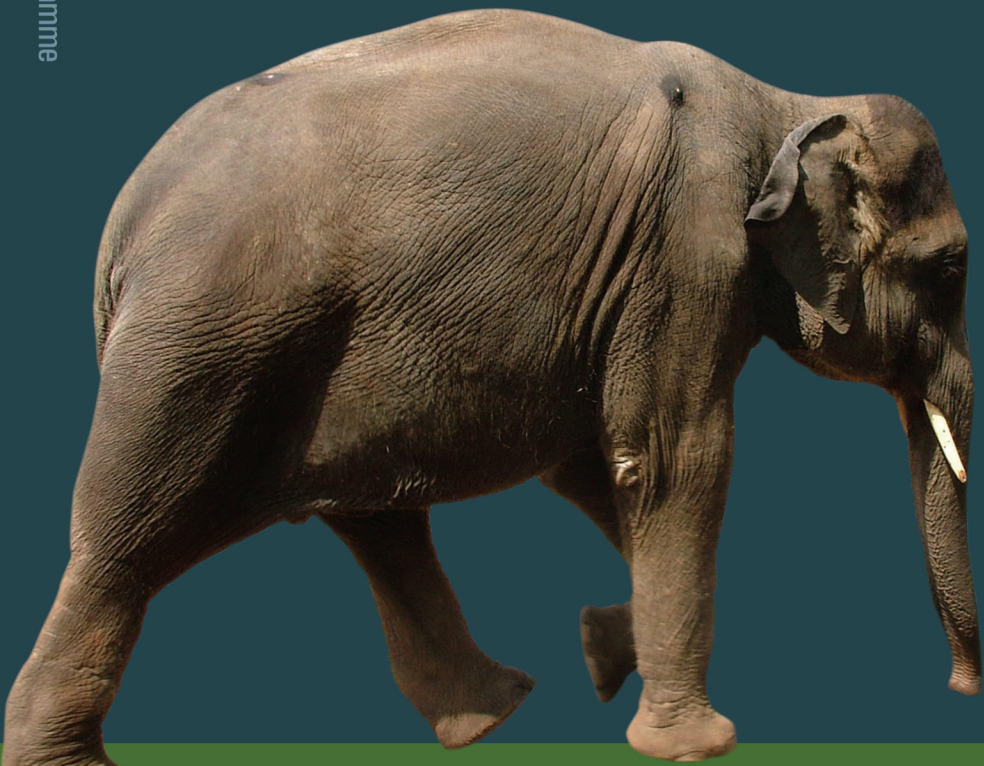
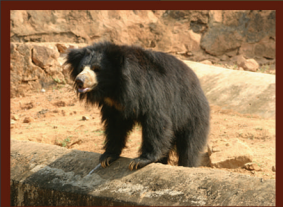


Master Planning of Zoos

Proceedings of Training Programme
on Master Planning of Zoos
for Directors and Managers of Zoos in India



Central Zoo Authority



भारतीय वन्यजीव संस्थान
Wildlife Institute of India



Master Planning of Zoos

Proceedings of Training Programme
on Master Planning of Zoos
for Directors and Managers of Zoos in India



Organized by



Central Zoo Authority



Sponsored by

Central Zoo Authority

Venue

Nandankanan Zoological Park
& Hotel Mayfair Lagoon
Bhubaneswar
Orissa

Pangolin (*Manis crassicaudata*)



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DISCLAIMER
The views expressed in this publication do not necessarily represent those of the organizers.

We regret errors or omissions, if any that we may have unintentionally made.

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Training on Master Planning of Zoos: An overview

*Dr. Brij Raj Sharma **

*Shrawan Kumar Sinha ***

*Brij Kishor Gupta ****

Zoos are conservation organizations which are uniquely placed to serve the need of conservation of species of wildlife, especially in a situation when wildlife and wilderness are under severe pressure and struggling for their survival in the natural habitats. No doubt, there lies enormous responsibilities on zoos for ensuring survival of species. Improvements in working situation of zoos for achieving conservation goals are important task ahead. In view of great significance attached to the good management of zoos for achieving conservation goals, preparation of long term Master Plan for the development of zoo along with management plan for its implementation has been made mandatory for every zoo in India under Recognition of Zoo Rules, 1992, [Rule 10(51)]. However, most of the zoos in the Country are still working/developing without the required documents meant for the purpose and consequently, we lose sight of strategic vision and conservation mission.

It is a well acknowledged fact that zoos are usually governed by their own priorities due to limitation of resources (i.e. space, finance, professionals etc.). But, managing their resources in best possible way for optimal and purposeful utilization based on scientific information/considerations, aesthetically designed concept, environmentally

compatible values and professionally sound management for ensuring good upkeep and welfare of wild animals in the zoos leading to long term survival of species in natural ecosystems / habitats, will certainly improve the worsening situation. This means zoos must ensure holistic and integrated development by implementing master plan and management plan in right perspective.

The objective of this training was to provide the required orientation to all the participants so that Indian zoos will be able to promote effective stewardship of the natural world by bringing people close to living animals, applying and advancing conservation, science and education and setting standards and excellence in animal welfare and environmental responsibility. It was with this background and the fact that Indian zoos should come up to the expectations of the society, the need for having a special training programme on master planning for the in-charge of the zoos was planned, the need for having a master plan in place, as a beacon for the future development of the zoos. Keeping in view the challenges being faced by Indian zoos in developing suitable Master Plan along with Management Plan, the Central Zoo Authority in collaboration with Wildlife Institute of India and Nandankanan Zoological Park, Bhubaneswar organized a training programme on

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** Director, Nandankanan Zoological Park, Bhubaneswar

*** Scientist, Central Zoo Authority, New Delhi

"Master Planning of Zoos" for Directors/Managers working in recognized large, medium and small category zoos in the country. The training programme was held at Nandankanan Zoological Park and Hotel Mayfair Lagoon, Bhubaneswar from 11th-16th April, 2006. Twenty eight Zoo Directors /Curators /Managers from different zoos of the country participated in the training.

The presence and active support of some of the prominent personalities encouraged every one involved in the programme. Sri Naveen Patnaik, Hon'ble Chief Minister, Orissa inaugurated this training programme on 11th April, 2006 in the especially organized inaugural function at Nandankanan Zoological Park soon after the inaugural release of tigers in their newly constructed naturalistic enclosure. He delivered the inaugural speech as Chief Guest and also released Indian Zoo Year Book, Volume-IV, 2006 (published by Indian Zoo Directors' Association and Central Zoo Authority) and an information brochure on Nandankanan Zoological Park on the occasion. There were distinguished presence of Sri R.P.S. Katwal, Additional Director General of Forests (Wildlife), Ministry of Environment and Forests, Govt. of India, Sri Prasanna Kumar Patsani, Member of Parliament, Sri S.P. Nanda, Principal Secretary, Forest and Environment Department, Govt. of Orissa, Sri Suresh Chandra Mohanty, Principal Chief Conservator of Forest (Wildlife) and Chief Wildlife Warden, Orissa, Sri B.R. Sharma, Member Secretary, Central Zoo Authority, Mr. Jon Coe Landscape Architect and Zoo Planner (Australia), Sri S.K. Patnaik, Member, Technical Committee, CZA and others. Sri R.P.S. Katwal, Addl. D.G. of Forests, MOEF, Govt. of India, presided over the function. Sri S.C. Mohanty, Sri Prasanna Kumar

Patsani, Sri R.P.S. Katwal and Dr. B.R. Sharma delivered their speech in the inaugural function. The vote of thanks was delivered by Sri S.K. Sinha, Director, Nandankanan Zoological Park.

During the training, it was stressed that it is high time that a Master Plan is developed for the co-ordinated growth of the zoo's separate facilities and functions. This also helps avoid unplanned or adhoc development of the zoo. If future decisions about the design and development of the zoo are all made with respect to the precedent and direction of the Master Plan, the future zoos will likely to be a coherent, site specific and unique institutions that fulfill identified goals. Therefore, the Master Plan should be a beacon for the development of zoo. However, the Master Plan need to be reviewed and updated at least every five years to keep pace with the on-going changes and recent developments. There are large areas of concern and there are widening gaps in promise and delivery which are required to be bridged at the earliest.

The training programme utilized the full benefit of the presence of international experts as guest speakers, Mr. Jon Coe (leading innovator of zoo planning and design for over forty years and fellow of American Society of Landscape Architects, presently living and practicing in Australia) who contributed to the planning of 57 zoos, botanical gardens and nature parks in North America, Africa, Middle East, Asia and Australia and Mr. Bernard Harrison (Principal Partner, Bernard Harrison and Friends Ltd., Singapore) who brings the experiences of a Curator and a Manager in Planning and operation of Singapore Zoological Garden Zoos and Night Safari of Singapore.

Sri S.K.Patnaik, Former Addl. PCCF(Wildlife) and Chief Wildlife Warden, Orissa and Member, Technical Committee, CZA who was involved earlier in development of holistic Master Plan of Nandankanan Zoological Park, also shared his valuable experience with the participants.

The relevant matter / issues on Master Planning were discussed by guest speakers and course faculty with the active involvement of Participants during the training programme. The summary of deliberations by speakers / participants has been separately arranged in this publication for easy reference and convenience. It is important to take advantage of these inputs along with wide ranging reading materials and references provided during this training programme, interactive exercises conducted on Master Planning in Nandankanan and also the proceedings of earlier short-term course on “ Zoo Planning Design and Landscape Architecture (organized earlier by Central Zoo Authority and School of Planning and Architecture during 27th Nov-3rd Dec, 2000) while developing Master Plan and Management Plan. In order to provide exposure to the participants to certain areas of significance and to further add value to the training programme, the guest speakers, Mr. Jon Coe and Mr. Bernard Harrison also delivered pre-dinner special lectures in the evening in addition to their presentations during the course lectures. The special screening of a film “Cherub of the Mist” (a film on conservation breeding and reintroduction of Red Panda—a success story)

was organized in the evening of 15th April, 2006. This film produced by “A Bedi Film Productions” was widely acclaimed / appreciated by the participants and guests and no doubt, this screening was appropriate to the occasion. The film later on received the Best Conservation and Environmental Film Award in 29th International Wildlife Film Festival, 2006 at Montana, U.S.A. A special video film on "Night Safari" (Themed Zoo) was also screened alongwith special lecture on the same by Mr. Bernard Harrison in the evening of 14th April, 2006. The names of guest speakers, course faculty and the participant trainees alongwith their contact information have been appended for easy reference and wider consultations. It is expected that zoos will come forward with their final Master Plan and Management Plan with the active involvement of participants trained. There are wide ranging areas to be covered under the plan. The guidelines indicating the format for the preparation of Zoo Master Plan has also been appended here in the last section of this proceedings. The entire schedule of the training programme kept everybody busy but the moments spent during the training were highly inspiring and informative. Endeavours were made to provide the best possible inputs within this short period, maximizing the advantages for developing Master Plan and Management Plan for respective zoos. This training on Master Planning of zoos is a great beginning and this exercise will be able to revolutionize the concept and operation of our zoos only when we all really make it happen and join hands in improving the conditions.

Indian Elephant (*Elephas maximus indicus*)



TRAINING ON MASTER PLANNING OF ZOOS AT A GLANCE

Inaugural Function 11th April, 2006

INAUGURATION AND RELEASE OF INDIAN ZOO YEAR BOOK AND BROCHURE ON NANDANKANAN

Sri Naveen Patnaik
Hon'ble Chief Minister, Orissa

WELCOME ADDRESS

Sri Suresh Chandra Mohanty, IFS
Principal Chief Conservator of Forest (Wildlife)
and Chief Wildlife Warden, Orissa

INAUGURAL ADDRESS

Sri Naveen Patnaik
Hon'ble Chief Minister, Orissa

OTHER SPEAKERS

Dr. Prasanna Kumar Patsani
Hon'ble Member of Parliament.
Dr. B. R. Sharma, IFS
Member Secretary, Central Zoo Authority, New Delhi.
Sri R.P.S Katwal, IFS
Additional Director General of Forests (Wildlife),
Ministry of Environment and Forest, Govt. of India.

VOTE OF THANKS

S. K. Sinha, IFS
Director, Nandankanan Zoological Park, Bhubaneswar.

TECHNICAL SESSION-I

11th April, 2006.

SPEAKERS

R.P.S Katwal
Dr. B. R. Sharma,
Jon Coe.

TECHNICAL SESSION-II

12th April, 2006

SPEAKERS

Jon Coe
S.K. Patnaik
Bernard Harrison
S.K. Sinha

Assignment briefing on Development of Conceptual Master Plan
(Facilitators: S.K. Patnaik, Jon Coe and Bernard Harrison)

Visit to Nandankanan Zoological Park for
interactive Master Planning Exercise

TECHNICAL SESSION-III

13th April, 2006

SPEAKERS

B.C. Choudhary
Bernard Harrison
L.N. Acharjyo
Rommel Mehta
Vinod Kumar

TECHNICAL SESSION-IV

14th April, 2006

SPEAKERS

Bernard Harrison
Brij Kishor Gupta
P.C. Tyagi
Manoj Kumar

Master Plan Workshop

(Facilitators: Jon Coe, Bernard Harrison, Brij Kishor Gupta and Tina Lim)

TECHNICAL SESSION-V

15th April, 2006

SPEAKERS

S.K. Patnaik
B.C. Choudhary
Tina Lim

Visit to Nandankanan Zoological Park for interactive Master Planning Exercise,
Discussion conservation breeding prospect and new developments
Special screening of film, “*Cherub of the Mist*”

TECHNICAL SESSION-VI

16th April, 2006

SPEAKERS

B.C. Choudhary

Welcome Address

by Sri Suresh Chandra Mohanty
Principal Chief Conservator of Forests (Wildlife)
& Chief Wildlife Warden, Orissa



Photo: Brij Kishor Gupta

I have the honour to extend most hearty welcome to the Hon'ble Chief Minister of Orissa to Nandankanan Zoo. He has always revealed very lively interest in matters related to wildlife and zoo and spared his valuable time to be here to inaugurate this All India Zoo Directors' Training Programme.

I welcome the esteemed Additional Director General of Forests (Wildlife), Govt. of India, Mr. R.P.S. Katwal, President of this inaugural function who is moving force behind this programme.

I welcome Mr. B.R. Sharma, Member Secretary, Central Zoo Authority and convey our gratitude to him for giving us this opportunity to host by selecting Nandankanan as a venue for this unique programme.

I extend a very cordial welcome to Sri S.P. Nanda, Principal Secretary to Govt. of Orissa, Forest and Environment Department to grace this occasion.

I extend a very cordial welcome to the Hon'ble Member of Parliament, Sri Prasanna Kumar Patsani for having come here to grace the occasion as a guest of honour.

Our hearty welcome goes out to all the Zoo Directors and Managers of Zoo, the resource persons from Wildlife Institute of India and from abroad and all esteemed invitees who are here in this inaugural function.

It is a mandate of the National Zoo Policy and Zoo Rules that every zoo has a long-term master plan. A master plan sets the vision for the zoo and sets out to prepare for blue print of action to achieve the various goals. Preparing the master plan is no doubt a highly professional job. This is an attempt to present the state of the art on this subject. This is, therefore, a very timely and creditable initiative on the part of Central Zoo Authority to launch such a training programme. The way things are going in the wild, one would suppose that the future for endangered wild animals lies in the zoo. It may sound highly futuristic but if we have to preserve our animals, the management of zoos has to be much more scientific. The scientific infrastructure has to be considerably strengthened. Planned breeding and exchange of animals and record keeping of sources and lineage are some of the aspects, required to be strengthened. The concept of environmental enrichment should extend to all animal enclosures to simulate the required habitat conditions for each animal. Master planning should seek to integrate the aspects of conservation, education, research and recreation. This training programme, I hope, will provide the ambience and the opportunity for exchange of ideas and information and for sharing of knowledge and skill.

I would once again welcome to the participants and resource persons and hope that they will have pleasant memorable stay in this temple city of Bhubaneswar.

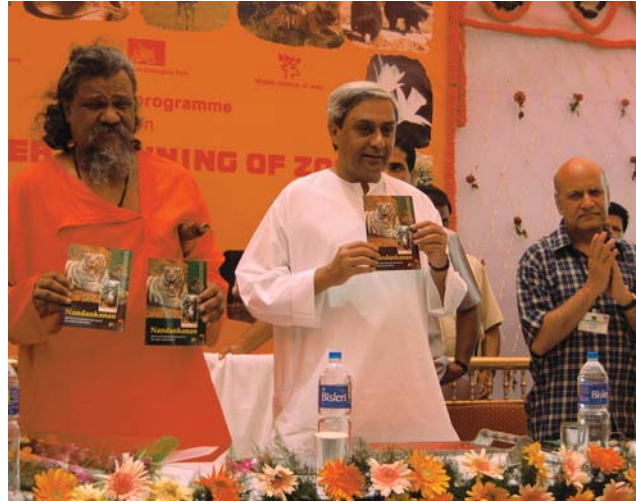
Welcome to you all.

Inaugural Address

by Sri Naveen Patnaik
Hon'ble Chief Minister, Orissa



Photo: Brij Kishore Gupta



I have great pleasure in inaugurating this All India Zoo Directors' Training Programme and in having to say a few words on this occasion.

