful professional communicators. By forging public opinion, they tend to influence the legislators. In this manner, protest voices are well organised and powerful and part of their power lies in their ability with words and story telling that usually draw emotions in the public opinion.

It's about managing perception

One of the challenges we face is influencing the perception of zoos and aquariums by our different audiences. Our visitors are already conquered in some way and in this regard, we may consider that we manage what they see and thus influence their perception of our utility in conservation and on the quality of our facilities.

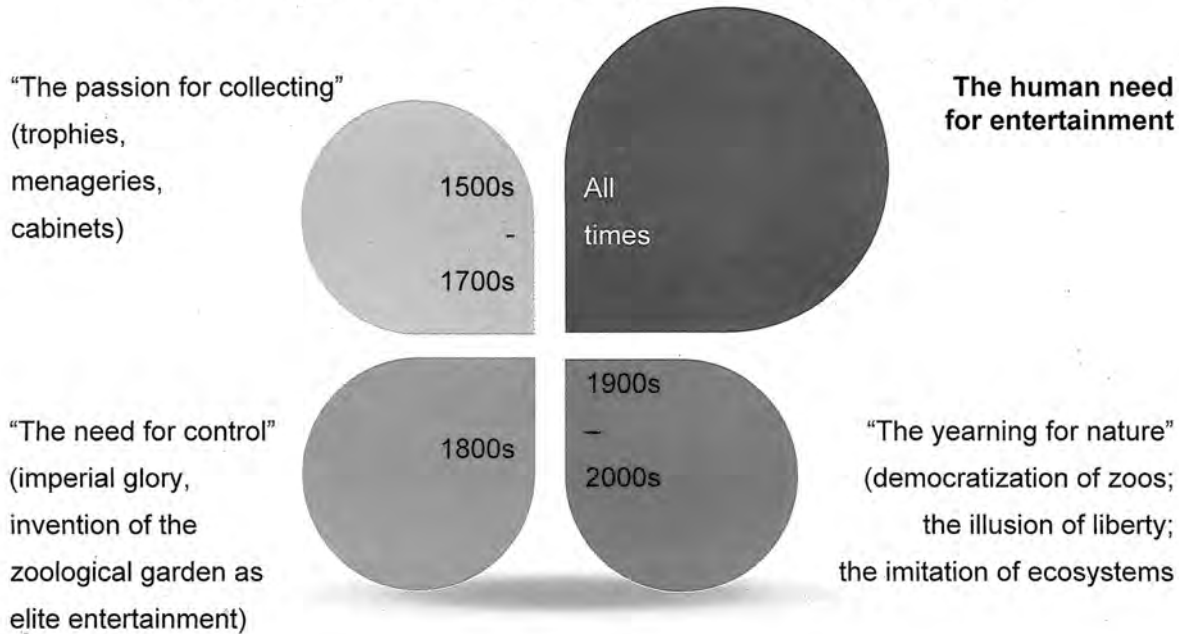
When it comes to the general public, with opposition groups, we can say that we are both in the same arena and have the same opportunity to influence the general public's opinion on our actions and our facilities. This is where substandard zoos have a negative effect. We have a responsibility in raising the bar for ourselves and the whole zoo and aquarium community.

The media love animal stories and we can offer plenty of good animal stories. The animals in our collections create unique opportunities for telling so many good stories on conservation, on reproduction of endangered species, etc. However, protest groups know how to play with all the horror stories they can find or link to our community and in doing so contribute to undermining the great conservation and education work done by accredited zoos and aquariums.

It is also important to actively manage the perception that governments and legislators have on zoos and aquariums as this can influence decision making at many levels that could have significant impacts on our capacity to carry out our missions. Supporters of protest groups are very knowledgeable of this and many have cleverly worked their way into the political arena hoping to introduce legislation that could compromise our work.

It's all about who influences who?

SOCIOHISTORICAL UNDERPINNINGS OF ZOOS AND AQUARIUMS



Based on Baratray & Hardouin-Fugier (2004) *Zoo: A history of zoological gardens in the West.*



Figure 1

Why consider protest voices?

- Because they are not a marginal phenomenon: for instance, the Humane Society has 11 million members and PETA, 2 million members.
- Because of their increased visibility. They appear in TV Shows such as Whale Wars, Animal Cops, know how to master the new information technologies such as the Internet and have carried social media campaigns with a worldwide span. They also use traditional publicity campaigns with TV ads and posters and attract celebrities as spokespersons.
- Because their power has increased in many ways, good as more questionable. Their influencing, for instance, has driven many fast-food chains to introduce more vegetarian products. In other instances, customers have been invited to boycott products. Finally we see governments introducing more and more legislation that limit movements of animals.

