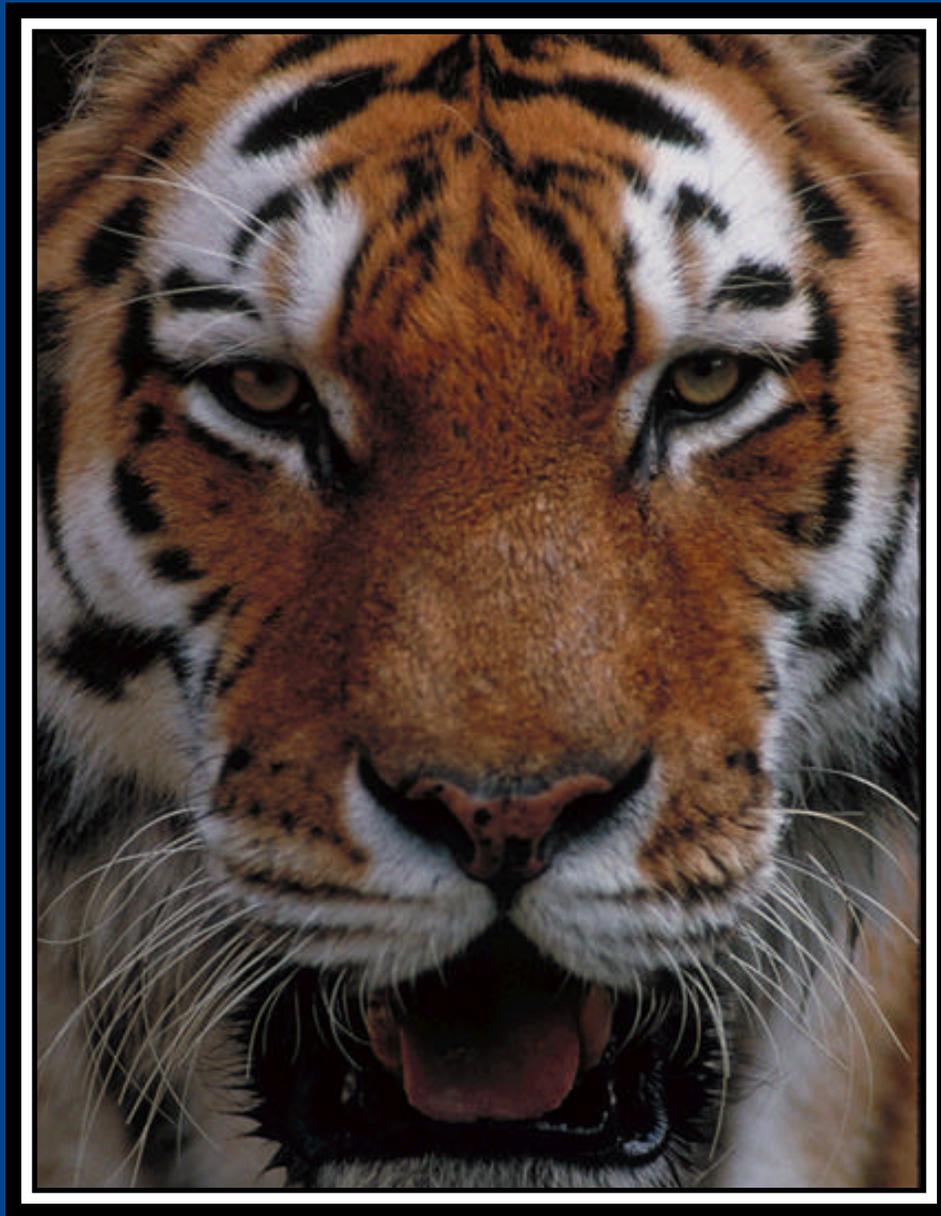


The World Zoo

Executive Summary



**The Role of the Zoos and Aquaria of the
World in Global Conservation**

IUDZG—The World Zoo Organization
and
The Captive Breeding Specialist Group of IUCN/SSC

Conservation Strategy

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Cover: Siberian tiger (*Panthera tigris altaica*). Mike Greer.

Page 1: Black rhino (*Diceros bicornis*). Bruce Brewer.

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Page 12: Simulated African national park in a zoo. Nancy Pajeau.