A zoo is not merely a collection of wild animals for display. Although the initial purpose of zoos was entertainment, over the years, the concept of zoos has undergone drastic metamorphosis.

A zoo is a theatre of complex interaction among animals, visitors and staff. They have their special needs, and now to reconcile them in the design of the zoo is a challenge for the management and the experts.

In the arena of wildlife conservation, zoos are assuming ever more significant role. The zoos provide environmental education, eco-system awareness, and nature interpretation. They facilitate research on wild animals and help in maintaining the gene pool of species on the brink of extinction. A zoo promotes conservation as

much as it provides recreation. All these roles have to be adequately factored into the planning for any zoo.

As they say, in the design of zoos, four essential principles have to be adhered to. The first is attractiveness, since attractive landscapes set the stage for aesthetic experience. The aesthetic experience is the basis for a satisfying zoo visit. The second principle is that natural landscapes should be the bench-marks of zoo design, since an animal enclosure should be as close to its natural habitat as possible. The third principle is effectiveness, meaning thereby that the design should follow the natural processes so as to be cost-effective in the long run. The fourth principle is flexibility, since a flexible design can answer all the evolving requirements of *ex-situ*-conservation.

The first zoo set up in India is the Marble Palace Zoo at Kolkata. That was 152 years ago. The

number of zoos, mini zoos, deer parks in the country would now run into several hundreds. The Nandankanan Zoo was established in the year 1960. This is a zoo, as you can see, in a wholly natural setting. Including a massive water body, it is spread over about 362 hectares of lush green area.

Nandankanan has had two master plans so far: The first one was prepared in 1967 and the second one was prepared in the year 2001. In the interim periods, many Five year Plans and Annual Plans have been brought into operation. The master plan has made comprehensive recommendations in regard to display arrangement of the animals and modification of enclosures, phasing out surplus animals, veterinary care and sanitation, water and power supply, security, development of landscapes and the lake, visitor amenities, educational and research programmes, fodder farm, zoo infrastructure, and contingency plan for emergencies. There is always a scope for improvisation. No master plan is a static document.

With the ideas and inputs of this training programme, I am sure Nandankanan will open a new vision for itself.

The natural ambition of a large zoo like Nandankanan would be to take up “captive conservation breeding” and “re-introduction” of threatened species back into their original habitat. Nandankanan has a record of captive breeding of many species, namely Gharial Crocodile, Tiger, Leopard, Pangolin, Himalayan Black bear, Sloth bear, Mouse deer etc. I understand, it will now take up captive conservation breeding of Vultures. However, re-introduction of these species (except Gharials) into the wild has eluded the zoo. The *ex-situ* and *in-situ* conservation programmes have to be linked and a zoo master plan should chalk out strategies for linking the breeding in the zoo to conservation in the wild.

With these words, I inaugurate this programme of training and experience sharing, and wish success to the mission.

Speech

by SriPrasanna Kumar Patsani
Hon'ble Member of Parliament



Photo: Brij Kishor Gupta

I am delighted to greet you all. I am happy to greet Mr. Sharma and Mr. Katwal who are heading the departments in the Ministry of Environment and Forests, Government of India and I would convey that the funding by them to this zoo, is not adequate. As you see, this is among the biggest and greatest zoos of the country and you can see the scenic splendour and the natural beauty, the nature's galore where the mind may take to the paragon of excellence where beauty is beautified. So, beauty lies in the eyes of beholders. We are beholding the beauty of Nandankanan, the Kanan of God, the Kanan of blooming flower of God's garden. If somebody is moving, he can realize the infinity coherence which synchronize within us.

I understand, the death of animals and birds is highlighted in the media every summer but this

year, this should not be henceforth be repeated. Let us protect the animal being, animal kingdom and the forest life. You can promote eco-tourism. You can ensure more funding from the Centre .

I am grateful to Chief Minister, Sri Naveen Patnaik. We cannot get Chief Minister like him who is also so helpful. When he heard that one elephant is sick today in Chandaka area, he wanted to visit the place. Since he is going to Delhi today and the area is 25 km away from here, it is not possible to go there. He was unhappy on hearing the miserable life of an elephant due to sickness. You know, in Vanaparba Mahabharat, our king could provide last batch of elephants from Orissa. The tanks where the elephants were there, Orissa was blessed by Lakshmi, the goddesses of prosperity but now a days, its population is declining. Let us protect the elephants, increase the number and let prosperity of Orissa enhance. Likewise, in a very nut-shell, I can convey my feelings to look at the entire Nandankanan for protecting the wildlife of our state, the country and the globe. I have seen as a wild traveler traveling more than hundred countries, it is a very rare zoo, not only in the country as a whole but also in the world. Let us determine today to protect, to enhance, to allot more fund and it is everybody's job. Let us be united for the betterment of this Nandankanan.

Namaskar !

Speech

by Dr. B.R. Sharma

Member Secretary, Central Zoo Authority



Photo: Brij Kishor Gupta

A very good morning to you.

I welcome all of you to this training programme, being organised by the Central Zoo Authority and the Wildlife Institute of India.

Historically, zoos began as menageries a place where animals were exhibited as objects of curiosity and for their entertainment value. Zoos were neither noticeably concerned about the natural requirements of animals nor particularly interested in their management on scientific lines. This has also influenced public perception of zoos, which ranges from one extreme to the other. At one end of the spectrum, some view them as immoral, unnecessary and proclaim 'close the zoos' other view them as drain on wild life. In between the extremes, there are several other views for and against the zoos. Overall it is observed that being public institutions, zoos have come under hard scrutiny and criticism in recent times.

Such varied opinions remind one of the famous parable, 'The five blind men and the elephant'. Depending on whether each one felt its ears, its trunk, its feet, its tusks or its abdomen, they said the animal was flat, tubular, like a pillar, spear or barrel. No one perceived it whole as an elephant.

The objective of operating a zoo has to be perceived as one entity as enshrined in the National Zoo Policy. Like nature, zoos are also dynamic and must therefore continually improve themselves or risk decline.

It was in this background and the fact that Indian zoos should come up to the expectations of the society, the need for having a special training programme on master planning for the in-charge of the zoos was planned and on the need for having a master plan in place, as a beacon for the future development of the their zoo. Mr. P.R.Sinha, Director, Wildlife Institute of India readily subscribed to this proposal and gave his consent

to collaborate with the Central Zoo Authority in organising the training programme and also make available the services of Mr. B.C.Choudhury to facilitate the proceedings of the training programme.

I will not go into the details of the master planning process right now, but would like to tell you that basically, a master plan is developed for the *coordinated growth* of the zoo's separate facilities and functions and helps avoid "ad-hoc" development of the zoo. If future decisions about the design and development of the zoo are all made with respect to the precedent and direction of the master plan, the future zoo will likely to be a coherent, site-specific, unique institution that fulfills identified goals. Therefore, the master plan should be a beacon for the development of the zoo. Of course, the master plan should, however, be reviewed and updated at least every five years, to keep up with the on-going changes in the zoo.

I am optimistic that the participants will be able to take the full benefit of the presence of

international expertise in Dr. Jon Charles Coe who brings in with him the knowledge of master planning of many western zoos and Dr. Bernard Harrison the experiences of a curator and a manager in planning and operation of zoos. Shri S.K.Patnaik who also happens to be the first zoo in-charge in India to bring out a holistic plan of Nandankanan Zoological Park will also be sharing his experience with you in this regard.

The present programme has been designed in such a way that I am confident, that the faculty will be able to convey to you regarding the need for future planning and provide you all an insight into the process of planning and developing your zoo.

I am thankful to Mr. S. K. Sinha, Director, Nandankanan Zoological Park, Bhubaneswar for agreeing upon to act as the local host for the programme.

With these remarks, I once again welcome all of you to the training programme.

Presidential Address

by *Shri R.P.S. Katwal*

*Additional Director General of Forests (Wildlife)
Ministry of Environment & Forests, Govt. of India*

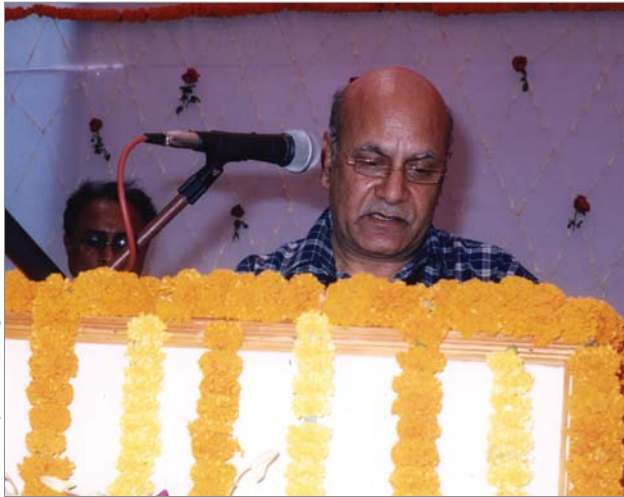


Photo: Brij Kishor Gupta

I am extremely happy to be associated with such an important event, the training programme on Master Planning of Zoos.

There may be many definitions to the word “Zoo” or “Zoological Garden”, but there are two characteristics that all such institutions have in common. First, they possess and manage a collection consisting primarily of wild (non-domesticated) animals; and secondly, this collection is on display to the public for almost throughout the year.

Indian mythology, history and literature are replete with accounts of animals kept by kings and nobles for work, warfare, hunt and entertainment. During the Gupta period (320 B.C- 476 A.D), also called the Golden period of Indian history, the Emperors maintained “ Game Parks” and enacted laws concerning conservation, health and welfare of captive animals. “Buddha Jatakas” have numerous references about taming elephants by Lord

Buddha. Scriptures also record the existence of a Deer Park where Buddha gave his first discourse. During the period of Great Mughals, emperor Jahangir maintained a collection of animals and birds and had commissioned Mansoor, a painter, to prepare a folio of paintings of birds and animals. Jahangir described 69 species of animals and 68 species of plants. Travellers to India during that period have described about animals, which were kept for the purpose of warfare, parades and sport.

The history of public zoos in India, however, is about 200 years old. During the British colonial period, the first zoo was set up in 1800 A.D by the then Governor General Lord Wellesley at Barrackpore, a suburb of Kolkata, on the banks of Hoogly River. The zoo had in its collection a variety of mammals, birds and also reptiles. Originally, set up as part of the Indian Natural History, the zoo is known to have existed for almost three quarters of the 19th century until Lord Lytton handed over the surviving animals to Calcutta Zoo in Alipore during 1876-1878.

In India, the zoo movement received an impetus after independence. In 1952, the then Indian Board for Wildlife (now re-designated as the National Board for Wildlife) recommended for setting up of a modern zoo at Delhi. The main features conceived were large enclosures with nature immersing exhibits without visible barriers. The Zoo was opened to public in the year 1959. Simultaneously, a huge influence in the role change and animal management techniques of zoos also

occurred in the western world during the same period. The Jersey Zoo in the Channel Islands, by Gerald Durrell, was open to visitors in 1959 and four years later the Jersey Wildlife Preservation Trust (now the Durrell Wildlife Conservation Trust) was established. Jersey Zoo was the first of its kind; its aims were for the animal collection to represent species on the brink of extinction, with captive breeding programmes linked directly to efforts to save dwindling wild populations. This led to setting up of standards for good zoos all over the world, with many zoos today contributing to research, education and species conservation programmes.

Modernization of the Indian zoos gained momentum after the establishment of the Central Zoo Authority in 1992. Standards and guidelines have now been prescribed to be followed by the zoos in the country. The National Zoo Policy was adopted by the Government of India in 1998, so that the very objective of operating zoos in the country is properly projected before our society. Today, therefore the role of the Indian zoos has changed from entertainment and amusement to the conservation of endangered animal species, and in the education of the public in conservation and environmental issues.

If the animals in a zoo do not get the basic requirement of space for their movement and exercise and are deprived of hygienic conditions, the zoo cannot be termed as a modern zoo. The living animals have to be treated on a different

footing than routine construction and development programmes. The zoos have to pass on to its visitors a sense of awareness and compassion relating to animals. The very establishment of zoos now is associated with the idea to protect near extinct animals and to educate people especially children in this regard. There are also some underlying factors which have led the zoos in a dilemma. Massive improvements in animal management techniques and enclosure design, as well as an ever increasing knowledge of individual species requirements, have led to highly successful breeding rates in most zoos. These high rates have led to a problem of surplus animals, animals that have either passed their reproductive fitness, already contributed the necessary genes to the breeding programme or whose genes are not required to maintain genetic diversity. Suggestions for doing away with this surplus animals range from establishing “retirement homes” where they can be housed for the remainder of their lives to euthanasia, an unpopular choice particularly with the public. These issues would have to be properly taken care, while preparing a master plan of a zoo.

I hope the present training programme being organised by the Central Zoo Authority will be able to provide the required orientation to all the participants, so that the Indian zoos will be able to promote effective stewardship of the natural world by bringing people close to living animals, applying and advancing conservation, science and education, and setting standards and excellence in animal welfare and the environmental responsibility.

Vote of Thanks

by *S.K. Sinha*

Director, Nandankanan Zoological Park



Photo: Brij Kishor Gupta

We take this opportunity to convey our sincere gratitude to Sri Naveen Patnaik ji, Hon'ble Chief Minister, Orissa for giving us his precious time to grace this function as chief guest. Sir, like sunshine, you have not only re-energized developmental activities in the state but you have also given a tremendous boost to the cause of wildlife conservation. You have always shown a keen interest and deep involvement for integrated development of Nandankanan. Sir, we know, you have dreams to make Nandankanan a centre par excellence. We assure that all of us will make it happen under your dynamic leadership. We are indeed grateful to you for your inspiration and guidance. It means a lot to us. Thank you sir.

On this occasion, I would like to thank Sri R.P.S. Katwal, Additional D.G. of Forests (Wildlife), Ministry of Environment & Forests, Govt. of India for accepting our invitation and joining us in today's session. Sir, your support will be vital for our mission. Thank you sir.

I would also like to thank Sri S.P.Nanda, Principal Secretary, Forest and Environment Department, Govt. of Orissa for always lending his supporting hand for desired growth of Nandankanan.

I am indeed thankful to Dr. B.R.Sharma, Member Secretary, Central Zoo Authority, for giving new momentum to the holistic development of zoos in the country. Without his support, it would not have been possible to organize this training programme on the scale it deserves.

I express my thanks to Sri S.C. Mohanty, Principal Chief Conservator Forest (Wildlife) and Chief Wildlife Warden, Orissa under whose leadership, Nandankanan and the Wildlife Organisation as a whole, has scaled new heights. Thank you sir for constantly being supportive to us in achieving our goal.

I express my thanks to all the officers from various zoos of the country and delegates from various organizations and resource persons from India and abroad for coming here to participate in this exercise to draft new blue print for the development of Indian zoos. I thank all of you for being part of our mission .

I express my thanks to our friends from media for coming here and conveying the message to the people.

I thank all our friends who have worked hard in Nandankanan and made this event a great success.

Thank you all.

Black-headed Ibis (*Threskiornis melanocephalus*)



Technical Session

I

Integrating *ex-situ* conservation with *in-situ* conservation in planning a Zoo

SPEAKER

R.P.S. Katwal

Additional Director General of Forests (Wildlife),
Ministry of Environment and Forests, Govt of India.

and

Dr. B.R. Sharma

Member Secretary,
Central Zoo Authority, New Delhi



Photo: Brij Kishor Gupta

The subject matter was presented with due emphasis on how and why the integration of *ex-situ* conservation and *in-situ* conservation is vital in zoo planning. The presentation provided the much needed thrust and orientation and in setting the stage for the training programme.

Integrating *ex-situ* conservation with *in-situ* conservation in planning a Zoo

- We can already predict that 21st Century conservation efforts will preserve habitats in varying degree of fragmentation and wildlife conservationists will need to be creative with broken systems.
- Species survival will emerge as a clearly separate agenda from habitat preservation, a global experiment in biospheric rescue where the lines between nature and captivity will be blurred.
- The main objectives of the zoos under the National Zoo Policy is to complement and strengthen the national efforts in conservation of rich biodiversity of the country, particularly the wild fauna.
- This objective can be achieved by conservation breeding under *ex-situ* conditions for rehabilitating them in the wild as and when it is appropriate and desirable.
- Conservation education and research for conservation of wildlife are other objectives of zoos enshrined in the National Zoo Policy.
- The National Wildlife Action Plan (2002-16) emphasizes on the role of zoos for *ex-situ* breeding of endangered species of wild fauna and their rehabilitation as per the IUCN guidelines for reintroduction.

Role of Central Zoo Authority

- Central Zoo Authority has constituted a Sub-Committee on Conservation Breeding with specified terms of reference to suggest and recommend the modalities for conservation breeding of endangered species in Indian zoos.
- The Central Zoo Authority has decided to provide financial assistance on 100% basis for creation of appropriate infrastructure for the identified species of wild animals in the zoos or as a satellite facility for conservation breeding programme.