- Because they have raised doubt and questions, including among some of our visitors and potential visitors, among the press community, legislators and government employees.

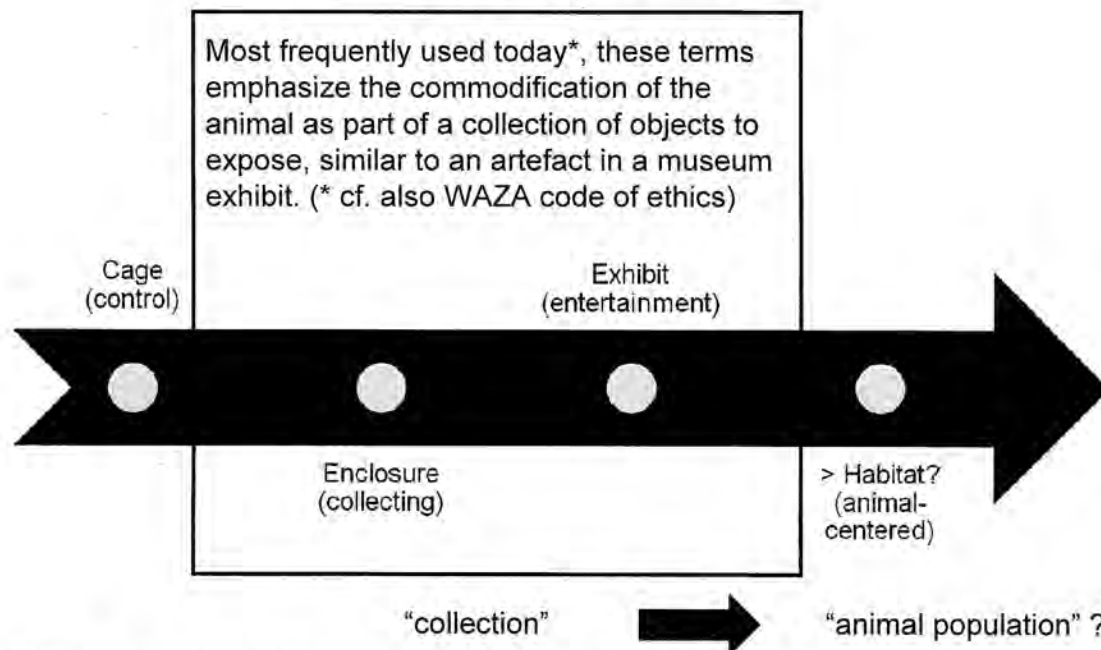
Having said this, zoos and aquariums also have higher visibility opportunities through media campaigns or behind-the-scenes televised docu-series. Social media is also ours for the taking and mastering. Institutions' web sites, Facebook or Twitter accounts can be used to our advantage. Interacting with our visitors on these social media can also be beneficial as they often speak positively about our institutions, our animals, our programs, etc. However we must not forget that with higher visibility also comes more vulnerability and a heightened importance to project a positive image and... walk the talk!

We must not forget that **"perception becomes reality"**.

Socio-historical underpinning

Zoos and Aquariums have come a long way in history and their goals and objectives have also changed over time as simplified in the Figure 1.

REMNANTS OF THE PAST IN VOCABULARY USED



Excerpt from : “Discursively Constructing Zoos and Aquariums: Institutional vs Animalist Voices”, by Andy Van Drom prepared for WAZA Marketing Conference, Granby



Figure 2

Perception today: often a recreational institution

Beyond the influence of our background, if we take a look at how our institutions are perceived, we realise that the recreational institution has outweighed the conservation institution. Andy Van Drom, a University Laval (Québec) professor prepared a presentation called “Discursively Constructing Zoos and Aquariums: Institutional vs Animalist Voices” for the International Zoo Marketing Conference in Granby. Unfortunately, he was not able to make this presentation but his observations are worth sharing. He examined 37 zoo and aquarium web sites to analyse the language used and he observed that zoos are responsible for this perception about their institutions. Here are a few examples of the promotional language used in some WAZA members’ websites:

- “Come and visit [...] Zoo. We have over 1000 animals **on show for a great day out** with the family and kids in [...].”
- “With **so much** to see and do, a visit to [...] Zoo is the **perfect day out** for people of all ages.”
- “[...] Zoo’s mission is for **visitors to enjoy** a unique educational and recreational **experience (adventure)** through close proximity with mainly endangered or exotic animals.”
- The following graph also shows the evolution in time of the mission related vocabulary used by zoological institutions.