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Executive Summary of The World Zoo Conservation Strategy

The Role of the Zoos and Aquaria of the World in Global Conservation



Introduction

The World Zoo Conservation Strategy is an initiative of IUDZG—The World Zoo Organization, and the Captive Breeding Specialist Group (CBSG) of the Species Survival Commission of IUCN—The World Conservation Union. Many zoo and aquarium professionals contributed to the contents of the Strategy, and thus, it truly is a document of the global zoo and aquarium community.

The World Zoo Conservation Strategy clearly demonstrates that the zoo and aquarium

community is able and prepared to dedicate its great potential to conservation, and that there is a definite course of action to be followed to this purpose. The primary aim is to support the conservation of species, natural habitats and ecosystems. The many aspects of zoo conservation elucidated in the Strategy are intended to complement and not substitute for other conservation activity. The Strategy strongly advocates integration of zoo conservation efforts with those of other conservation bodies. By endorsing preparation of the World Zoo Conservation Strategy, IUCN and WWF—The World-Wide Fund for Nature, have shown their support.

The World Zoo Conservation Strategy summarizes current views on the role of zoos and aquaria in global conservation. Being a “living document”, the Strategy will evolve over time as conservation needs change and philosophies are further defined. With the release of the first edition of the Strategy it is fully recognized that, while many zoos and aquaria and their organizations have progressed far in their contributions to conservation, others still have much to achieve before they can reach the goals set out by the Strategy. The Strategy anticipates, however, that all responsible zoos will increase their conservation activity, and it provides guidance and support for this process.

Aim and Objectives of the World Zoo Conservation Strategy

The aim of the World Zoo Conservation Strategy is to help conserve the earth’s fast-disappearing wildlife and biodiversity in general. Its main objectives are:

1. To identify the conservation areas in which zoos and aquaria can make a contribution and to determine how these institutions can support and facilitate the processes leading to conservation of the nature and sustainable use of natural resources.
2. To develop understanding and support for the conservation potential of zoos and aquaria from national and international authorities as well as other social and political bodies and organizations.
3. To convince local zoo and aquarium authorities and conservation agencies that presently the greatest purpose to be served by the existence of these institutions is the contribution

they can make to conservation, both directly and indirectly.

4. To assist zoos and aquaria in the formulation of conservation priorities and policies.
5. To indicate how contributions by the individual zoo and aquarium can be augmented through the extension and intensification of contacts in the global zoo and other conservation networks.

To Whom is the Strategy Addressed?

The World Zoo Conservation Strategy is primarily written for:

1. National and international policy and decision makers and local government authorities, who can influence the contribution of zoos and aquaria to conservation.
2. Zoo governing bodies, councils, benefactors and others, who can directly influence and support the conservation policy course of individual zoos and aquaria.
3. Zoo and aquarium professionals, including directors, curators, animal keepers, educators, and public relations officers, who may use the Strategy as a tool to enhance their institution’s conservation efforts and convince others of the need.
4. Other conservation organizations and government agencies responsible for conservation in the wild.

Section 1

Conservation: The Central Theme of Zoos

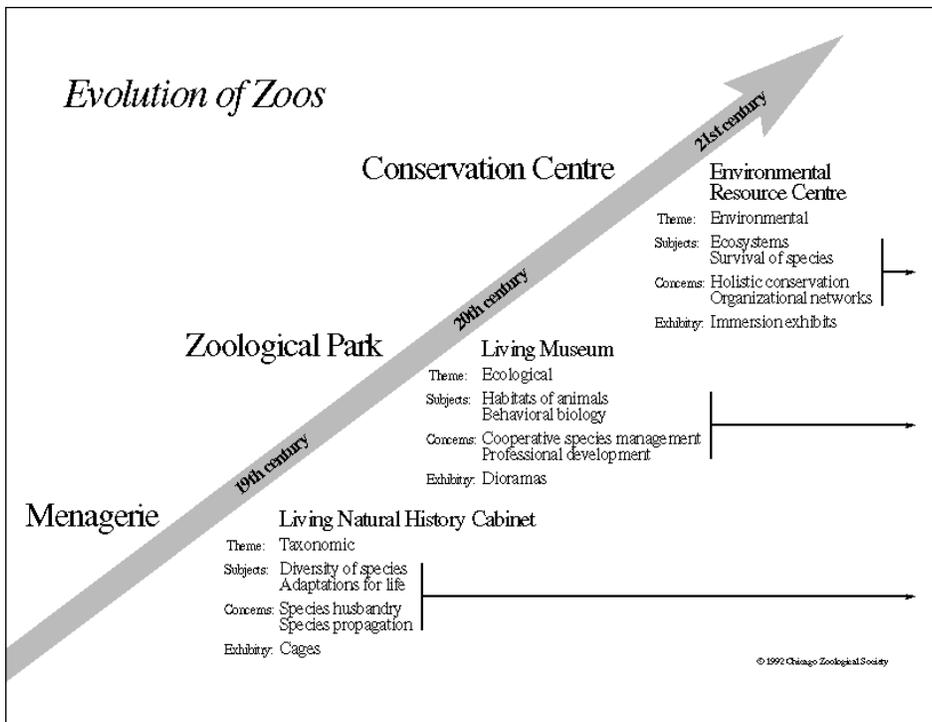
Zoos in a Changing World: Their Evolution Will Continue