Strategy

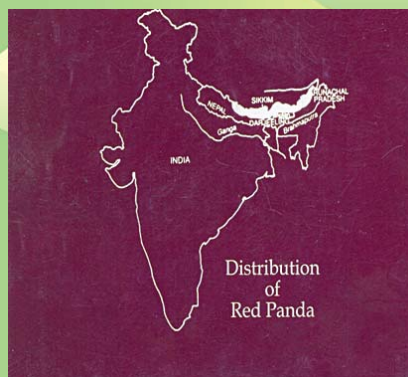
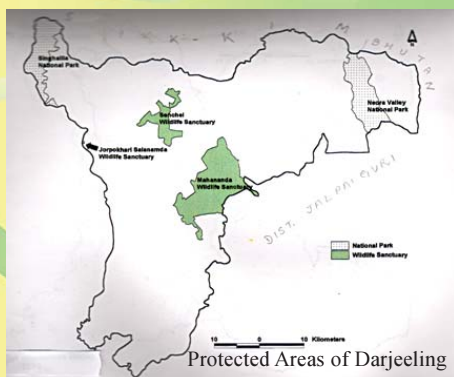
- The conservation breeding programme in India is a joint venture of *in-situ* and *ex-situ* wildlife managers. This is need based programme. The Chief Wild Life Wardens and Protected Area Managers have been requested to identify the species which need immediate interventions in the form of *ex-situ* conservation breeding for the protected areas under their control.
- One component of the programme is identification of the protected area having wild population of the proposed species / re-introduction site in the vicinity of the conservation breeding facility. The *in-situ* managers of the protected areas will be taking corrective measures to address the cause of decline/ extinction of wild population of the targetted species in its natural habitats.

- Two to four zoos in the habitat range of the targetted species will take part in the breeding programme of the targetted species. Conservation breeding facility in the form of off-display centres or in the form of satellite facility will be created only in one or two zoos of the region.
- The immediate target will be the planned coordinated *ex-situ* conservation breeding of endangered species whose population in the wild is in few hundreds/thousands. Preference will be given to the species having localized distribution.
- The possibility of identifying around 25 animals as founders will be assessed from the existing captive population in Indian zoos. Efforts will be made to acquire suitable founders from foreign zoos. If required, the Government of India will also be approached for allowing acquisition of animals of wild origin from the rescue centres or from wild.
- The target will be to have at least 100 physically, genetically and behaviorally healthy animals in Indian zoos from all the critically endangered species, of which 2000 animals of the species are left in the wild.
- Necessary infrastructure, trained manpower, finances and linkages between *in-situ* and *ex-situ* managers is being developed for successful implementation of the project.

Development of *Ex-situ* and *In-situ* Conservation Linkages: Vision for future; case studies

Red Panda *Ailurus fulgens fulgens*

Inhabits temperate forest in the Himalayas at an altitude of 13,000 feet Found in a mountainous stretch from Nepal, through north-eastern India and Bhutan into China, Laos and Myanmar. Recent surveys have indicated a small population in Singhalila and the Neora Valley National Park in West Bengal and parts of Arunachal Pradesh.



Project panda

- Project started in 1990 as part of Global Red Panda Management Program
- 6 pandas received from foreign zoo and five existing wild Red Panda in zoos.
- Project was conceived by MOEF/CZA/Intl. Stud Book Keeper-Dr. Angela Glaston.
- Padmaja Naidu Himalayan Zoological Park, Darjeeling (West Bengal)- focussing on high altitude fauna.
- The Padmaja Naidu Himalayan Zoological Park is ideally situated within the natural distribution zone of the Red Panda.
- The Zoological Park had the proper housing facility and earlier records of successful breeding of Red Panda in captivity even at the time of beginning of the Project
- During and after political disturbance in Darjeeling Hills in eighties the Red Panda population in Darjeeling was on verge of extinction.

Ultimate goal of *ex-situ* Conservation: Support of survival in the wild

- The IUCN Council adopted the position statement Translocation of Living Organism in 1987, in which the release of animals from *ex-situ* populations into natural environments was included.
- Translocation are powerful tools for the management of the natural and man-made environments which, properly used, can bring great benefits to natural systems and to man”.
- The IUCN statement defines, three types of translocation involving transfer of individuals from a captive situation to a wild habitat, or from one natural habitat to another:

Breeding in captivity



- A total of 37 Red Pandas were born in zoo.
- Two females (*Mini* and *Sweetie*) selected for release into the Singhalila National Park-high density of Red Pandas has been recorded from the area.

Re-introduction - Aims and objectives

- Definition: An attempt to establish a species in an area which was once part of its historical range, but from which it has been extirpated or become extinct.
- The principal aim: To establish a viable, free ranging population in the wild, of a species, sub-species or race which has become globally or locally extinct in the wild. It should be re-introduced within the formal natural habitat and range and should require minimal long-term management.
- A multi-disciplinary approach: Involves a team of persons from Central Government/State Forest Department, NGOs, Research Institutes/Universities, Veterinary institutions.

Pre-project activities

- Biological: Feasibility study/background research
- PHVA (Population and Habitat Viability Analysis)
- Previous re-introductions
- Choice of release site and type
- Evaluation of re-introduction site
- Availability of suitable release stock
- Release of captive stock
- Socio-economic and legal requirements
- Planning, preparation and release stages

Post-release activities

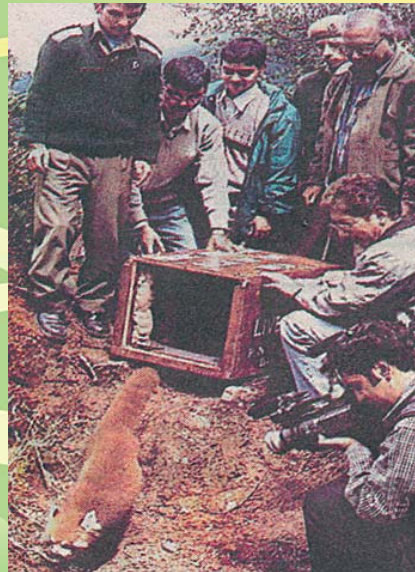
- Post release monitoring (direct/indirect)
- Demographic, ecological, behavioural studies
- Long term adaptation by individuals
- Investigation (collection of mortalities)
- Interventions (supplemental feeding/veterinary aid, if necessary)
- Decisions for revision, re-scheduling or discontinuation of program.
- Habitat protection/restoration
- Continuing public relation activities, including education and mass media coverage.
- Evaluation of cost effectiveness and success of re-introduction techniques.
- Publishing in scientific journals.

Release of Red Panda into the wild

- Soft release: (15th August, 2003)
- Both the females were kept in the soft release facility, under observation and for acclimatization.
- No feed provided while in soft release.
- Weight and Health - monitored.

Release in to the wild

- Released on 14th November, 2003, Gairibans, Singhalila National Park, West Bengal.
- Before release *Mini* weighed 5 kgs. and *Sweetie* weighed 4 kgs.
- Before release both animals were radio-collared for subsequent monitoring.



Monitoring methods

- Non-triangulation location technique - Homing-in on the animals method
- Direct observation/monitoring - time intensive methods.
- Both the animals were monitored on alternate days.
- GPS reading of the location was also taken.

Interaction with wild pandas- positive sign of adjustment

- *Mini* was seen interacting with the wild pandas.
- Entered into the Nepal forest in January 2004
- *Mini* found dead in March 2004, sign of predation.
- Her skull, portion of her tail and paw along with attached collar was found on the 15th March, 2004.

Behavioral observation

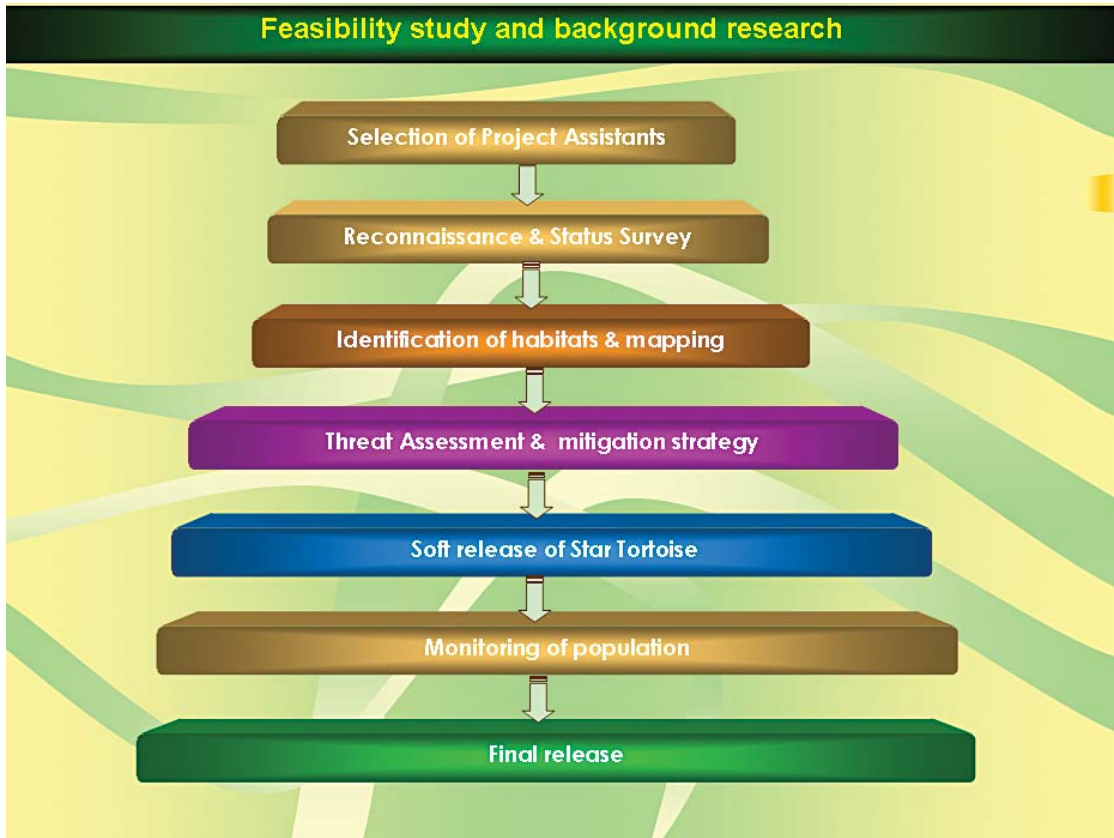
- *Sweety* was observed to be very mobile.
- Seen together with a wild panda on 17th Feb., 26th Feb., 11th March, 1st April, 3rd April.
- *Sweety* gave birth to a cub in a tree hollow on the 7th July, 2004.
- A success story.



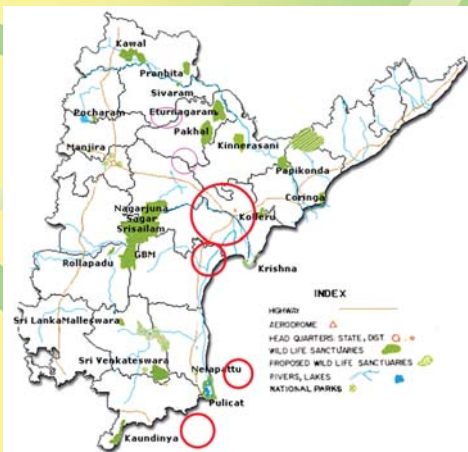
Release of Star Tortoise (*Geochelone elegans*)

- Star Tortoises are found in the forests of Western and Southern Indian States.
- In recent times, there has been spurt in its smuggling to the countries of South East Asia and Far East due to its heavy demand as pet.
- During 2002-2003 many number of Star Tortoises have been seized by enforcement agencies at airports both within and outside the country.
- One of the largest ever consignment of 1830 Star Tortoises was seized by Singapore CITES Authorities, in a unique joint cooperative effort by various agencies.
- Upon seizure, the consignment was flown back to India, thereafter, these animals were quarantined at Nehru Zoological Park, Hyderabad and released into the wild on 15.11.2003 after ascertaining its home range through DNA typing conducted at Centre for Cellular and Molecular Biology, Hyderabad.
- The animals have been micro chipped so that in the event of its smuggling in future, it would be possible to identify the areas vulnerable to poaching.
- This operation is unique in the sense that both *ex-situ* and *in-situ* managers worked together for the conservation of this species.





Maps showing the places of release



Cover type information

Habitat viability analysis

- To know the food and shelter value
- Facilitate to locate new habitats where there is a possibility of species availability or introduction.

Water information:

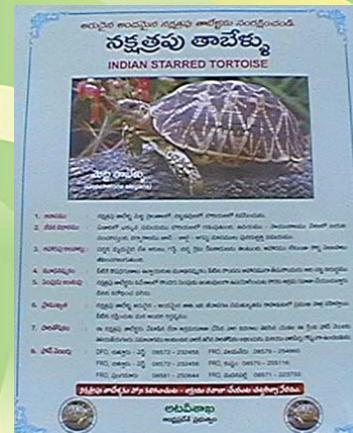
- To know the availability of water in and around the selected habitats to provide dipping spots during breeding season.

Terrain information:

Broadly four terrain classes i.e. valley, plains, plateau, moderate and steep slopes.

Awareness & Protection

- Conduct awareness campaign especially in the identified threat villages.
- Include the Yanadies, Shikaries in eco-development programs.
- Strict enforcement of Wildlife (Protection) Act, 1972.
- Reward the informers of poaching.
- Publication materials like: Brochures, Pamphlets on conservation and importance of Star Tortoises.
- Displaying slides on Star Tortoises in Cine -Theaters.
- Writing Slogans on Star Tortoise at all important places
- Erecting hoardings on all highways and important places on conservation of Star Tortoises.



Coordinated planned breeding programme of Lion Tailed Macaque

- Lion Tailed Macaque (LTM) is one of the most endangered species inhabiting the evergreen forests of Indian Peninsula.
- The habitat of this species is threatened due to biotic pressures of various kinds.
- A programme of planned breeding of this species has been initiated with financial assistance from Central Zoo Authority.
- Presently three zoos namely – Arignar Anna Zoological Park, Vandalur (State of Tamil Nadu), Sri Chamarajendra Zoological Gardens, Mysore (State of Karnataka), Thiruvananthapuram Zoo, Thiruvananthapuram (State of Kerala) are actively participating in the programme.
- The existing population of this species has been studied and exchanges of individuals have been effected among zoos with a view to form social groups.
- A social group from San Diego Zoo is also being received to provide requisite stability to the existing zoo population.
- The aim of the programme is to establish a viable population of in captivity and restocking of the wild.
- It is hoped that restocking of the species would focus attention on the need to protect the habitat for conserving the rich biodiversity occurring in the unique ecosystem of the evergreen forests found in the peninsular India.



Ecology and behaviour of LTM in wilderness & captivity

- Lives in groups of 8 to 40 animals (Average 18 animals)
- Groups comprise one adult, one sub-adult male, five to seven adult females, remaining juveniles and infants
- Birth – throughout the year – peak December and February
- Female matures at an age of 6 years (4.8 years in captivity)
- Inter birth intervals is about 2.5 years (1.3 years in captivity)
- Oestrous cycle every month
- Gestation period – 6 months
- Average birth rate is 0.31 infants/female/ per year
- Mortality rate of all classes 0.045/year
- Population growth rate slow because of low birth rate and delayed age at first birth
- Feeds on seeds, fruits, flowers, nectar, invertebrates, small birds and mammals
- LTM population in the wild - current population fragmented, 5 Large population and 6 isolated population.



State	No. of animals
Tamil Nadu	1000
Kerala	2000
Karnataka	1000

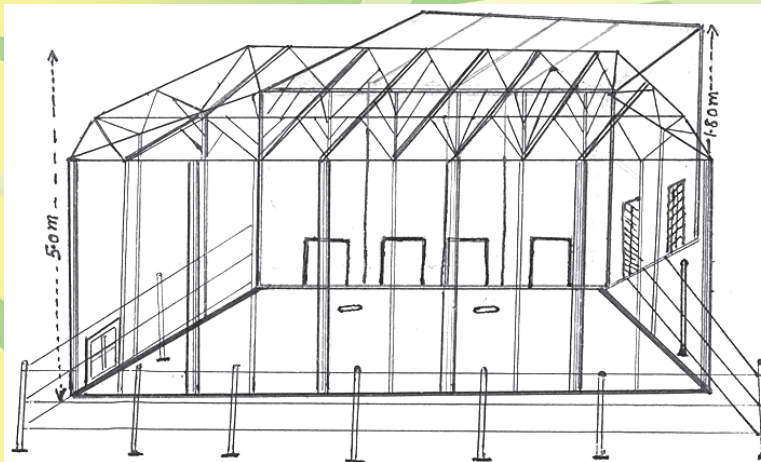
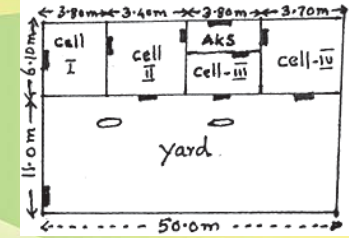
Status of LTM in Indian zoos

- LTMs in 15 zoos in India 32:19 (51) – CCBP stock – 20:16 (36)
- Number of females declining sex ratio 1:0.6
- Population declining with mortality and natality rates of 3.75 & 1.75, respectively
- Only 3 breeding females for the entire Indian population being from AAZP
- Females from Bhilai, Patna and Jaipur are proven breeders identified for acquisitions

Captive breeding programme population

Name of the zoo	Male	Female	Total
Arignar Anna Zoological Park	9	6	15
Thiruvananthapuram Zoo	8	7	15
Mysore Zoo	3	3	6
Total	20	16	36

LION TAILED MACAQUE'S ENCLOSURE



LTM in Island moated enclosure in AAZP





Reading ID number



Tranquilized LTM for fixing transponder

Planned breeding programme

- There should be some purpose or objective for keeping each and every individual animal in a zoo.
- Get the right founders of the targeted animal species.
- Have and maintain the history cards, pedigree charts and stud books for each individual and targeted animal species.
- For that each and every animal of the species must be identifiable by the keepers - by popular name; by the management using ear tags, rings or transponders.
- The zoo library should have sufficient reference material on the targeted animal species.
- Proper housing facilities, veterinary facilities including pathological laboratory facility should be available in the park.
- Next important step is to select the proper breeding pairs, considering pedigree, compatibility, age structure, social behavior etc.