See Figure 2.

Problematic situation

These observations about the influence of the past in our language and vocabulary show how we, not intentionally, provide ammunition for animal rights / welfare groups: “Zoos are pitiful prisons” (PETA). This also reinforces the mission of these groups to close down zoos and aquariums and “end the use of animals for entertainment”.

The study showed that emphasis largely remained on “entertainment” and that efforts to provide information related to education, conservation and research were unequal between institutions. The research highlighted some contradictions between messages and practices and also noted that zoos and aquariums do not exploit the full potential of new information technologies.

It seems that for many of us our language is still very much influenced by this socio-historical background. It is not always easy to sell “conservation” but somehow we must find mechanisms to better promote our missions of conservation and education.

Marketing challenges

With such observations about our promotional habits, it becomes more than obvious that marketing conservation is a must and not a luxury. However, and whatever marketing efforts are put in place, many challenges remain. The existence of too many sub-standard zoos is an obstacle that must be addressed by our associations in concerted efforts with local governments. Our community must also remain sensitive to the public’s expectations towards animal welfare and maybe we need to look at a few practices we have in place. Finally, and as mentioned earlier, it is crucial that we master the new marketing technologies as they add to our vulnerability to others forging public opinion on our community.

Marketing strategies

Many strategies were highlighted at the Granby Conference in June 2011, among these:

- How partnerships at the international level raise the profile of WAZA and its members
- How national, regional and international associations can play a role particularly in lobbying efforts
- How to link education and marketing for efficient and compelling messages
- How social media marketing is a must, but requires resources and remains a tool amongst others

Other strategies to consider

When looking at efforts that can be made, it may be useful to distinguish between what can be done at different levels as the actions and targets differ.

At the international level: At this level, we can already appreciate how strategic partnerships raise the profile of WAZA and its members. Another useful strategy would be to promote the value of a quality label, such as WAZA’s Code of Ethics.

At the regional or national level: At this level, associations can play a crucial role in lobbying governments to recognize the value of accreditation processes and consider accredited zoos and aquariums as partners in legislation making. AZA has done a tremendous effort in this regard in the last years and benefits are already showing.

At the institutional level: This is where a lot can still be done and among some actions here are a few:

- Pay attention to the vocabulary used
- Avoid contradictions between messages and practices
- Develop relationships with the local media
- Invite the media to cover aspects of conservation efforts from a documentary perspective
- Be present and active on social media networks and help supporters by providing efficient messages

Conclusion

In conclusion, it is fair to say that a lot has been done but there is still a lot to do!

The Travelling Sex Show

Creating sustainable zoos by creating exhibits that the public will pay to see

**Bernard Harrison –
Principal Partner, Creativity & Design, Bernard Harrison and Friends**

Abstract

The Travelling Sex Show – is a hypothetical travelling zoo exhibit which consists of a range of live exhibits, graphics, video, virtual reality, and motion based theatre and the like – to tell the story of sex, which starts with microscopic exhibits of asexual reproduction and moves through displays of reproduction. It addresses the following issues: the purpose of life and sex; factors that determine sex; courtship; copulation; raising young; the third chimpanzee; and what are males good for anyway?

The Sex Show ends with a final exhibit on humans, reviews our sexuality and social structure, speculates on Oxford geneticist Bryan Sykes's theory of a world without male humans.

The Travelling Sex Show can be a profitable, business venture, funded by a consortium of zoos, which can travel to each venue for a 6-month season.

Introduction

Sex is possibly the most taboo subject in the world, yet we all talk about it and joke about it all the time and are embarrassed about it too. That makes it a great subject for a zoo display!

The British Museum of Natural History ran a six month long exhibition in 2011 entitled 'Sexual Nature' with a separate exhibition charge of £8 for adults and £4 for children. One of many display supplements was a series of short films show Isabella Rossellini acting out the part of a range of animals having sex.