Collections of wild animals have been in existence since antiquity. The history of modern zoos, however, started some 200 years ago with the creation of the first public zoos. Since that time large numbers of zoos have been established in all parts of the world, and a great diversity has arisen among these institutions, which now vary from zoos with general collections to specialized institutions such as aquaria, bird-parks, primate zoos, and safari parks. The World Zoo Conservation Strategy refers to all of these zoological institutions as “zoos”.

Great changes have taken place in the world since the establishment of the first public zoos. Changes in human society include an increase in the amount of free time and an ele-

vation of the overall educational level. An enormous gain in knowledge of all aspects of life has occurred in the biological sciences. But, at the same time, there has been, and still is, an ever-increasing threat to species, habitats, and ecosystems throughout much of the natural world. These and other changes, have had far-reaching consequences for zoos, which have evolved accordingly from menageries into highly complex, professionally managed zoological parks.

The World Zoo Conservation Strategy concludes that this evolution of zoos should continue. Caring for our planet’s biological systems is one of the greatest challenges to humankind. Consequently, conservation is being seen as the central theme of zoos, and zoos should thus further evolve into conservation centres. The leading zoos have already taken the first steps on this path; many other zoos should be stimulated, guided, and helped to follow.



Zoos are rapidly evolving to serve in multiple ways as conservation centres. The horizontal arrows indicate that professional capacities of concern and subjects communicated to the public in earlier phases of zoo development are now vital services to conservation. As conservation centres, zoos must additionally address sustainable relationships of humankind and nature, explain the values of ecosystems and the necessity of conserving biological diversity, practise the conservation ethic throughout zoo operations, and cooperate within the world zoo network and with other conservation organizations. Immersion exhibits involve zoo visitors in the environmental circumstances of the animals, and such experiences are conducive to favourable reception by visitors of strong conservation messages.

The World Conservation Strategy: Zoo Initiatives Will Help Achieve its Goals

The World Conservation Strategy issued by IUCN, UNEP, and WWF in 1980, its successor *Caring for the Earth* published in 1991, and various related documents, as well as the *Convention on Biological Diversity*, have provided the impetus for the formulation of the role that the zoo community will play in conservation. These documents urge sustainable use of the earth's natural resources and biodiversity, and establishment of a new equilibrium between human societies and the natural environment.

The World Conservation Strategy emphasizes that there are three major initiatives by which the zoo community can help to achieve these goals:

1. By actively supporting the conservation of endangered species populations and their natural ecosystems.
2. By offering support and facilities to increase scientific knowledge that will benefit conservation.
3. By promoting an increase in public and political awareness of the necessity for conservation, natural resource sustainability, and the creation of a new equilibrium between humans and nature.

These objectives will provide the basis for the mission statements of all zoos that will play a role in reaching the goals of the World Zoo Conservation Strategy.

The Global Zoo Network: Great Potential for Conservation Efforts

Although there are many more institutions that could come under the term “zoos”, the Strategy is directed primarily at the more than one thousand zoos that are organized in zoo associations. Such associations exist at the national level in many countries throughout the world, and at a regional level on several continents and subcontinents. At the global level, IUDZG—The World Zoo Organization, represents the zoo community. The zoos participating in this network have demonstrated a desire to work together in a structured manner towards a common future, and thus form the basis for further developments in the framework of the World Zoo Conservation Strategy.