Health precautions

- Before mating – like deworming, vaccination. Health supplements etc., during pregnancy and after pregnancy are also required to be taken.
- Facilities like nursery for hand rearing, trained manpower etc should be handy and if we properly succeed *in-situ* by improving the habitat and *ex-situ* by planned breeding – the two can meet.

Conservation breeding of vultures

- White-backed vultures, (*Gyps bengalensis*),
- Slender billed vultures, (*Gyps tenuirostris*)
- Long-billed vultures, (*Gyps indicus*),



Suggested Action Plan for conservation of vultures

- It was felt that for the reversal of the decline of vulture population, *ex-situ* conservation (captive breeding) programmes in the region required immediately. The Central Zoo Authority announced to provide financial assistance on 100% 'basis for the establishment of vulture conservation breeding centres in the off exhibit areas of four zoos of the country (Van Vihar Zoo at Bhopal; Sakkaubagh Zoo, Junagdh; Nadankanan Biological Park, Bhubaneswar and Nehru Zoological Park, Hyderabad)
- The Vulture Breeding Centre being established at Pinjore, Haryana shall be collecting and raising nestling of vultures.

Laboratory for Conservation of Endangered Species

(LaCONES) established at Hyderabad in collaboration with the Centre for Cellular & Molecular Biology, Hyderabad, Central Zoo Authority, Department of Forests, Government of Andhra Pradesh, Department of Bio-technology, Government of India and Council of Scientific & Industrial Research.



Assisted reproduction in birds

White-backed vulture
(*Gyps bengalensis*)

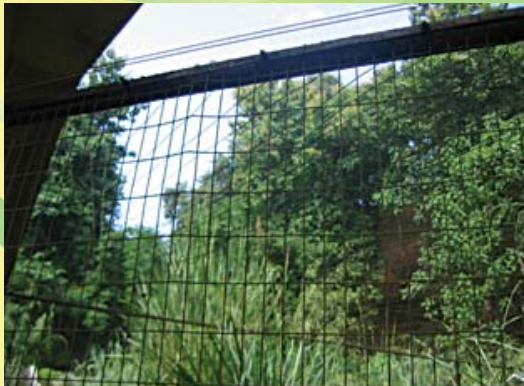
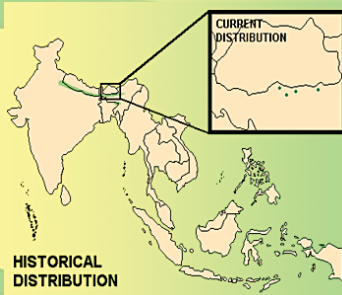
Semen collection, semen profile
Artificial insemination
Sexing by molecular techniques



Pigeon as a model
(*Nicobar pigeon, Nilgiri wood pigeon*)



Pigmy Hog Conservation Breeding Centre, Assam



Policies and Guidelines of the Central Zoo Authority and the need for the development of Master Plan

SPEAKER

Dr. B.R. Sharma, IFS
Member Secretary
Central Zoo Authority
New Delhi



Photo: Brij Kishor Gupta

Dr. B. R. Sharma elaborated the policies and guidelines of Central Zoo Authority and emphasized the need for the development of Master Plan. Tracing the origin of CZA's present policy and evolution of technical process on development of Master Plan, the presentation covered various aspects of Master Plan and Management Plan, which included the components of Master Plan, theme/objective, resources, budget,

collection plan, layout plan, display, conservation breeding, health care, conservation education, research, visitors facilitation, human resource development, rescue and rehabilitation, disaster management etc. It was further explained why this training was needed now. The support provided by CZA for preparation of Master Plan was also apprised with the expectations from the Master Plans of Indian zoos.

Policies and Guidelines of the Central Zoo Authority and the need for the development of Master Plan

The Wild Life (Protection) Act, 1972

- The Act with its amendments provides clear-cut basis for legal protection of India's wildlife.
- Despite its flaws, it is still undoubtedly one of the strongest legislation on wildlife protection in the world.

Zoos in India

- Keeping animals for warfare, parades and sports is ancient to India.
- The history of public zoos is, however, 200 years old, starting from Barrackpore near Kolkata in 1800.
- Apex Court of this nation has put a ban (November, 2000) on further establishment of zoos in the country.

Central Zoo Authority

- Central Zoo Authority was created by Government of India through an amendment of the Wild Life (Protection) Act in 1992.
- The objective was to enforce minimum standards and norms for upkeep and health care of animals in Indian zoos
- To restrain mushrooming of unplanned and ill-conceived zoos in the country.

Recognition of Zoo Rules, 1992

- In order to evaluate and provide accreditation to the zoos in the country, the Recognition of Zoo Rules, 1992 were framed under the Act.
- There are 51 standards and norms which have been prescribed for compliance by the zoos.

'Rule 51' of the Recognition of Zoo Rules

- (51) Each zoo shall prepare a long-term Master Plan for its development. The zoo shall also prepare a Management Plan, giving details of the proposals and activities of development for next six years. The copies of the said plans shall be sent to the Central Zoo Authority.

National Zoo Policy, 1998

- To give proper direction and thrust to the management of zoos in the country, the National Zoo Policy was framed and adopted by Government of India in the year 1998.
- The main objective of the zoos under National Zoo Policy is to complement and strengthen the national efforts in conservation of rich biodiversity of the country, particularly the wild fauna.
- This objective can be achieved through the following protocol:
- Coordinated conservation breeding of critically endangered species in *ex-situ* conditions.
- Conservation education.
- Research for conservation and if resources permit to act as Rescue Centres.

Classification and accreditation of Zoos

- For deciding standards and norms, the Zoos have been classified into large, medium, small and mini categories.
- There are 159 recognized Zoos in India, of which
 - 19 are Large
 - 12 Medium
 - 27 Small
 - 101 Mini category Zoos

Ownership pattern of recognized Zoos

• Central Government	4
• State Government	11
• State Forest Deptt.	92
• Public Sector	12
• Institutes	3
• Trust	14
• Municipal Cooperation	15
• Private	8
Total	159

Working Plan, Management Plan, Master Plan

- Forestry in India has a long and successful tradition of ‘Working Plan’.
- The ‘Management Plan’ should be the wildlife corollary.
- A strict code of practice of preparing and implementing such plans have not been seen in Indian Zoological Parks scenario.
- A good ‘Plan’ is pre-requisite for a good management.

Master Plan

- A Master Plan in a zoo is a document prepared by a planning process which set out the values and objectives for a zoo by presenting strategies and operational schedules.
- The plan shows how these objectives can be achieve within a time bound framework.

Components of Master Plan

- | | |
|---------------------------------|------------------------------|
| • Theme/ Objectives | • Conservation Education |
| • Resources | • Research |
| • Budget/ availability of funds | • Visitors’ facilitation |
| • Collection Plan | • Human Resource Development |
| • Layout Plan | • Rescue & Rehabilitation |
| • Display | • Disaster Management |
| • Conservation Breeding | • Management Plan |
| • Health Care | |

Theme/Objectives

- Objectives of zoos have changed from time to time—from entertainment, to time pass, to research and to education.
- In the present scenario and as per National Zoo Policy, the objectives of the zoos can only be the combination of all or any of – conservation breeding, conservation education, research for conservation and to act as Rescue Centre.

Resources

- Establishment of a zoo requires lot of resources in form of land, funds, trained manpower, animals for display, other infrastructural works including water, electricity etc.
- So the planning should be as per the availability of natural and human resources.

Budget

- The big factor is fund, not only for the creation of the facility but for its later maintenance.
- In India, zoos are considered as public service ventures and continuously need support from Government and/or other funding agencies.
- The master planning process must consider all these factors.

Collection Plan

- The Zoo Operators has to be very sure of the wild animal species to be displayed in the zoo.

- Population size of the each identified species is another important component of collection plan so that appropriate housing can be created for all the targeted species and individually.

Master Layout Plan

- Considering the natural resources available, site factor, theme and collection plan the master layout plan has to be developed keeping all the factors of zoo management in mind including animal welfare infrastructural development, visitors circulation etc.

Display

- It is important to decide what should be on display and how to display that.
- The theme and objective of the zoo will decide the placement and positioning of animal enclosures and other exhibits.
- The conservation breeding activities and housing for rescued animals should preferably in off-display areas.

Health care

- Health care is the second most important component after animal housing.
- The health care facility should be planned depending upon the size of the collection as well as the animal species chosen.

Conservation Breeding

- If appropriate housing is available all the animal houses should contribute into the planned breeding of the targetted species.
- If the conservation breeding is intended for reintroduction in the wild, it should preferably be in off-display.
- Cooperative population management, coordination at regional and global level should also be part of the conservation breeding programme.

Conservation Education

- Conservation education is the most accepted objective of the zoos. Zoo Education, Master Plan should be a complete chapter in the Master Plan.
- The Central Zoo Authority has involved Centre for Environmental Education (CEE) for developing a National Zoo Education Master Plan.

Research

- Research is very important, it should not come in the end, it should be a continuous process.
- Planning for the research related activities in *in-situ* as well as *ex-situ* conditions should become a part of the master plan.
- Creation of infrastructure including data storage, trained personnel and the issues to be dealt should be identified and become part of the Master Plan.

Visitors facilitation

- Visitor facilities like ticket counters, souvenir shops, rest rooms, rain shelters, food courts, toilets/urinals and mode of transport are the components to be taken care of while finalizing the master plan for the zoo.
- Visitors circulation in the zoo should be well-defined.

Human Resource Development

- Having professionally skilled manpower and regular upgradation of professional skills of the establishment is another aspect which should also be considered.
- The Regulation of Zoo Rules also prescribed some guidelines for the same it should be considered while planning for the zoos.

Rescue & Rehabilitation

- If appropriate housing is available, the zoo should continue to accept these animals, of course, after proper quarantine.
- A separate area can also be earmarked for creation of off-display rescue facility.
- Some of these rescued animals can be used as founders for conservation breeding programme.

Disaster Management

- A contingency plan for emergent situations and natural disasters should also form part of the master planning exercises.

Management Plan

- The Management Plan shall be a document, which will detail out the activities to be taken up in the line indicated in the master plan for a particular time frame preferably five years (plan period), prioritizing the work to be taken up in phased manner.

Why this training

- There are not many zoos having properly drafted master plan in the country.
- We are in the last financial year of the XTH Five Year Plan. XITH Five Year Plan is being finalized.
- The Central Zoo Authority in its last meeting in February, 2006 has decided to fund improvement of all categories of recognized public sector zoos, including mini zoos.
- The funds for animal housing and veterinary care will be available on 100% basis and for infrastructure development on 50:50 basis.

- As per the rough calculation, our total requirement for the above activities is around Rs. 500 crores.
- It is also felt that zoos cannot absorb more than Rs.50 crores annually, so we have to plan for next ten years to make some visible impact in Indian zoos scenario.
- It has been decided that all the zoos will be requested to finalize their master plan component within this financial year (i.e. within XTH Five Year Plan period) and should be ready for its implementation from the next financial year (i.e. from XITH Five Year Plan) phasing out the activities in the next ten years during XITH and XIITH Five Year Plan period.
- The planning process in the Central Zoo Authority, which is the main source of funds for improvement of Zoos and master planning for the Indian Zoos can overlap and programme can be implemented efficiently.

Central Zoo Authority support

- Presently Central Zoo Authority is providing finance upto Rs. 1.00 lakh for preparation of Master Layout Plan in the zoos.
- Central Zoo Authority is ready and willing to provide all possible assistance for preparation of well-drafted and documented master plan for zoos in India.

Master Planning Process

A Short Overview of the Planning Process

SPEAKER

Jon Coe

Landscape Architect and
Zoo Planner and Designer
Australia.



Photo: Brij Kishor Gupta

Jon Coe presented an overview of master planning process and also gave valuable planning tips in his presentation. Some useful definitions for zoo planning and design were also elaborated at the beginning. He explained various aspects of planning process like; benefits of planning, factors responsible for failure of plans, type of plans, stages of planning, type of planning process, fully integrated programme, in-house planning team, planning tips etc. His presentation laid foundation for further deliberation on the Master Planning exercises during the training programme.

MASTER PLANNING PROCESS

A Short Overview of the Planning Process

“The future is not some place we are going to, but one we are creating. The paths to it are not found but made, and the making of these pathways changes both the maker and the destination.”

Dr. Peter Ellyard “Commission for the Future”

What is a Planning Process?

- Planning is a dangerous journey into the future – not planning is even more dangerous!
- Master Plans are like road maps
 - ▶ Chart a hopeful, uncertain course
 - ▶ Planning is an adventure
 - ▶ The journey changes people and their plans
- Master Plans are not blueprints
 - ▶ Must be flexible, living guidelines
 - ▶ Self-correcting and evolving

Benefits of Planning

- Anticipate and shape future
- Prioritize actions
- Budget time and money
- Improve communication and integration
- Sell your agenda internally and externally
- Evaluate progress

Why do Plans Fail?

- Unrealistic and unachievable
- Superimposed from above
- No support from below
- Not “business-like”
- Planning paralysis
- Principal advocate leaves

When is Planning Needed?

Tool of responsible management at times of major change

- New leadership
- New opportunities
- New challenges

Update plans on a regular schedule

What Type of Plan?

Physical Planning

- | | |
|---|--|
| <ul style="list-style-type: none"> • Land • Structures • Tangible assets • Operational or Management Plan • Communication • Goals and objectives • Resources vs obligations • Phasing | <ul style="list-style-type: none"> • Landscape • Collections • Phasing • Organizational structures • Job descriptions • Incentives |
|---|--|

What Type of Plan?

- | | |
|---|--|
| <ul style="list-style-type: none"> • Business/Strategic Plan • Goals and objectives • Assets versus liabilities • Cash flow | <ul style="list-style-type: none"> • Market • Return on investment |
|---|--|

Comprehensive Plan

- Physical Plan
- Operation and Management Plan
- Business Plan

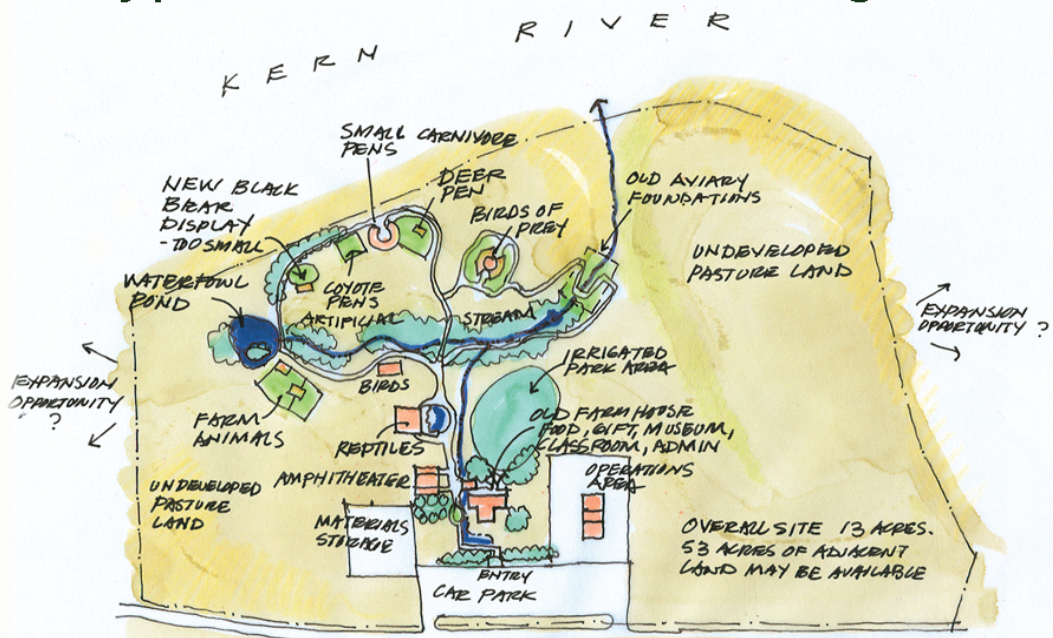
Stages of Planning, For all types of planning

- Vision Workshop
- Create shared vision for next 10-20 years
- Inventory and Analysis
- Program Brief
- Concept Plan
- 80% of decision making with 20% of the effort
- Extensive but not intensive
- Balanced
- Action-oriented