Dr Olivia Judson¹ published a book in 2002 entitled 'Dr Tatiana's Sex Advice To All Creation' and in 2004 she played Dr Tatiana in an adaptation of her book in a series aired on UK Channel 4 and Discovery Canada. In a similar vein, the Australian Broadcasting Corporation aired a 4-part series called 'Sex In The Bush' in 2004.

There are various interpretations on how many classifications of life there are on Earth. One of the latest is the following groupings or kingdoms: Animals, Plants, Fungi, Chromista¹, Protozoa and Bacteria.

For completeness, we would draw examples from all of the Kingdoms, demonstrating asexual and where appropriate sexual reproduction, as well. However there will obviously be a predominance of examples from the animal and plant kingdom.

Display techniques

The idea is to set up a consortium of zoos who are each willing to contribute a prorated share of the set up costs in return for hosting (and charging for) the Travelling Sex Show for about six months. The Show needs to be flexible and utilize some of the existing, out door exhibits in the consortium zoos. Thus if the zoos have a chimpanzee or bonobo exhibit, this would be a good location to site the Show.

Besides existing outdoor exhibits, there can be a variety of indoor exhibits, primarily glass fronted cages (for small mammals and birds) and tanks (for reptiles, amphibians, fish and invertebrates). However, as some of the exhibits will be small or microscopic, other display techniques should be used such as projection microscopes. Also as much of the sexual behaviour that is of interest is almost impossible to show on display, a range of supplementary techniques such as high definition television (of wildlife documentaries from National Geographic, BBC Wildlife, Animal Planet and Discovery), computer generated imagery (CGI), holograms, touch screens and of course graphics can be used. Finally, to add some excitement motion simulators and 3D theatres can also be used.

¹ Chromista, probably rather unfamiliar to many, included the diatoms, kelp and mildew using colourful pigments to capture and store energy from the sun.

It is envisaged that there would be several galleries, each with a different theme. The term gallery is used here very loosely, which could be tent like structure along an existing trail or an existing building. Visitors would enter an introductory gallery: The Purpose of Life and Sex? After this, the layout of the display would depend on the layout of zoo hosting the Travelling Sex Show. It is envisaged that visitors will meander in and out of galleries to view existing outdoor animal and plant exhibits (where their sexual activities are highlighted).

It is also envisaged that the galleries would have the following themes, though more could well be added, or existing ones combined where deemed necessary or appropriate:

- The purpose of life and sex
- Factors that determine your sex
- Hermaphrodites
- Courtship
- Copulation
- The mating game
- Bringing up baby
- The third chimpanzee
- What are males good for anyway?
- A world without men

A short description of each Gallery and some simple and certainly not exhaustive thoughts on factoids² of information that can be disseminated and the display techniques, are set out below:

The purpose of life and sex?

The introductory gallery would address the simple question 'What is the purpose of life' and Richard Dawkins² would be seen on a touch screen talking about the selfish gene. One of his quotes used in the graphics could be:

The Purpose of Life – '*The blind tendency of genes wanting to continue their existence into the next generation*'

The topic of asexual reproduction would be covered here with numerous examples using mainly projection microscopes and high definition video to show asexual reproduction through binary fission, in a range of examples such as bacteria, amoeba, hydra and algae such as *Spirogyra*, spore formation in fungi and fragmentation in plants, corals and sponges. These can be extended to examples of cloning in aphids and female whip lizards (*Cnemidophorus sp.* and *Aspidoscelis sp.*) mating to introduce the concept of parthenogenesis.

Some examples of parthenogenesis in zoos can be illustrated: a hammerhead shark born in Omaha Zoo in 2001; a clutch of Burmese rock pythons hatched at Artis Zoo in 2003 and a Komodo dragon born at Chester Zoo in 2006.

Purpose of sex?

Videos and graphics will explain that animals and plants undergo sexual reproduction to share and generate new genetic material. Sexual reproduction ensures that at least 50% of your genes are passed down to the next generation. It is not as good as 100% image of yourself but it helps them to adapt to inevitable changes in the environment.

Simple sex or conjugation can be illustrated in such projection microscopes displays as with paramecium (*Paramecium putrinum*).

Here it is interesting to show the difference in cloning and sexual reproduction in such animals like tardigrades (*Hypsibius sp.*) and potato aphid (*Macrosiphum euphorbiae*), which switch from cloning to sexual reproduction at the onset of winter or harsh conditions.

² Factoid: defined here as a short and digestible piece of factual information

What determines your sex?