The global zoo network is unique in two ways. Firstly, collectively the zoos of the network are visited annually by at least 600,000,000 people (approximately 10% of the current world population). This number of visitors is unequalled by any other group of public, conservation-oriented institutions. Secondly, zoos form a network of public institutions which—in numerous countries, cities, and urban areas of the world—focus on living organisms and nature from all parts of our planet, instead of concentrating only on local or regional conservation issues.

The enormous numbers of people reached by the zoo network, coupled with the global perspective in which each individual zoo presents the elements of nature, results in great potential for global conservation through the zoo network. The World Zoo Conservation Strategy therefore advocates further development of this network and strengthening of all ties within the zoo community as well as links between the zoo network and other conservation organizations and initiatives.

Section 2

Education: An Essential Conservation Task

The sheer mass visitation to zoos makes them excellent institutions to increase public awareness of the irreplaceable values of nature. Education is therefore an essential conservation task of zoos.

The living animals that attract the visitors form the basis for zoo education. They provide a unique harmony between the recreational purpose of a visit to the zoo and effective education. The attractiveness of living charismatic animals serves as a starting point to stimulate the visitors' interest in the subtle relationships and balances of the living world.

The zoo public is not only large, but also broad in its composition, including all levels and sections of society. Informal zoo education therefore should be directed towards widely diverse groups, not exclusively towards children. People from a variety of educational institutions take advantage of zoo facilities and thus form specific target groups for formal education. Such educational institutions range from nursery schools to universities.

Because of the diversity of audiences for zoo education, great skill, creativity, and inventiveness is required of zoo educators, as is the use of a wide variety of educational techniques. Consequently, zoo education must continue to become a profession in its own right.

An inexhaustible array of biological and other themes can be explained through zoo education. These include classic themes such as ani-

mal adaptations, behaviour, reproduction, and nutrition, but also more complex subjects such as evolution and ecology. Conservation themes are of special importance in zoo education programmes. Zoo programmes can explain how easily the subtle balances in natural habitats and ecosystems are disturbed by human interference, and the connections between human consumption and lifestyle and the survival of species and biological systems. Species and habitat conservation projects and research activities conducted by zoos offer living illustrations for zoo conservation education, and form direct links with the practise of conservation.

The World Zoo Conservation Strategy concludes that zoo education programmes deserve strong support from authorities and conservation agencies. However, the Strategy specifies a number of important conditions for good education in zoos, such as the necessity of a professional approach, knowledge of composition and motivation of the zoo public, the adoption of a clear-cut educational plan for the zoo, and the use of evaluative techniques. The maintenance of high standards of animal housing and husbandry, resulting in optimal well-being and natural behaviour of zoo animals, is also crucial to effective zoo education. Additionally, exchange of educational knowledge, information, and expertise between zoos in all parts of the world will enhance the effectiveness of the global zoo network for conservation education.

Section 3

Species and Habitat Conservation: Direct Zoo Contributions



Zoo Animal Collections: Basic to All Zoo Conservation Tasks

It is estimated that the thousand-plus federated zoos of the world collectively house some 1,000,000 animals, predominantly higher vertebrates. An increasing proportion of this total number is made up of individuals belonging to endangered species. The World Zoo Conservation Strategy encourages zoos to dedicate more of their space to such species, and to register all individual animals with ISIS, the International Species Information System.

Responsible zoos base their animal collection plans on conservation objectives—including education, research, and species conservation—while clearly considering animal welfare issues. In several parts of the world, national, and regional zoo associations have started processes to coordinate collection planning of member zoos. The Strategy advocates eventual globally coordinated fine adjustment in the planning of all zoo collections.

Living animal collections are basic to the conservation tasks of zoos, and these collections themselves can only be conserved by guaranteeing satisfactory longevity, propagation, and welfare of individual animals. Knowledge of wild

animal husbandry has increased greatly in recent years, resulting now in the need for populations of many species to be regulated by cooperative zoo efforts in order to avoid over-population. Collective efforts are also required to exchange accumulated husbandry and reproduction knowledge and experience for species that do not as yet breed optimally in zoos.