Stages of Planning, For all types of plans

- Master Plan Document
- Introduction
- Set the scene, history, etc.
- Theme concept
- Circulation concept
- Exhibit concept
- Landscape concept
- Infrastructure concept
- Appendix
- Plan elements and development guidelines
- Physical Plan, Operation and Management Plan, Business Plan
- Summary of findings
- Visions, goals and objective
- Education and visitor experience
- Researches
- Conservation
- Operations
- Development, phasing, budgets
- Comprehensive Plan combines

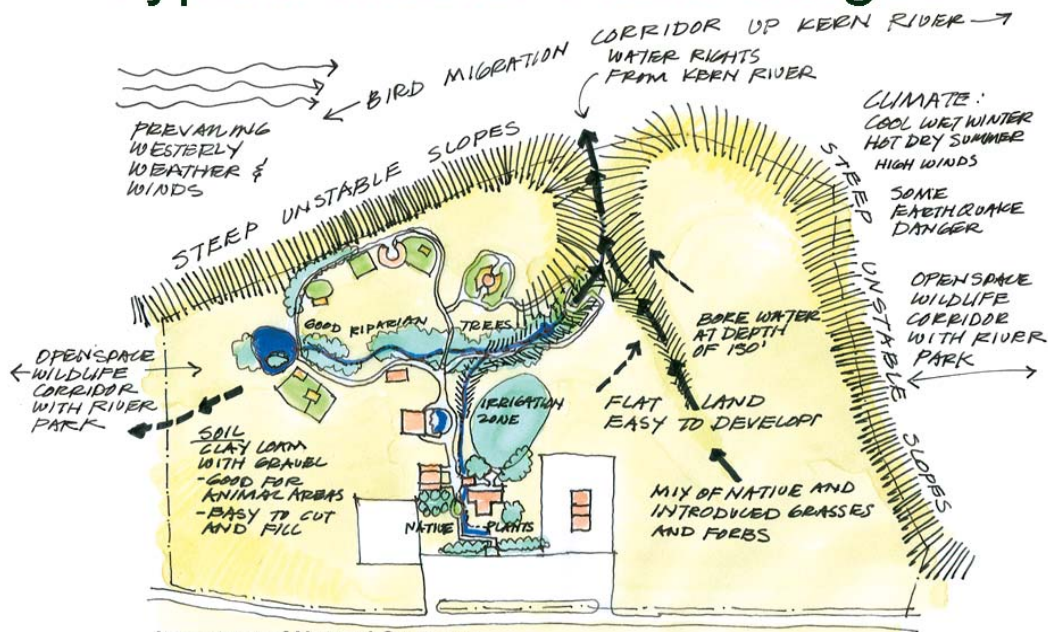
Typical Master Plans Stages



Inventory of Existing Facilities
 California Living Museum
 Bakersfield, California

Recreated from CLRdesign, inc. 1998 Master Plan

Typical Master Plans Stages



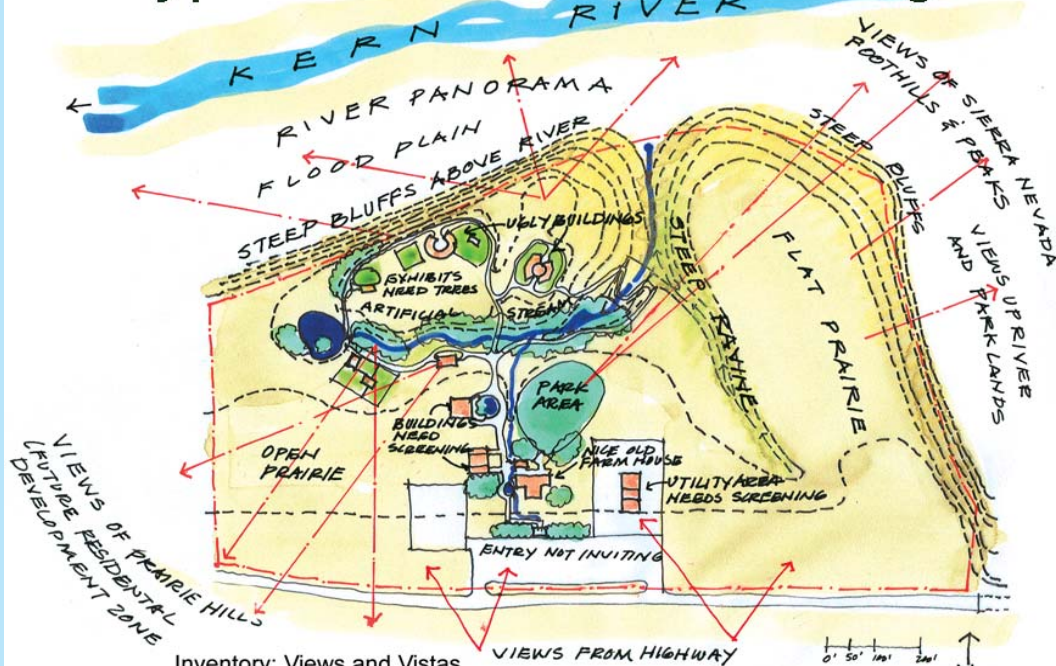
Inventory of Natural Systems

California Living Museum
Bakersfield, California

Recreated from CLRdesign, inc. 1998 Master Plan

0' 50' 100' 200'

Typical Master Plans Stages



Inventory: Views and Vistas

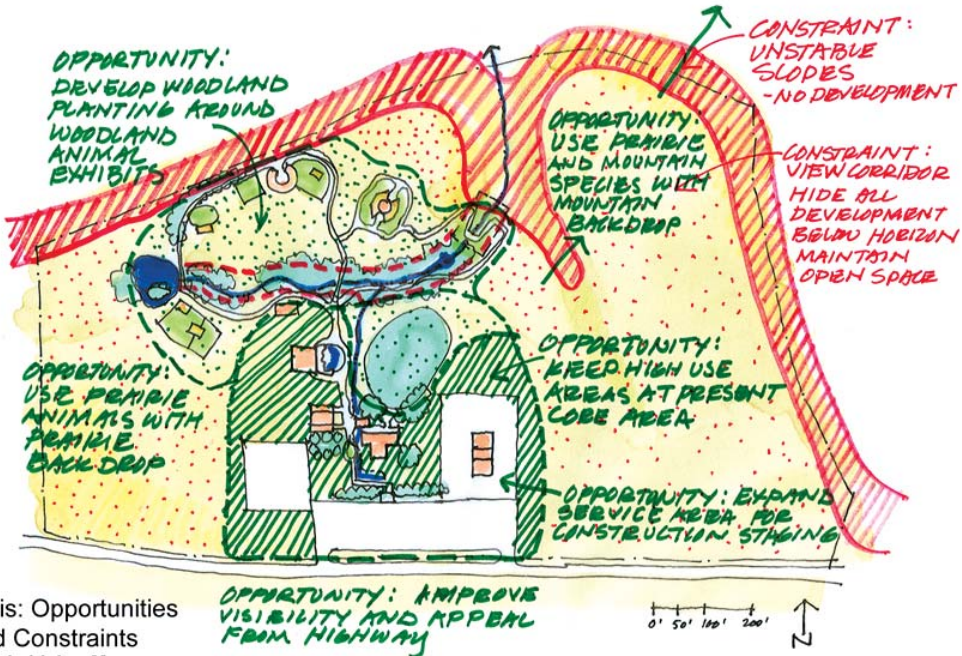
California Living Museum

Bakersfield, California

Recreated from CLRdesign, inc. 1998 Master Plan

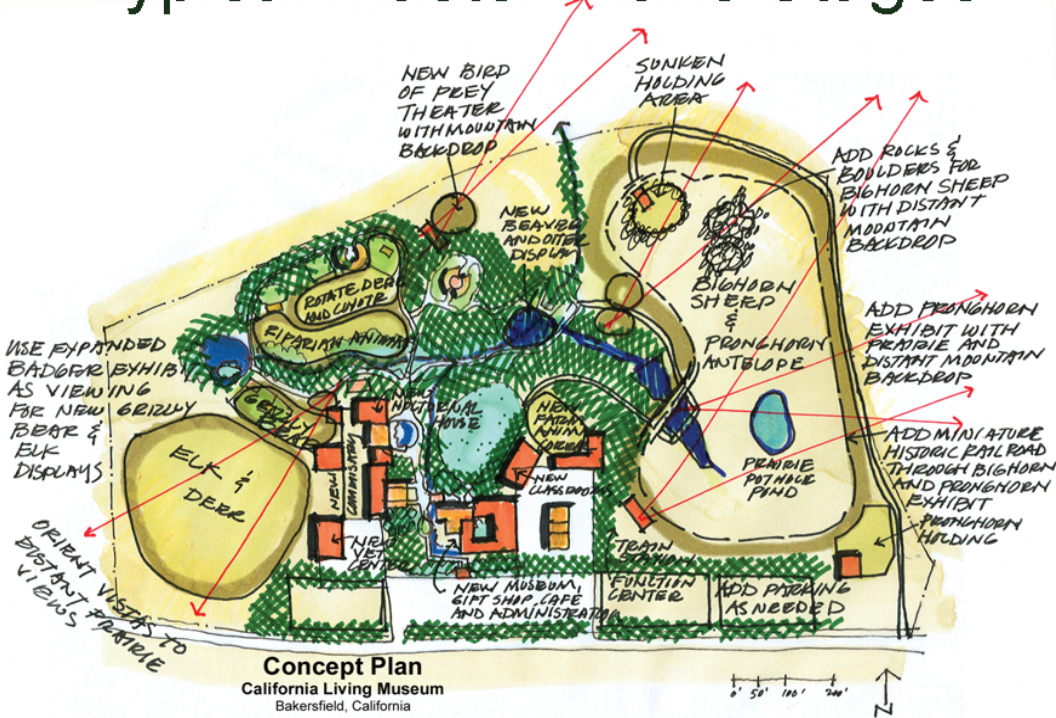
0' 50' 100' 200'

Typical Master Plans Stages



Analysis: Opportunities and Constraints
California Living Museum
Bakersfield, California

Typical Master Plans Stages



Concept Plan
California Living Museum
Bakersfield, California

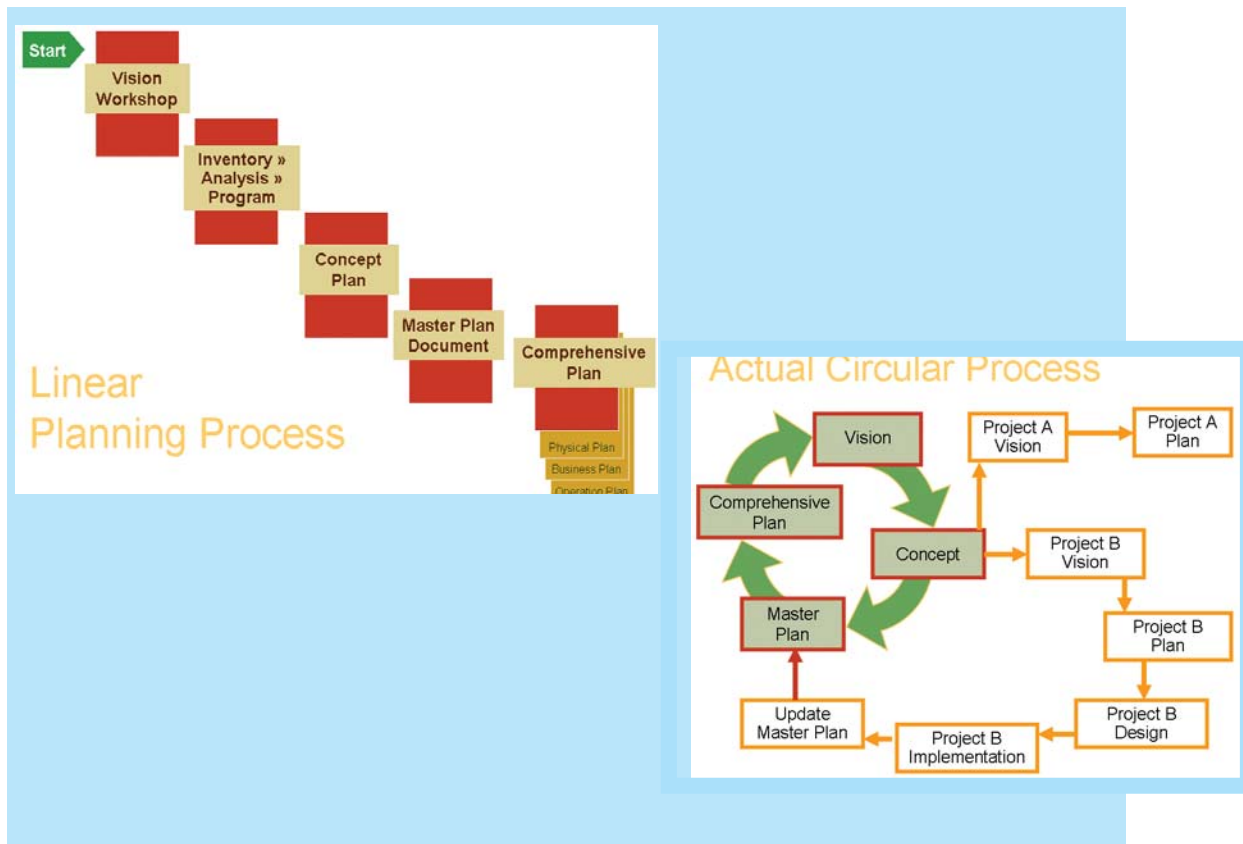
Recreated from CLRdesign, inc. 1998 Master Plan

Typical Master Plans Stages



Typical Master Plans Stages





Full Integrated Program (FIP)

as developed by Woodland Park Zoo

In-House Planning Team

- Reflect hierarchical organization chart
- Diverse representation – all major stake-holders
- Interactive, open process “workshop”



Planning Tips

- Success depends upon the quality of people involved
 - Staff, Consultants and Advisors
- Zoo must lead consultants, not vice versa
- Staff heavily engaged in planning should:
 - Receive special training
 - Be compensated for extra time put in or have some other staff take over some of their regular duties
- Zoo requires trained facilitator to keep things moving
- Planning efforts must be supported by management
- Need firm deadlines and milestones
- Seek help from consultants, universities etc but do not give up leadership
- Think about sustainability
- Support your message
- Do not allow architecture to dominate animals or landscape
- See your zoo as other see you
- See your exhibits as the animals see them

Planning gives Good Value

However much you spend on planning, if it is good planning, it is good value

- Planning typically costs 1% to 10% of the cost of a single major project
- Allows you to test ideas before building them
- Helps insure an orderly development process
- Saves costly mistakes
- Build support for fund-raising and project development

Useful Definitions for Zoo Planning and Design

Context: the exhibit viewers perceptual surroundings.

This is everything that exhibit viewers perceive consciously or unconsciously while experiencing an exhibit.

Content: intended communication.

Basically, this is what interpretive signs say. It is the cognitive information that the zoo or aquarium wants people to perceive, understand and remember.

“Immersion design” theory emphasises the “...in imitation of nature” part of the definition and calls for highly realistic simulations of nature. An example would be an artificial tree cast from a real tree.

“Naturalistic design” has come to signify “in accordance with” or functioning like nature. An example would be a tree-like structure built using manufactured logs and timbers.

Theme: the subject of the overall presentation or experience; the overall character-giving concept.

Message: the actual communication received and remembered by zoo visitors.

This may include the (cognitive) information, concepts or ideas that the visitor gleans from the actual interpretive information, filtered through the (affective) context of the setting and the distractions, prejudices or attitudes of visitors themselves. The message that counts most is the one the visitor remembers. Serrell emphasizes the importance of clearly and finitely defining the “message” as the first step in the exhibit design process. Since the message is communicated through the entire immersive environment, the entire team of designers, educators and other stakeholders should participate in framing the intended message.

Contextual Exhibits: a museum term similar to immersion exhibits.

Exhibit: in educational discussion the term “exhibit” often derives its meaning from its historic connection to museum exhibit design. Thus it is used to describe a well-defined object, display or group of displays.

Exhibit: in terms of immersion design has a broader meaning, including the entire environmental surround. This could include everything from the surfacing underfoot to the themed character interacting with guests to vistas of distant landscape, and, of course, the animals being displayed.

Landscape Immersion: Exhibit or Experience:

“Ideally the viewer should move through the characteristic landscape of the natural habitat zone seeing its sights and savouring its moods. Only then can we become aware that the landscape is also inhabited by animals separated by unseen barriers. The success of this landscape immersion depends entirely upon two factors: 1) the completeness and correctness with which the characteristic landscape is projected, and 2) the care and accuracy with which the viewpoints and views are located and composed, concealing barriers, enhancing perspectives, composing light and shadow and, most importantly, visually unifying animal space and visitor space”.

The term is developed from two definitions: “Landscape”: an expanse of natural scenery and “Immersion”: to involve or engage deeply.

Immersion Exhibit: A shortened form of landscape immersion. This term could also apply to exhibits in cultural, agricultural or other settings as well as natural landscapes.

Naturalistic: “In accordance with or in imitation of nature” (Webster Dictionary). The terms “naturalistic” and “immersion” are used interchangeably in general conversation about zoo exhibits. However as designers we apply these terms differently and find confusion over specific meanings can lead to misunderstanding.