This Gallery explains how organisms create males and females and the fact that males are basically genetically modified females.

There are several ways to create a guaranteed balanced sex ratio, which is important for survival.

Genetically sex determination (GSD)

It is explained that GSD mechanisms have evolved independently in many different genera throughout the history of life on earth to ensure a balanced male-female sex ratio. Mammals, birds, all snakes and most lizards, amphibians, flying insects, worms and some fish – employ specific “sex-determining” chromosomes or genes to determine the sex of the embryo.

The two that are illustrated are the XY and ZW chromosomes.

It is explained that the method we are most familiar with in all mammals is the XY chromosomes, where the smaller Y chromosome of the male controls the sex. Thus it is the sperm that controls the sex of the offspring.

This is as opposed to the ZW system where the ovum determines the sex of the offspring. The males are homogametic (ZZ) while the females are heterogametic (ZW). The Z chromosome is larger and has more genes, like the X chromosome in the XY system. This method is used by birds, some fish and crustaceans, some insects and some reptiles (e.g. Komodo dragon).

Temperature-dependant Sex Determination (TSD)

It will be explained that TSD is thought to be the primordial mechanism that triggers either testicular or ovarian development in the early embryo and was used by dinosaurs and pterodactyls and still by crocodiles, alligators, turtles, some species of lizards and surprisingly some fish. This system relies on the temperature inside the nest – all males being developed at temperatures above 33°C and all females at temperatures below 29°C. In between these extremes, either gender will develop.

It is postulated that global temperature increases during the global warming that occurred 65 million years ago (following the series of asteroid strikes that ended the Cretaceous Period) might have led to a skewed sex ratio and thus a predominance of males in the land dinosaurs, leading to their extinction. Crocodiles and turtles which lived in estuarine waters and river beds, which might have afforded some protection against the more extreme effects of environmental change, gave them more time to adapt. This factoid would be the subject of a 3D theatre presentation.

Hermaphrodites

The previous Gallery looked at how sexes are formed, where as this Gallery looks at hermaphrodites where organisms have both female and male in their body. In some, the predominant sex of the organism can change during their life, while others have male and female organs simultaneously.

There are two basic types of hermaphrodites: sequential and simultaneous.

The Clown fish (*Amphiprion ephippium*) is a sequential hermaphrodite, being born a non-reproductive male, then turning into a reproductive male and finally turning into a female – which is the dominant sex. The giant grouper (*Epinephelus lanceolatus*) is known specifically as a protogynous hermaphrodite, which commences life as female in a harem but eventually turns into a dominant male.

An example of a simultaneous hermaphrodite is the earthworm (*Lumbricus sp.*). Although they possess active ovaries and testes simultaneously, they have a protective mechanism against self-fertilization.

The only vertebrate known to naturally self-fertilize is the mangrove rivulus (*Kryptolebias marmoratus*), a fish that has both testes and ovaries. In some populations, it can become a hermaphrodite, developing both male and female parts simultaneously and essentially clone itself by laying its own, already fertilized eggs. They can also survive out of water for weeks and the fish may hold clues to how their ancestors evolved into land animals.

Of course there would be displays of angiosperms, as 80% of these plants are hermaphrodites. There are many examples that will be shown, the cactus species *Echinopsis spachiana* is a good display as it shows both carpals and stamens, making it the perfect flower.

Live exhibits in tanks can be used here for display, with supplementary touch screen high definition video snippets.

Courtship – choosing a mate

The next Gallery looks at how the male impresses the female, often competes with other males, and eventually entices her into having sexual intercourse and thus spreading his genes. Females normally select the fittest male to spread her genes. And how some females do the same.

There are a range ways males attract females – some birds have impressive courtship displays like the bird of paradise and many of the pheasants. The male of the polygamous bowerbirds (Family Ptilonorhynchidae) decorates his nest with bright objects to entice the female to enter and mate.

Male and female fireflies (Family Lampyridae) use bioluminescence and flash their lights to attract each other, while the male queen butterfly (*Danaus gilippus*) uses perfume, by spraying the female with pheromones during courtship, through the hair pencils extend from its abdomen.

Certain species of balloon fly (*Hilara sp.* and *Empi sp.*) offer nuptial gifts, an insect wrapped up in a silk balloon, to entice the female to mate while she unwraps and eats the gift. Another nuptial gift is the spermatophore (a capsule or mass created by males containing spermatozoa that is transferred into the female's ovipore during copulation). The spermatophore may contain nourishment in which case it would be a nuptial gift. The male Mormon cricket (*Anabrus simplex*), a species of bush-cricket, makes a spermatophore that is 27% of his body weight as a nuptial gift for the female.