Although zoos have progressed far, and will continue to support the establishment of stable captive populations of the species they keep, the acquisition of animals from the wild is important under certain conditions, particularly when necessary to the survival of species disappearing in nature. Animals should be removed from the wild only if this, in one way or another, contributes to the long-term survival of these species, especially in their natural habitats. Furthermore, collection of wild animals must always take place in agreement with the responsible conservation authorities. The World Zoo Conservation Strategy takes the position that the commercial trade in animals taken from the wild should cease as soon as possible as a source for acquisition of zoo animals.

Ex Situ (Off Site) Conservation: Supporting Species Survival in the Wild

Apart from maintaining animal collections as a basis for zoo education and research, zoos can also directly contribute to preventing of extinction of endangered species. This is accomplished by propagation of populations of such species *ex situ* (off site—away from their original natural habitat). *Ex situ* conservation is not an alternative for, but rather is complementary to conservation of those species in their original habitats (*in situ*, or on site). Consequently, *ex situ* zoo populations should be managed so as to support the survival of species in the wild. In accordance with the IUCN *Policy Statement on Captive Breeding* (1987) and the *Convention on Biological Diversity* (1992), the World Zoo Conservation Strategy asks for strong support of *ex situ* conservation programmes from the zoo community

as well as from authorities and conservation agencies where such programmes are shown to be in the species' best interest. In an increasing number of cases, *ex situ* populations are crucial components of species survival.

Risks of genetic degeneration and domestication can be minimized by cooperatively managing *ex situ* zoo populations according to strict guidelines. Population management guidelines are directed towards retaining as much of the original genetic variability as possible. Populations properly managed can serve as valuable genetic reservoirs for species survival in nature.

Small population management theory has advanced significantly during the past decade, and is being continuously refined. Tools for population analyses are available in the form of textbooks, sophisticated population management software, and computerized animal record databases (such as the ARKS system, used by over 400 zoos, and the International Species Information System, ISIS). Population management practises are organized in regional breeding programmes. These have been, or are being, developed in all major regions of the world. Currently, there are regional breeding programmes for over 300 endangered species. The World Zoo Conservation Strategy calls for further increase in the number of such programmes. National and international authorities are asked to facilitate legal transfers of animals within the framework of *ex situ* programmes aimed at supporting propagation and at minimizing loss of genetic variability and other unwanted effects.

The Captive Breeding Specialist Group (CBSG) of the Species Survival Commission of IUCN forms a link between the World Conservation Union and zoo-based *ex situ* species conservation. It acts as a catalyst in breeding programme development and facilitates global coordination of regional programmes. Furthermore, it enhances liaisons between zoo programmes and the *in situ* conservation activities of IUCN, the SSC's many specialist groups, other international conservation organizations, supranational authorities, and governmental agencies. Such liaisons should be developed as much as possible.

Liaisons between *ex situ* and *in situ* conservation efforts are expected to become of ever greater importance: captive and wild populations of endangered species may have to be managed interactively and then should be considered as components of “metapopulations”. Species survival will come to rely on cooperation between all parties involved in *ex situ* and *in situ* conservation, and on recognition of the interdependency of their conservation efforts and the need for their mutual reinforcement.

Capacity: Space Limitations Require Careful Choice of Species

Depending on species-specific parameters, a population of 250 to 500 individuals is required to maintain sufficient genetic variability for a period of at least 100 years. Based on the approximately 1,000,000 animals living in the 1,000 organized zoos of the world, and assuming that half of the available space in these zoos will be available for animals in *ex situ* breeding programmes, it is estimated that the zoo community can maintain healthy populations of 1,000 to 2,000 endangered species. The number could be increased if a higher proportion of space is used for endangered species, if more zoos join the global zoo network, or if private breeders of endangered species participate in breeding programmes and abide by the cooperative rules.

Nevertheless, space is very limited and careful choice of species for *ex situ* conservation support is required. Firstly, the conservation community should determine which species would benefit most from support by *ex situ* programmes. The Captive Breeding Specialist Group has developed techniques for this assessment, and other IUCN specialist groups and conservation agencies are called on to give strong support to CBSG’s efforts. Secondly, zoos should determine which species they can best maintain and breed, and which species are likely to raise public consciousness through zoo education.