Examples could include: “life with elephants in an Asian village” (Melbourne Zoo); “visit to a remote greater one-horned rhinoceros rescue centre” (proposed for Woodland Park Zoo); or “visit to a gorilla research camp in West Africa” (Zoo Atlanta).

Scenario: the outline for a proposed natural or cultural setting which carries out the intended theme; setting the scene.

Examples include providing of charred logs, exposed permafrost and fast-moving braided streams, all to suggest the effects of fire, frost and flood in shaping the boreal landscape and provide the setting for encountering indigenous wildlife.

Storyline: the narrative or pictorial sequence of active events or experiences envisioned in a themed setting.

Storylines and storyboards, annotated sequential illustrations or computer generated simulated walk-throughs, were long used in the motion picture industry and are now used in zoo design to visualize the intended visitor experience in detail.

Sustainable: The United Nations World Commission on Environment and Development’s definition in 1987 suggests that development is sustainable where it “meets the needs of the present without compromising the ability of future generations to meet their own needs.”

Preparation of a strategic plan (Fundamental goals and overall vision) First step towards initiating master plan process

SPEAKER

Jon Coe

Landscape Architect and
Zoo Planner and Designer
Australia.



In continuation to the presentation Plan Ahead—a short overview of the planning process, Jon Coe emphasized the need of strategic planning for sustainable development in this presentation and provided deep insight to the subject with appropriate explanation on strategic planning as first step towards initiating master planning process, fundamental goals, overall vision, problems and solutions, strategically phased development, sustainable phasing etc. It is an important area of consideration in the developmental process of master plan / management plan.

Strategic Planning

- “The only permanence: change” Heraclitus
- “The best way to adapt to change is to be part of making it” Unknown
- “Principals of ecology: everything is connected and everything changes.” Coe
- “Sustainability depends upon strategically controlled change.” Coe
- “Entertainment is the engine which drives attendance.” Coe
- Novelty is the best means to renew attendance.” Coe
- “Those who think there is a difference between entertainment and education don’t understand either one.” McLuan

Sustainable Development

Problem 1: Too little development – No growth

- Not enough to see and do at the zoo
- Nothing has changed, no reason to visit again
- Public attitude: “The zoo is a loser” (USA) – “Not worth our support”
- Attendance revenue drops
- Zoo can’t pay its bills

Sustainable Development

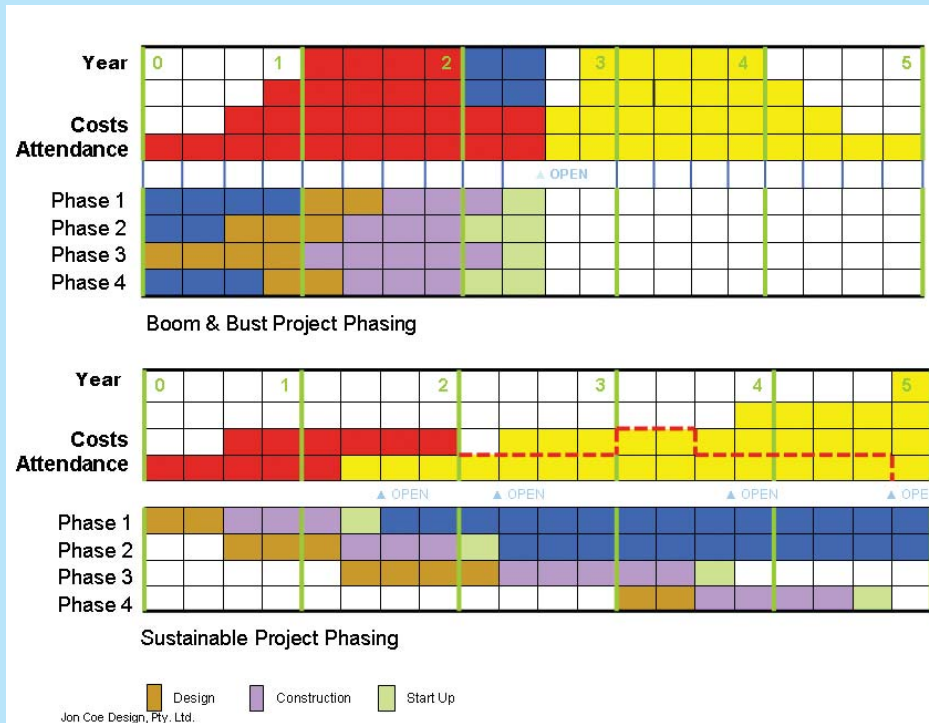
Problem 2: Too much development at one time

- Resources become exhausted
- Financial
- Human
- Community
- Nothing left to continue development
- After first two years people say “nothing has changed at the zoo, no reason to visit again”
- Attendance revenue drops
- Zoo can’t pay its bills (especially debt service)

Problem 3: “It won’t be popular, but this is what we need to build”

- Attendance revenue stagnant or drops
- Zoo can’t pay its bills

Sustainable Phasing



Strategic Planning

- Project Type A – Clean-up, fix-up, plant-up
- Project Type B – Seasonal Attraction
 - Travelling exhibit
 - Concert series
 - Seasonal programs
- Project Type C – Modest Permanent Display
 - Birds
 - Small mammals
 - Hoof stock
 - Education centre
- Project Type D – Block-Buster Display
 - Larger carnivore
 - Major habitat
 - Great ape

- The idea is to phase the best combination of these types of new projects or renovations to provide a new attraction every year or two to attract and sustain attendance growth and income
- No matter how large (or small) your budget, always retain enough resources to begin planning the next project.
- Develop a 5-10 year strategic plan to guide your development.

Interactive Session for discussion on various issues for improvement of zoos

Dr. B.R. Sharma, IFS
Member Secretary
Central Zoo Authority
New Delhi



Photo: Brij Kishor Gupta

An interactive session for discussion of various issues for improvement of zoos were organized. Initiating the discussion, Dr. B. R. Sharma, Member Secretary, CZA, elaborated some fundamental issues for improvement of zoos and initiatives of Central Zoo Authority to support various activities of significance. Directors/Managers of various Indian Zoos interacted with Mr. Sharma, Member Secretary, CZA with their queries. Necessary clarifications were made accordingly.

Interactive Session for discussion on various issues for improvement of zoos

Central Zoo Authority

- The Authority was established in 1992 to restrain the mushrooming of ill-planned zoos in the country as well overseeing the management of zoos and provide them necessary technical and other inputs to come upto the desired level of the management.

Recognized Zoos in the country

- There are 159 recognized zoos in the country. Out of which, 19 are large, 12 medium, 27 small and 101 mini categories zoos.

Improvement of Zoos

- The Central Zoo Authority is providing financial assistance for improvement of recognized public sector zoos in the country.
- Creation of appropriate animal housing, veterinary facilities, research/ training related activities are being financed on 100% basis.
- Whereas expenditure on infrastructure development is being shared with the zoo operators on 50:50 basis.

Improvement of Zoos

- All proposals for creation of new animal houses are first discussed in the Sub-Committee on Zoo Designing around second half of June every year.
- The financial estimates of the approved designs are placed in the Technical Committee meeting around the month of July for financial approval.

Procedure to be followed

- The zoos are requested to submit their annual plan of operation within first quarter of the financial year i.e. within June along with the utilization certificate for funds already been released to the Zoos.
- The new designs will be discussed in the Sub-Committee on Zoo Designing and all other proposals for financial assistance will be taken up in the Technical Committee in the month of July.
- The Authority will try to release the funds within July/ August to the Zoos.
- All the cases where Central Zoo Authority is providing 100% grants, 50% of the funds will be released along with copy of the Memorandum of Understanding (MoU) for the same and the balance amount will be released after receipt of the duly signed MoU.
- In cases where Central Zoo Authority is sharing funds on 50:50 basis. even the first instalment of funds will be released only on receipt of duly signed MoU.

Procedure to be followed

- No fresh proposal will be entertained without receipt of Utilization Certificates for all earlier releases.

Veterinary Care

- Central Zoo Authority is providing all necessary assistance to zoos for creating basic veterinary facilities to the extent can be handled by the veterinarians posted in the zoos.
- The zoos have been requested to develop some mechanism with the legal veterinary institutions/hospitals in their regions for providing specialized services and diagnostic facilities to the zoos.
- Central Zoo Authority can provide one time financial assistance for developing the above mechanism.

National Referral Centre

- Indian Veterinary Research Institute, Bareilly has been identified to act as National Referral Centre on veterinary care for Indian zoos to provide super-speciality services and diagnostic facilities.
- The Centre will organize studies/research on animal health care related articles in Indian zoos and also conduct training for the zoo veterinarians.

Research

- The Central Zoo Authority has signed MoU with the following Institutions to initiate research/ studies in the following zoo related activities:

Name of the Institute	Research work to be carried out
School of Planning & Architecture, New Delhi	Formulating broad guidelines on principles of Zoo Design.
Indian Veterinary Research Institute, Bareilly	Evolving standard protocol on wild animals health
National Institute of Animal Nutrition & Physiology, Bangalore	Standardization of animal diet in captive conditions
Centre for Environmental Education, Ahmedabad	Zoo Education Master Plan & Interpretation
Laboratory for Conservation of Endangered Species (La cones)/ Centre for Cellular & Molecular Biology, Hyderabad	Bio-technological interventions in zoo management
Wildlife Institute of India, Dehradun	Trainings for zoo personnel, stakeholders and policymakers
Wildlife Institute of India, Dehradun	Maintenance of National Studbook for Endangered Species

Research

- The Central Zoo Authority in collaboration with Department of Bio-technology, CSIR and Andhra Pradesh Forest Department has created Laboratory for Conservation of Endangered Species (LaCONES) at Hyderabad. The Authority has already invested Rs. 6.40 crores for creation of the facility.
- The main functions will be DNA fingerprinting of the zoo animals, frozen zoos and assisted reproduction in endangered species. The facility is expected to be inaugurated soon.
- The Central Zoo Authority has decided to provide financial assistance in the form of small grant fellowships (upto Rs.2.00 lakhs per year for a period of three years) to the zoos to conduct research/studies to deal with the local issues.
- The Central Zoo Authority has also decided to appreciate the innovative initiatives taken up by different zoos for improvement of zoo. The financial grant upto Rs.2.00 lakhs will be provided for the furtherance of the innovative works.
- The Central Zoo Authority and Ministry of Environment & Forests is considering creation of a Centre for Zoo Science in the National Zoological Park, New Delhi. The Centre will be providing consultancy services to Indian zoos and act as a referral centre providing trainings to the zoo personnel, coordinate research activities and maintain studbook.

Training

- It has been decided to arrange short-term trainings for the zoo incharges and zoo veterinarians in alternate years in collaboration with Wildlife Institute of India, Dehradun and Indian Veterinary Research Institute, Bareilly.
- The short-term training programmes for middle level zoo officials will be organized annually in collaboration with Wildlife Institute of India.
- The Central Zoo Authority is also sponsoring short-term training programmes zoo keepers annually at seven locations on regional basis.
- The zoo directors are requested to attend and make their staff attend the training programmes.
- The Central Zoo Authority is sending one zoo director and one zoo veterinarian every year to Jersey, U.K. for three week training. More international agencies are being conducted for more such trainings in future.

Indian Zoo Association (IZA)

- There is a need to have a national association representing Indian zoos (Indian Zoos Association) with Membership from Indian zoos (institutional Members) and Associations of zoo related professionals (Association Members).
- The Indian Zoo Association will deal with the issues like training of zoo personnel, printing of zoo related literature, maintenance of studbook of endangered species in Indian zoos etc.

Landscape Immersion exhibits and beyond

Naturalistic Enrichment: Ideas for Integrating Enrichment Features with Immersion Landscapes and Interpretation

SPEAKER

Jon Coe
Landscape Architect and
Zoo Planner and Designer
Australia.



Photo: Brij Kishor Gupta



In continuation to the task on “Landscape immersion exhibits and beyond”, this lecture presentation of Jon Coe on “Naturalistic Enrichment” provided lots of innovative ideas and insight for creating naturalistic enrichment features for wild animals in captivity. The naturalistic enrichment is an essential feature, required to be integrated in the conceptual and operational design of landscape immersion exhibits for creating proper and healthy living condition for wild animals in the zoos.

“We’ve spent a million dollars making this exhibit to present a message about wild animals and their habitats... and you’ve stuffed it up with cheap playground equipment and toys.”

Animal First!
"Animal need more then green bushes... without animals there would be no zoo!"



People First!
"No... without visitors there would be no zoo!"

Antiquated negative debate gets you...?

Instead...

Play & Occupation....

Play is the work of youngsters. Occupation is the work adults do. Think like an animal!

What would animals of a given species use for play and occupation in the wild?

Plus

Message...

The message tries to communicate that animals are independent, competent beings highly evolved for the wild lives they lead.

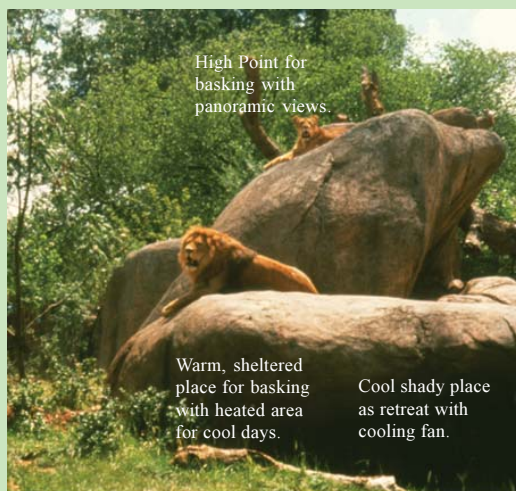
Equals

Naturalistic Enrichment

Environmental Enrichment Ideas



Built in Features of Enduring Interest to Animals



High Point for
basking with
panoramic views.

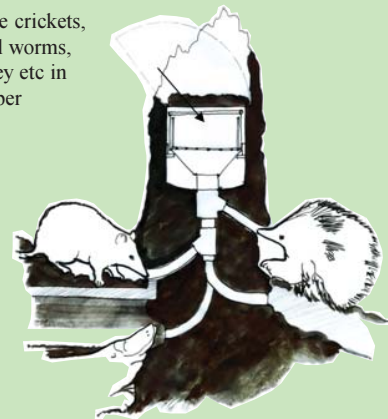
Warm, sheltered
place for basking
with heated area
for cool days.

Cool shady place
as retreat with
cooling fan.

Suitable for
Large carnivores
Large raptors
Small carnivores
Baboons, macaques, monots

Notes: Make all favoured
areas visible to public. Place
animals above viewers for
maximum impact

Place crickets,
meal worms,
honey etc in
hopper



Artificial Termite Mound

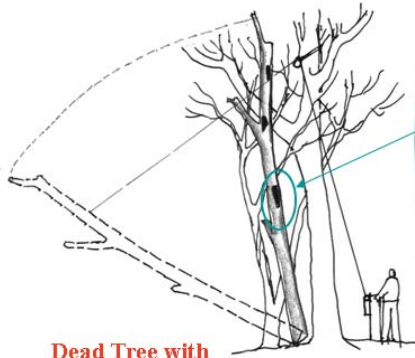
Suitable for
Small to medium carnivores

Fixed Enrichment Features

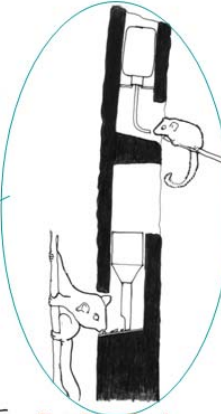


PVC Cricket/Meal Worm Feeders

Naturalistic Environmental Enrichment Jon Coe Design P/L March 2006



Dead Tree with Feeding Features being positioned



Feeding Features hidden in Dead Tree



Knot hole for injecting honey

Sloth Bears at Honey Log
From photo by Brij Gupta

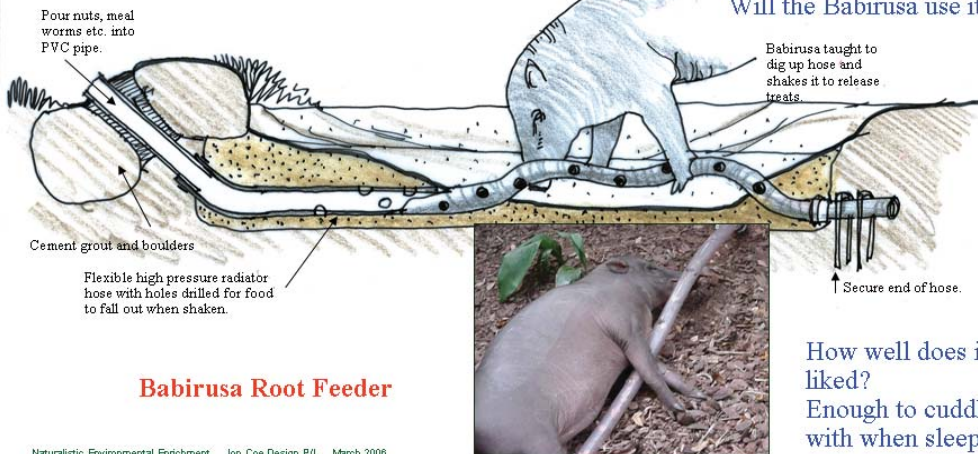
Moving Enrichment Features



Prototype at Houston Zoo

Will the Babirusa use it?