Male elephant seals spar for dominance and a territory on the beach where the winner takes a harem of up to 100 females, over which he has almost exclusive access to mate with.

Fertilization – sperm quest

This Gallery examines the actual act of fertilization, be it external or internal...or somewhere in between!

Salmons return to the same river they were born in because they know that it's a good place for eggs to mature. The ocean has far more predators than a stream. The female salmon makes a redd (a shallow in the river bed) where she lays and guards her eggs, while the male fertilizes them externally. Most adults die of exhaustion after mating, but some do return to the sea. This exhibit makes an excellent candidate for a motion-based theatre, which will really illustrate the tortuous journey salmons have to make upstream.

External fertilization is most common in the ocean and many invertebrates and most fish use it. Some species like the Pacific oyster (*Crassostrea gigas*) have separate sexes and broadcast their eggs and sperm into water.

Sperm can be produced in vast quantities; the testes of the male tuberous bush cricket (*Platycleis affinis*) make up 14% of body weight; a human ejaculate contains 180 million sperms; a blue whale releases 1,500 litres of semen in one ejaculation!

But sperm can also be produced in limited but high quality packages. For instance a male fruit fly (*Drosophila bifurca*) produces one 6cm long sperm, which is 20 times longer than the body length of the male. Each male has about 800 sperm in its reproductive tract at one time and it is estimated it releases only 50 per copulation.

Females usually produce much fewer eggs than males do sperm. The vertebrate that produces the most eggs is the sun fish (*Mola mola*) which releases 300 million eggs at a spawning. The male must release a huge amount of sperm!

Internal fertilization

External fertilization is a bit random, that is why so many eggs and sperm are produced. There are a number of different methods organisms have developed for the internal fertilization of eggs, which becomes vital as animals and plants move on to land.

The male octopus (Order Octopoda) has a modified arm called a hectocotylus that deposits a spermatophore in female mantle cavity. The hectocotylus detaches and is left in the female's cavity. In the case of the Paper Nautilus (*Argonauta argo*) the hectocotylus detaches with the spermatophore that swims to female and fertilizes her.

Male spiders have modified pedipalps with bulbous tips that act as syringes to inject sperm into the females' reproductive openings when mating.

Many lizards and snakes have more than one penis, for instance the male garter snake (*Thamnophis sp.*) has two hemipenes, although only one is used at a time.

The monotremes in some ways are more closely related to reptiles than marsupials and placentates. The male echidna (*Megalibgwilia sp.*) has a four-headed penis, only two heads of which are used at each intercourse. Most marsupials except for the two largest species of kangaroo have a bifurcated penis. That is, it separates into two columns, and so the penis has two ends corresponding to the females' two vaginas.

Most zoos have a lion exhibit, so copulation in lions – to induce ovulation – can be illustrated, on high definition video at the exhibit. When a lioness is in oestrus, the male will stay with her constantly, mating may only last less than a minute, but will occur every 15-30 minutes for several days until the cycle is over.

The mating game

This Gallery takes a look how organisms mate and as monogamy is extremely rare in the animal world, how males try to ensure that their sperm is the one that fertilizes the female's eggs.

This can be done in a range of different ways:

- In some species of cuttlefish (Order *Sepiida*) the males 'flush out' the females' sperm receptacle with a squirt of water; others remove other males' sperm using a special spoon-shaped arm, before mating. The male dies after the process of mating and the female usually shortly after laying eggs.
- The penis of male carrion beetle (*Nicrophorinae*) has a spermatophore scoop that it uses to get rid of previous lovers spermatophores.
- Up to 12 male green anacondas (*Eunectes murinus*) may try to mate with the larger female, when she is receptive. The successful male implants a sperm plug or chastity belt of sorts, to prevent other males from depositing the sperm.
- The drone honey bee (*Apis sp.*) mates with a virgin queen in the air and insert his endophallus, ejaculating semen. After mating, the drone pulls away from the queen, ripping off his endophallus that remains attached to the newly fertilized queen. Other drones can remove the endophallus, although it serves as a form of chastity belt.
- In stick insects (Order *Phasmatodea*) the male fights with many others for the right to mate with the female. Once he does, he then mates all night, a convenient way of keeping other males away from the female.