Conservation needs and zoo strengths should be combined in the formulation of

Regional Collection Plans (RCPs) that identify which endangered species will be supported by *ex situ* breeding programmes of regional zoo associations. Global attunement of regional collection plans will lead to Global Captive Action Plans (GCAPs) for all major animal groups likely to be held by zoos.

Obviously, the careful choice of which species will benefit most from zoo-based breeding programmes requires lengthy consideration. At the same time, prompt action must be possible in cases where quick rescue operations are the only possibility for survival of critically endangered species.

Although the total number of species whose survival can be directly supported by *ex situ* programmes is limited, the World Zoo Conservation Strategy emphasizes that the impact of this contribution on conservation is much greater than the raw figure of 1,000 to 2,000 would indicate. Sometimes the species concerned are key species in their habitats, and their conservation is crucial to hundreds or even thousands of other species in the same environment. More often, species involved in *ex situ* programmes can serve as flagships, raising considerable public interest in the conservation of the natural areas from which they originate.

Artificial Reproduction and Cryopreservation: Biotechnology in Support of Conservation

The use of techniques for artificial reproduction may one day enhance the management of *ex situ* populations, and can aid in the retention of maximum genetic variability. Various pilot studies have shown that techniques such as artificial insemination and embryo transplantation can be applied to several vertebrate groups. Much more research is needed, however, to explore the full range of applications of these technologies for species conservation.

Cryopreservation of gametes and embryos may also be used to great advantage in

species conservation programmes. Banks of frozen germplasm can serve as genetic reservoirs, and can act as a third component of species conservation, with *in situ* and *ex situ* populations being the other components. As with artificial reproduction techniques, much research is needed before the advantages of cryopreservation can be fully used for the conservation of a wide range of endangered species.

The World Zoo Conservation Strategy calls on all involved parties to intensify exploration of artificial reproduction and cryopreservation as techniques for supporting species conservation. It also calls for an integrated use of cryopreserved genetic reservoirs in *ex situ* and *in situ* population management strategies. Yet the Strategy cautions against an overestimation of the value of cryopreserved genetic material. Living populations—*in situ* as well as *ex situ*—are essential to preserve non-genetic learned behaviour patterns, for these may be crucial to species survival. Thus, deep frozen genetic material is useless without living populations. Zoos are called on to use all knowledge and skills available to preserve crucial natural behaviours in *ex situ* populations.

Back to Nature: Zoo Animals for Reintroduction and Restocking

Ex situ zoo populations can directly support the *in situ* survival of some species by providing the nuclei for re-establishment or reinforcement of wild populations in nature.

The World Zoo Conservation Strategy emphasizes—in accordance with the IUCN position statement on *Translocations of Living Organisms* issued in 1987—that such reintroductions and restocking projects, when properly applied, can bring great benefits to natural biological systems. Careful consideration should, however, be given to genetic and behavioural quality of animals for reintroduction, to preventing transfer of pathogens and parasites to natural areas, and to mixing of subspecies through

reintroduction. Additionally, factors threatening reintroduced animals should be eliminated from reintroduction areas, and the carrying capacity of such areas should not be exceeded.

Reintroduction and restocking projects have been undertaken with more than 120 species. Fifteen of these reintroductions have resulted in the establishment of self-sufficient populations to date. Many projects, however, are still in too early a stage to assess their outcome, and techniques are rapidly improving. The World Zoo Conservation Strategy emphasizes that well prepared and managed reintroduction and restocking projects are of crucial importance to gather knowledge and experience for future efforts. Scientifically based projects therefore deserve full support of the zoo community, IUCN/SSC specialist groups and conservation authorities. Such projects are not likely to be successful within only a few years; rather they require long-term commitment of all parties involved.

Zoos will not be operating independently in reintroduction and restocking projects. Instead, cooperative groups of zoos will act as suppliers of animals, with studbook keepers and breeding programme coordinators of the relevant species being actively involved in this process. Animals will be supplied on a sustainable harvesting basis, and a genetically and demographically healthy zoo population will be retained for possible future projects. Projects will always be carried out in agreement with IUCN guidelines and within regulations of the conservation authorities of the recipient countries, as well as in cooperation with IUCN/SSC specialist groups and other conservation agencies. Reintroduction projects can often benefit habitat and species protection through careful public education and publicity.