Babirusa taught to dig up hose and shakes it to release treats.



Pour nuts, meal worms etc. into PVC pipe.

Cement grout and boulders

Flexible high pressure radiator hose with holes drilled for food to fall out when shaken.

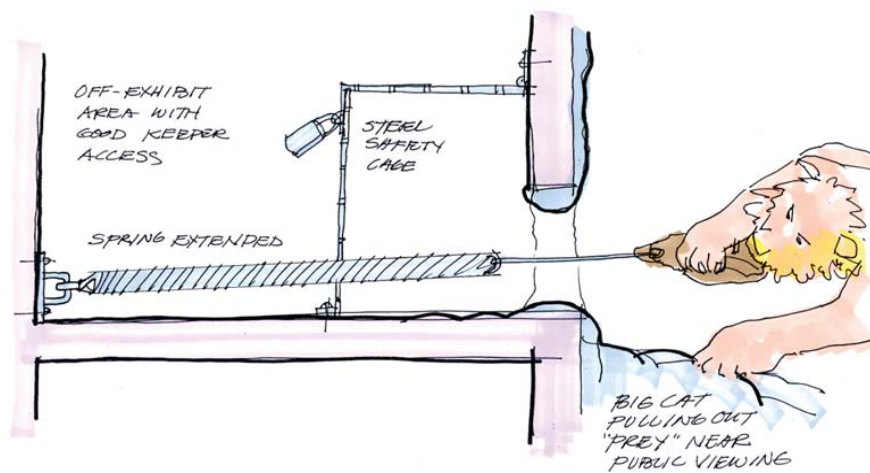
Secure end of hose.

Babirusa Root Feeder

How well does it liked?
Enough to cuddle with when sleeping!

Naturalistic Environmental Enrichment Jon Coe Design P/L March 2006

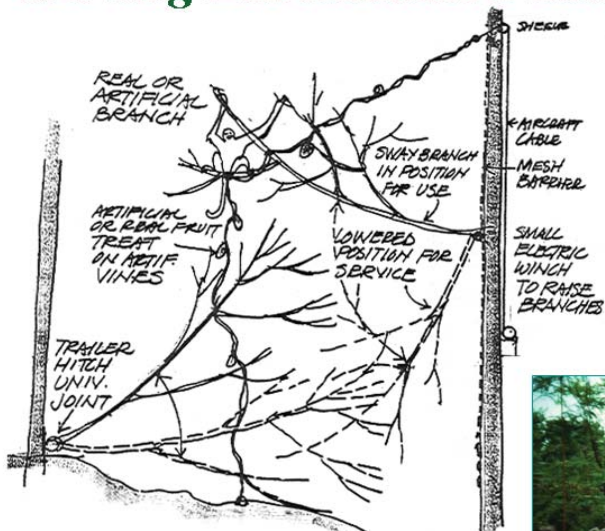
Moving Enrichment Features



Hidden Bungee Feeder

Naturalistic Environmental Enrichment Jon Coe Design P/L March 2006

Moving Enrichment Features



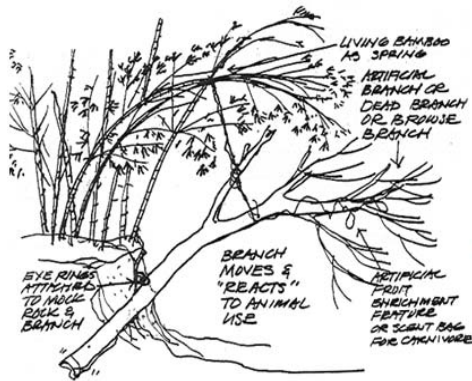
Sway Branch Concept

Naturalistic Environmental Enrichment Jon Coe Design P/L March 2006



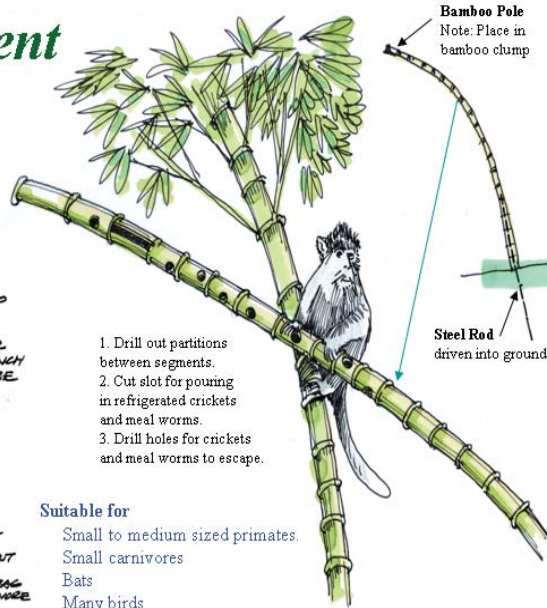
Denver Zoo

Moving Enrichment Features



Low-Tech Sway Branch

Naturalistic Environmental Enrichment Jon Coe Design P/L March 2006



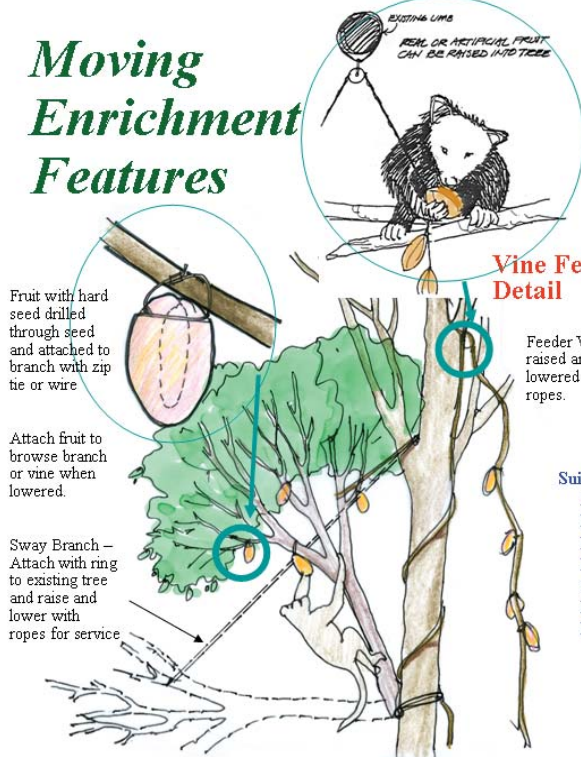
1. Drill out partitions between segments.
2. Cut slot for pouring in refrigerated crickets and meal worms.
3. Drill holes for crickets and meal worms to escape.

Suitable for

- Small to medium sized primates.
- Small carnivores
- Bats
- Many birds

Changeable and Interactive Bamboo Cricket/Meal Worm Feeders

Moving Enrichment Features

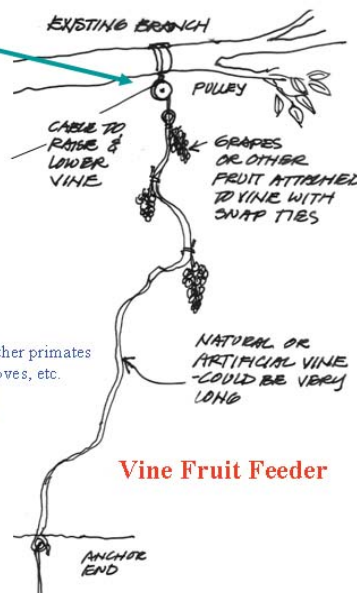


Vine Feeder Detail

Feeder Vine raised and lowered with ropes.

Suitable for

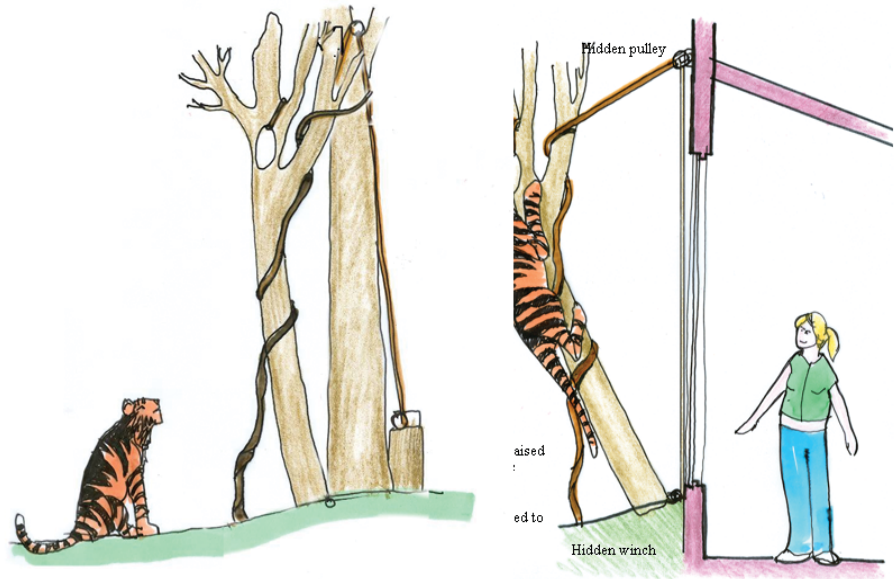
- Apes and other primates
- Hornbill, doves, etc.
- Binturong
- Red panda
- Squirrel
- Fruit bats
- Elephant



Vine Fruit Feeder

Naturalistic Environmental Enrichment Jon Coe Design P/L March 2006

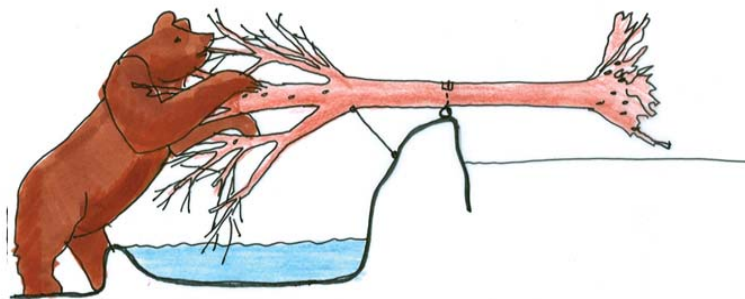
Moving Enrichment Features



**Sway Feeding Pole
Attached to Building**

Naturalistic Environmental Enrichment Jon Coe Design P/L March 2006

Moving Enrichment Features



Balancing Treat Logs

Suitable for

Bears
Big Cats
Giraffe
Rhinos, etc.

Smaller version

suitable for

Large birds,
Small cats
Smaller primates, etc.

holes through
ches and stuff with
ut butter, etc.



.....kle log to gunite

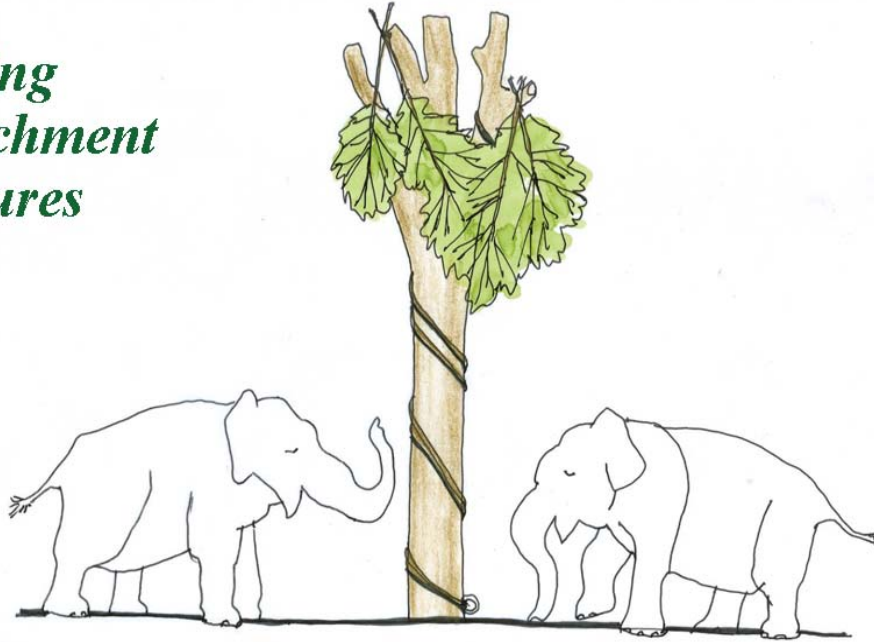
Log floats and bobs
in pool

Motion of bobbing log
attracts animals



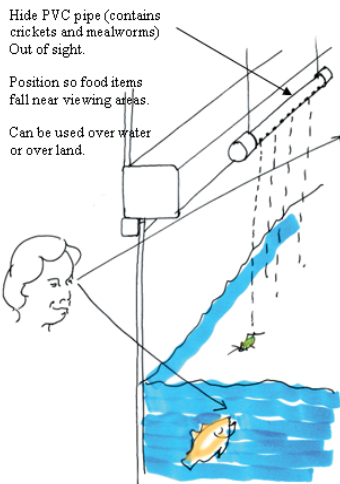
Naturalistic Environmental Enrichment Jon Coe Design P/L March 2006

Moving Enrichment Features



Elephant Push Tree

Hidden Enrichment Features



Hide PVC pipe (contains crickets and mealworms) Out of sight.

Position so food items fall near viewing areas.

Can be used over water or over land.

Suitable for
Water Animals
Fish
Otter
Platypus

Land Animals
Mongoose, Meerkat
Sun Bears, Sloth Bears
Foxes
Macaques
Bats



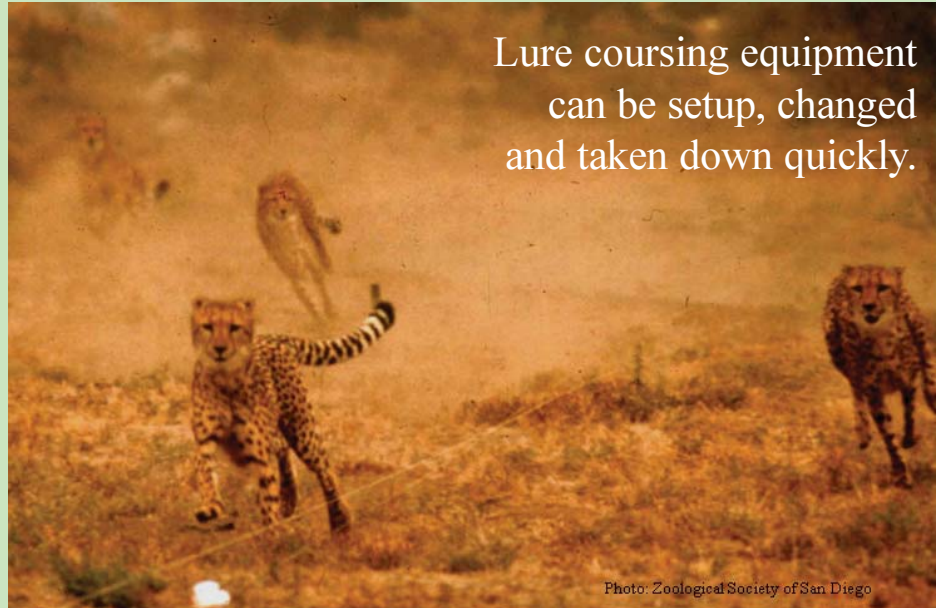
Infrared motion detector activates underwater jet as animals pass by.

Water may be warmer or cooler than ambient.

Water jet may transport food.

Suitable for
Otters
Seals, penguins, sea lions
Water monitor
Pygmy hippos and hippos
Elephants
Tapirs
Crocodiles

Temporary Enrichment Features



Lure coursing equipment
can be setup, changed
and taken down quickly.

Photo: Zoological Society of San Diego

Lure Coursing for Cheetahs

Off-Exhibit Enrichment Features



Highly enriched Orangutan
Day Room at Denver Zoo.
Photo Jon Coe



Elephant-Activated Shower at Columbus Zoo.
Photo Columbus Zoo

Use everything in Off-Exhibit Areas

Summary

- Think like a wild animal
- Keep it natural in display areas
- Understand and support storyline
- Build in features of enduring interest to animals
- Provide easily changeable natural attractions
- Use hidden delivery systems
- Use everything in off-display areas



Exhibits are a Zoo's
Natural Voice
Make enrichment count
for both Visitors and
Animals!



Biophilia:

The human bond with nature. Our attraction to nature is genetically determined, but culture determines how we express this interest.

Zoos are one form of this expression

Visitors' experience results from the interaction of:

- Context: Features around and in the exhibit perceived consciously and unconsciously
- Context: information and concepts which zoo educators want to convey.
- Message: Subjective mosaic of information and emotion which the zoo visitors actually experience.

Context: Entirely man made

Early zoos showed humans
in control of nature.

A visionary.....

1900's

One hundred years ago, Carl Hagenbeck
reintroduced the idea of animals as part of
nature.....and invented the theme park.

1930's –1970's

Context: Partly “natural” and partly “manmade”
Hagenbeck's ideas were widely copied, diluted
and misrepresented. Nature again was
represented as objects.

Modernism 1930's – 1970's

Modernist designers rediscovered Hagenbeck's multi-species panoramas and
interpreted them with modernistic rockwork.