Some animals even tend to the sadomachestic:

- The male bed bug (*Cimex lectularius*) injects sperm into the female's abdomen leaving her with open wounds, which are susceptible to infection.
- The ultimate cleaning machine is surely the bristles on penis of bean weevil or seed beetle (*Callosobruchus maculatus*) clean out competitors' sperm.

Bring up baby

This Gallery looks at raising the young, and some of the quirks in doing so.

Bringing up baby – literally!!! The female gastric brooding frog (*Rheobatrachus silus*) swallows her eggs, then her digestion slows down, she stops feeding and the tadpole develops in her stomach. After six to eight weeks, she opens her mouth, dilates her oesophagus and the babies crawl out. Sadly this Australian amphibian is now thought to be extinct.

The brush-turkeys (*Alectura lathamii*) are birds which build large, communal nests on the ground, made of leaves and earth about 1.5 metres high and up to 4 metres across. The eggs are hatched by the heat of the composting mound which is tended to by the males who by adding or removing material maintain the temperature of the mound at 33–35°C.

Like social insects, the queen naked mole rat (*Heterocephalus glaber*) suppresses breeding in females and is the only one in the colony that breeds.

It is well known that marsupials raise their young in a pouch. It is however less well known that the female giant isopod (*Bathynomus sp.*) also has a brood pouch in which she raised her young.

Ants, bees and carrion beetles are the only insects to raise young. Carrion beetles (*Nicrophorinae*) cover the carcass with antibacterial and antifungal oral and anal secretions, which slows down the decay of the carcass. Although the larvae are able to feed themselves, both parents also feed the larvae digesting the flesh and regurgitate liquid food for the larvae to feed on.

Sibling rivalry

Baby nurse sharks (Ginglymostomatidae) at the age of 5 to 6 months kill and eat each other in the uterus – only the fittest surviving.

In the Kookaburra (*Dacelo sp.*) there is battle for survival between siblings. One chick will fall by the wayside. The tougher brothers and sisters begin by stopping it from getting any food. As the chick gets weaker they begin attacking it. This is kept up until it's inevitable death.

Brood parasitism in the European cuckoo (*Cuculus canorus*) is well documented. Their eggshells are thick to provide resistance to cracking when the eggs are dropped in the host nest. The cuckoo egg hatches earlier than the host's, and the cuckoo chick grows faster; in most cases the chick evicts the eggs or young of the host species. The chick encourages the host to keep pace with its high growth rate with its rapid begging call and the chick's open mouth.

Parental altruism

The female Pacific giant octopus (*Enteroctopus dofleini*) finds a den, seals the entrance in which she lays and tends to some 50,000 eggs. The eggs are strung in lengths of 200 and glued to the roof of the den where she tends to them for 6 months. This involves constantly groom them to prevent bacteria and algae from growing on the eggs. The female also blows water across the eggs ensuring a constant oxygen supply. Once they hatch, the mother dies.

Having mum for dinner is a bizarre show of unconditional love as females hump earwig (*Anechura harmandi*) where the female is consumed by her offspring once they hatch out of the egg, their first meal! This behaviour is referred to as matrophagy.

In one species of the beewolf wasp (*Philanthus basilaris*) sometimes the father ends up as grub for the grubs. After mating, the female lays an egg and places a paralyzed honey bee into a small underground chamber, as future food for the larvae. If she cannot find any honey bees she will sometimes substitute the male beewolf wasp.

The third chimpanzee

In his book by the same title, Jared Diamond³ draws our attention to the very close relationships between chimpanzees (*Pan troglodytes*), bonobos (*Pan paniscus*) and man. (Our last common ancestor lived about 6 million years ago.) This similarity is not only genetical (a difference of 1.6%) but also in our social behaviour.

In chimpanzee society, which is totally male dominated, power is used to resolve questions of sex, there being power struggles between males for dominance and thus the right to mate with a harem of females. In turn alliances are formed to topple the dominant male. This is as opposed to bonobo society that is female dominated and in which male aggression is greatly reduced. Here sex is used to resolve questions of power and subdue aggression and males are less dominant to females in the social hierarchy.

As their closest relative, humans could well have gone the way of the chimpanzees or the bonobos.

We went the way of the chimpanzees!