Section 4

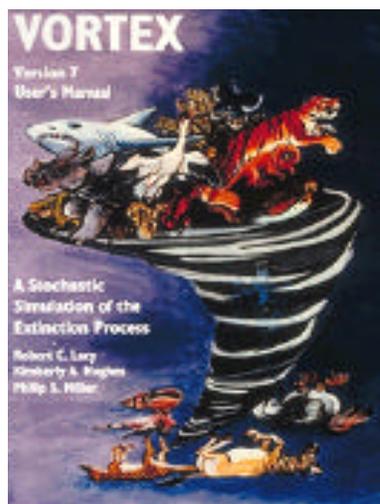
Knowledge and Research: Crucial to Conservation

Zoos have always been, and continue to be, great potential sources of basic scientific knowledge. All zoos are encouraged to make their animal collections available for ethically responsible research endeavours. The scientific community is encouraged to make good use of the facilities zoos offer.

Proper management and conservation of zoo collections and *ex situ* populations require extensive scientific knowledge in a wide range of biological and veterinary disciplines. Much knowledge has been accumulated over the past century, but still more needs to be acquired through scientific research. As the average zoo has only limited staff to undertake research, cooperation with research institutions, universities, and nature conservation agencies should be sought. Zoo authorities and research and conservation bodies are called on to increase financial contributions for zoo-based research.

In view of limited research resources, the zoo community must identify research priorities. Individual zoos, zoo associations, breeding programme coordinators, and regional breeding programme organizations all have a role to play in this process. The Captive Breeding Specialist Group of IUCN/SSC will assist in integrating research action plans.

The World Zoo Conservation Strategy encourages the establishment of banks of research material and databases of research data in order to enable more effective zoo research. In addition to being published in scientific books and periodicals, research data should be made available to zoos in an easily accessible form in order to ensure the best practical use of such data. Data should not remain in internal reports, but should be distributed as widely as possible within the zoo and conservation community.



VORTEX is a powerful computer programme for assessing species population viability on the basis of genetic, demographic, ecological, and catastrophic factors. It has been applied to wild populations of rhinos, puma, and other species as well as to captive populations. It is available through CBSG.

Zoo-based knowledge and research not only are important to *ex situ* conservation, but also have great relevance to *in situ* conservation. The World Zoo Conservation Strategy calls on the global zoo community to continue adding its special knowledge to nature conservation, and whenever possible to increase the amount of this contribution. Conservation organizations are encouraged to utilize fully the special knowledge of zoos and to support zoo-based research, as *ex situ* and *in situ* research are closely intertwined in regard to nature conservation. In particular, zoo knowledge of the biology of small populations will become more and more relevant to conservation of wild species as habitats are further reduced in area and the geographic ranges of species are increasingly fragmented.

Section 5

The Way Forward: Towards a New Integration



Zoos are institutions that can uniquely integrate their three major conservation tasks of environmental education, research, and species and habitat conservation. Combined with the enormous public interest in zoos and the ever more intensive cooperation within the worldwide zoo network, this integrated approach provides a great potential for conservation. This potential should be used to the very best advantage.

When this is realized, the zoo community will be a powerful ally to conservation agencies, authorities and networks in the construction of a *time bridge*. Such a time bridge will be necessary to help as many species, habitats, and ecosystems as possible survive the destruction that is likely to continue for at least some time into the future. By supporting the survival of natural elements and by continuously working

to increase public awareness, zoos will help to limit the degree of the expected crises, thus increasing the chance of restoration of natural systems thereafter.

The World Zoo Conservation Strategy strongly emphasizes that cooperation, coordination, and interaction in all conservation efforts are the only means for success. The time has passed for diverse conservation groups to insist dogmatically upon their individual viewpoints. The Strategy therefore urges the entire global zoo network and all other conservation-oriented networks to integrate and intensify their efforts towards their mutual goals. This great mustering of all available resources will be crucial to giving our Earth's biosphere the best possible chance for survival of its biological wealth of genes, species, and ecosystems.



A simulation of a warden's station of an African national park in a zoo. Visitors are immersed in the environmental setting here, and experience the human elements as well as the biological. The conservation efforts of zoos are primarily expressed through such educational exhibits, research, and ex situ population management of species threatened with extinction. More and more, zoos are linking their work directly to the survival of species in the wild, especially in the national parks and protected areas of the world, and are engaged in outreach and training activities to assist governmental agencies and others in management of these areas.