As with both the chimpanzees and bonobos, man evolved to be polygamous and much of the non Judo-Christian world still practices polygamy³. In fact the institution of marriage is starting to come into question, in the western world divorce rates are up to 50% and there is 76% chance of one partner in a marriage having an extra marital affair. Genetic studies indicate that in many bird couples 10 to 30% of offspring are not sired by the male partner, which is fairly similar to studies in married human couples.

Are humans meant to be monogamous?

This is a question that can be addressed in this Gallery with a dearth of information currently available. And a pertinent quote that can be used by film director Nora Ephron's father is: 'You want monogamy? Go marry a swan!'

And now, through genetic studies, we are finding that even swans are not monogamous!

One bird that ensures monogamy is the Great Pied Hornbill (*Buceros bicornis*). After mating the male seals the female into a nest and feeds her through an opening until the chicks are ready to emerge. Takes no prisoners!

What are males good for anyway?

This Gallery addresses the uses of males, which are rather few and far between! We can find some examples of their usefulness to the females:

The male sea devil, a deep-sea angler fish (Family Ceratiidae) is tiny in comparison to the female and spends most of his sexual life attached to the female's forehead, like a thumb drive, full of and supplying her sperm!

During mating, the female praying mantis (Family Mantidae) often decapitates and eats the head of the male mating her – an intercoital snack?

While the female black widow spider (*Latrodectus mactans*) will usually eat the male after mating. Better than a cigarette after sex? She only has to mate once because she can store the male's sperm then fertilize her own eggs.

Male parenting normally ranges from indifference to infanticide

In the case of lions (*Panthera leo*) the male actively kill cubs that are not sired by them. In several subspecies of baboons (*Papio hamadryas*) the males kill lactating babies to induce quick ovulation in a nursing mother, so she will become sexually available.

However some males are solely involved in the process of raising the young

- Why do some males invest a lot of time and effort to carry the eggs around like the male midwife toad (Family *Alytes*)?
- Incubate the eggs like the King Penguin (*Aptenodytes patagonicus*)?
- Brood and giving birth to them like the sea horse (*Hippocampus sp.*)?
- Raise them in his mouth like the male arowana (Family Osteoglossidae)?
- Care for them after birth like the male rhea (*Rhea americana*)?
- And share the duties of breastfeeding like the male Dayak fruit bat (*Dyacopterus spadiceus*)?

It is to make sure that they are the real fathers and that they raise their own young!

³ There are 49 countries in the world where polygamy is legal

A world without men?

This Gallery explains that Mitochondrial Eve is the hypothetical first woman estimated to have lived about 200,000 years ago, most likely in East Africa, when modern man (*Homo sapiens sapiens*) developing as a distinct human population. Mitochondrial Eve is the source of mitochondrial DNA (mtDNA) for all humans alive, passed down only from mother to daughter. This makes it possible to trace maternal lineage back in time.

Y-Chromosomal Adam is the hypothetical first man estimated to have lived between 142,000 and 60,000 years ago. Paternally inherited, Y-chromosomal DNA is used to trace paternal ancestry.

Prof Bryan Sykes⁴ has a fascinating hypothesis that human male fertility is falling – sperm counts have declined by 20% in the past 50 years and unlike other chromosomes, the Y chromosome cannot repair itself and with continual atrophy will decline to 1% of its present level within 5,000 generations. In which case men will disappear in about 125,000 years!

A world without men?

A wonderfully controversial question and one that evokes a great amount of emotion (especially from men) and debate (especially from women!).

What would be the consequences?

- USA prison population would drop by 97%!
- There would be no more wars!
- Road deaths would fall by 70%!
- Women would not have a decent sex life?

The last exhibit is a high definition TV monitor showing a video of Kaguya, the fatherless mouse (created by a team of Japanese and Korean scientists led by Dr Tomohiro Kono⁵) that had two female parents. They developed a process called haplodisation that removed one of the two sets of chromosomes from some cells leaving them with only one, just like normal gametes. They then created a viable embryo. Kaguya later gave birth to conventionally fathered offspring.

It may thus be possible for two women can have a child who is biologically from both of them from a process of haploidization.

And if so, the final, parting and totally, controversial question:

- Do humans need men in the world anyway?
- But would we want a world without men?
- Close with images of Sean Connery... and George Clooney!!!!!!

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This paper is best read in conjunction with the PowerPoint presentation of the same title made to the WAZA conference in Prague in 2011, which is available for download at www.bernardharrisonandfriends.com media releases.

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