The beginning of Immersion 1976

The first immersion gorilla exhibit was opened at Woodland Park Zoo, Seattle, U.S.
visitors enter the gorillas forest before encountering the apes themselves



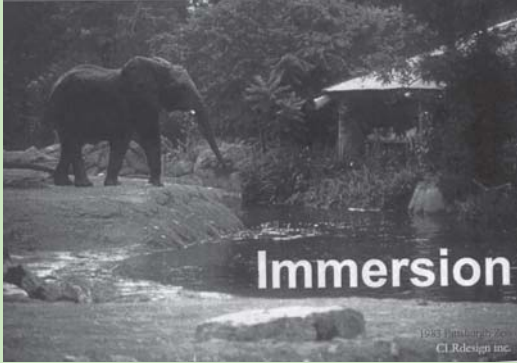
Children clearly
understood the
message:
“Animals and land
scape are
inseparated.”



1987 exhibit
Willie B steps
outside for the
first time in 27
years!



Willie B –before and after at Zoo Atlanta



Immersion Theory.....

“Immersion”.....
Like meeting a bear in Alaska!

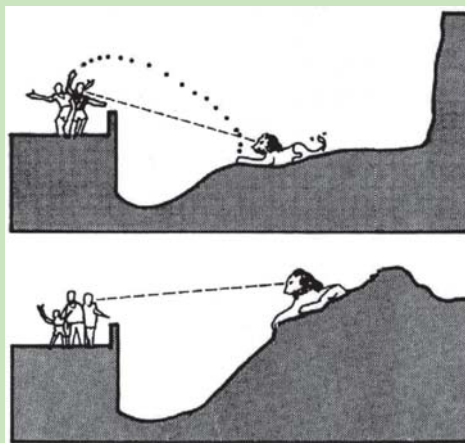


People in dominate position to direct and control

People in a subordinate position are more likely to learn

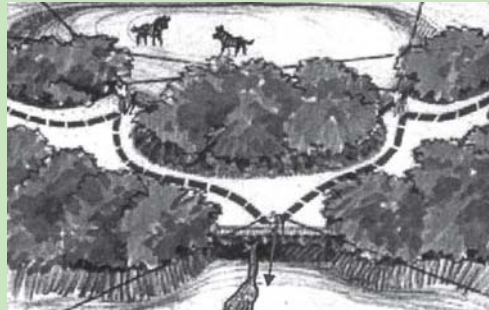
People looking down on animals want to control them.

People looking up to animals may respect them more.

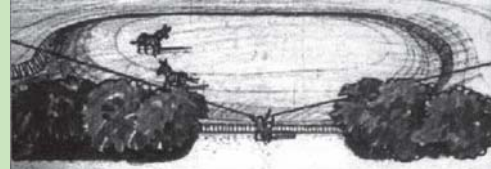




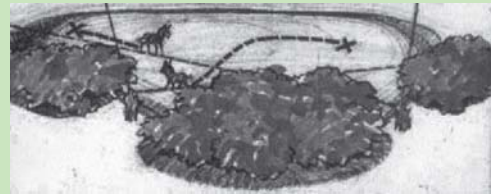
Break up viewers into small groups



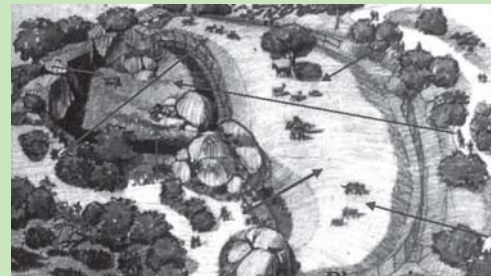
Allow the visitors to appear to move through the animal areas
Immersion concepts.



Don't allow entire exhibit to be seen



Allow the animals to move through the view



Plan using these concepts

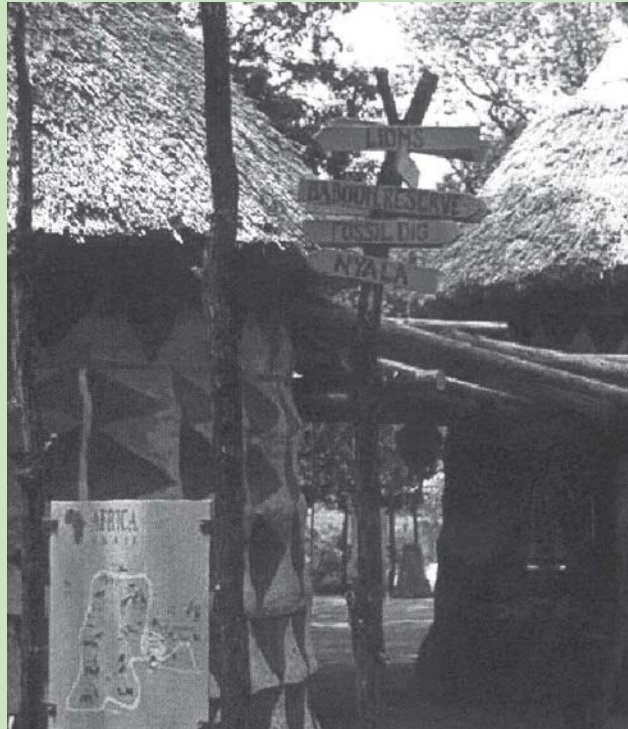
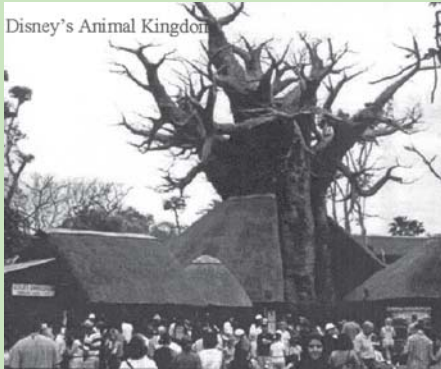
Is Green Space Enough?



Criticism of Immersion Exhibits

- Cost of Exhibits
- Animal Visibility
- Restrictions to Management Practices

Cultural Immersion



Natural Activities & Choices With activity-based design and husbandry

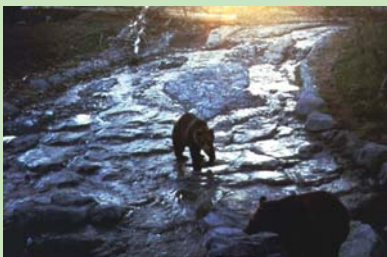
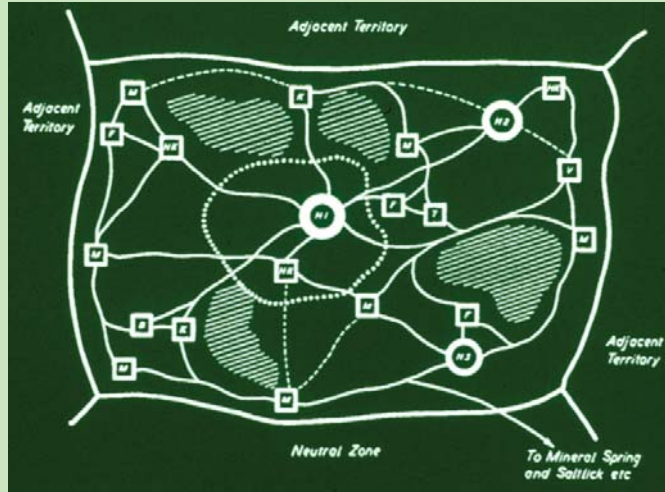


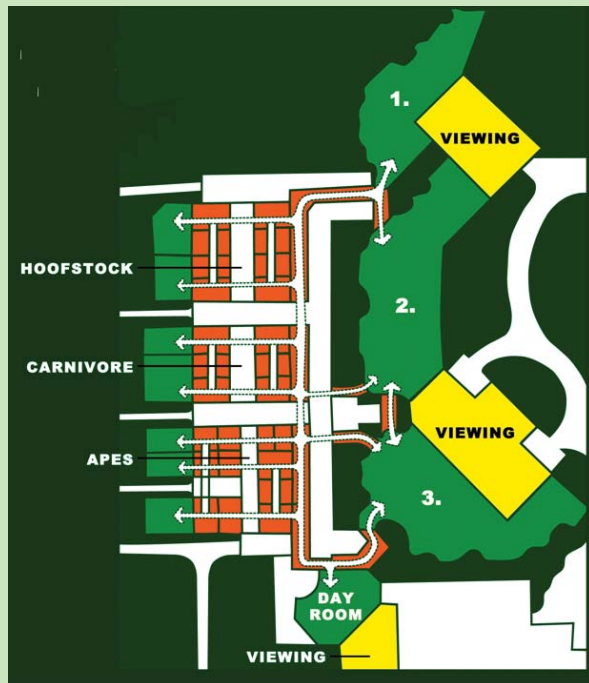
Photo: Zoological Society of San Diego



Hediger's Concept of Territory



Rotation exhibits



Making Rotation Work!



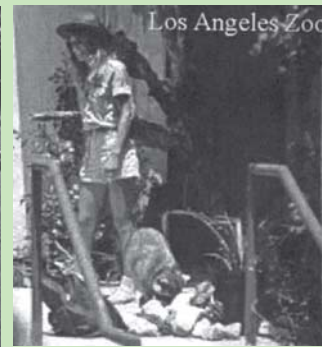
Transfers Training



Plus
Animal benefits
Staff benefits
Zoo visitor benefits

Minus
Added cost
Increased complexity
Increased risk

Tools of change shows & habitat theatre

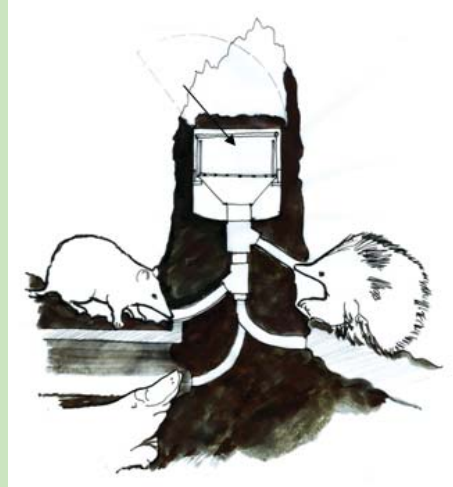


Tools of change Attracting Animals



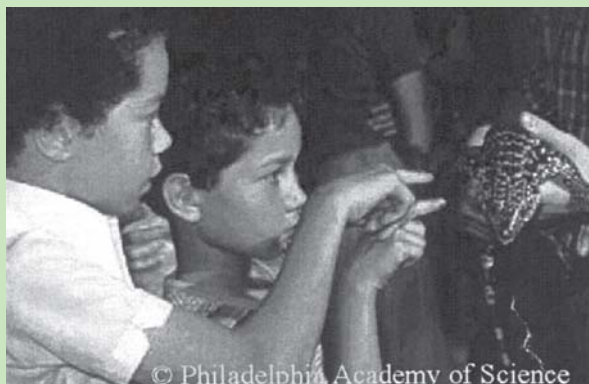
PVC Pipe Feeder

Place refrigerated meal worms, crickets etc. in removable food hopper



Low Provisioning Station

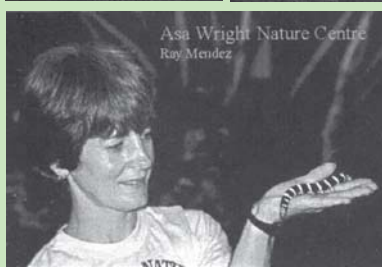
Tools of Change: Animal Close Encounters





Tools of Change: Expand the Senses

Tools of Change: Night Events & Encounters



Humane Design: What's Needed ?



- Space ?
- Microclimate ?
- Access ?
- Social Opportunity ?
- Delight ?

- Respect ?
- Freedom ?
- Choice ?
- Self Determination ?

Technical Session

II

Brahminy Kite (*Haliastur indus indus*)



Zoo Planning and Designing Tools

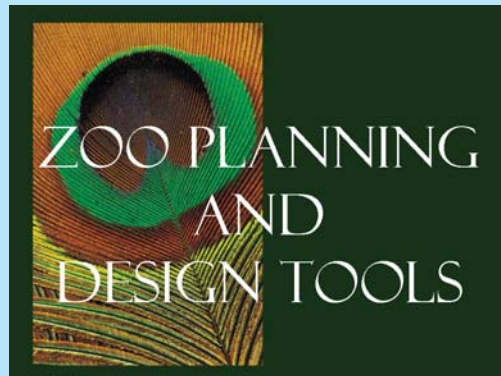
SPEAKER

Jon Coe

Landscape Architect and
Zoo Planner and Designer
Australia.



This talk on “Zoo planning and Design tools” by Jon Coe suggests some essential planning tips and design tools, required to be integrated during the development of master plan of a zoo. Such considerations enrich the planning and designing process for a desired growth and orientation.



What do you stand for?

Mission

- What is your purpose?
- Why do you exist?

Vision

- Where are you going
- How do you want to be known?

Message

- What do you want visitors to remember after their visit?
These affirmative statements should be prepared for the zoo as a whole in the Master Plan and also should be re-defined for each project undertaken.

Design Innovation

- What are the most limiting factors to zoo improvement?
 - Attitude of scarcity
 - Conservatism that only copies proven success (and mistakes)
 - Copies of copies reduce innovation
 - International Best Practice – a 25 year old idea that just got here

Design Innovation

- “Innovation does not swim in the main stream.”
- Innovation prospers in an environment of both great need and great freedom.
- Potential breakthroughs are found at the intersections of strong technologies or philosophies.
- Build bridges not boxes, share ideas freely.

Levels of Innovation

Business as usual

- Low risk
- Low gain!

Best Practice

- Modest risk
- Modest gain.

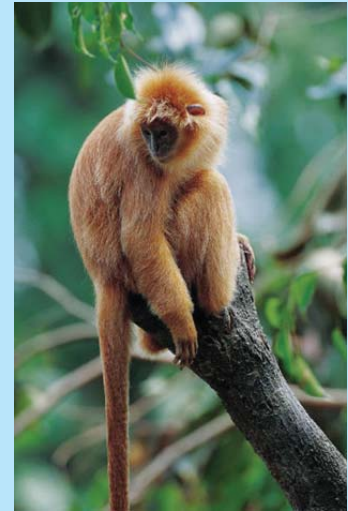
Cutting Edge

- High risk
- Possible high gain!

Next Generation Ideas

- Very high risk
- Gains...unknown!!

The Zoo Designer's Dream



It is possible for a zoo anywhere in the world with sufficient freedom, imagination and resources to move beyond the best existing zoo in the world.

How well do you know your audience?

- Regional demographics and trends
- Surveys of visitors
 - Audience satisfaction
 - Repeat visitation
 - Seasonal patterns
 - Daily patterns
 - Design days ($\pm 85\%$ of peak days)
 - Opportunities to spread attendance more evenly
- Tour groups
- School groups
- Society membership
- Donor community
- Peak days



How well do you know your animals?

- Existing species
- Quality of records
- Existing individuals
- Species-typical behaviour
- Conservation status
- Trends in husbandry and display
- Animal husbandry standards



Animal Husbandry Standards

Care standards, exhibit and off-exhibit sizes, barrier sizes, etc.

Australian Standards

- Exhibited Animal Protection Action (Australia) 1986
- Exhibited Animal Protection Regulations 1995
- Standards for Exhibiting Carnivores in New South Wales, Australia 2004

American Zoo and Aquarium Association

Taxon Species Advisory Groups Survival Plans

- | | | |
|---------------|----------------------|--------------------|
| ■ Antelopes | ■ Felides | ■ Rhinoceros |
| ■ Apes | ■ Marine mammals | ■ Rodents |
| ■ Sheep/Goats | ■ Marsupials | ■ Small carnivores |
| ■ Bats | ■ New World primates | ■ Tapirs |
| ■ Deer | ■ Old World primates | ■ Birds |
| ■ Elephant | ■ Pangolins etc. | ■ Reptiles |
| ■ Equids | ■ Prosimianus | ■ Fish |

Indian Animal Welfare Regulations

How well do you know your plants?

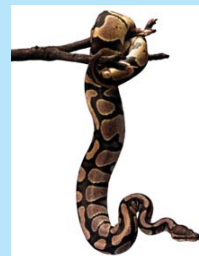
Tree surveys
and plant
inventories

- Species
- Health
- Condition
- Location
- Value
- History



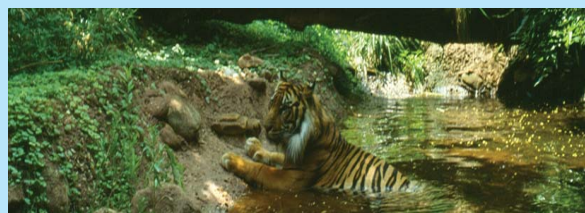
Traditional Thematic Organizing Concepts

- | | |
|------------------------------------|------------------|
| ■ Taxonomic | ■ Zoo-geographic |
| ■ Behavioural (nocturnal, aquatic) | ■ Popularity |
| ■ Mixed | |



Recent Thematic Organizing Concepts

- Bio-geographic (Biome)
- Cultural (African savannah village, Thai elephant camp)
- Conservation connections (replicate *in-situ* sites)



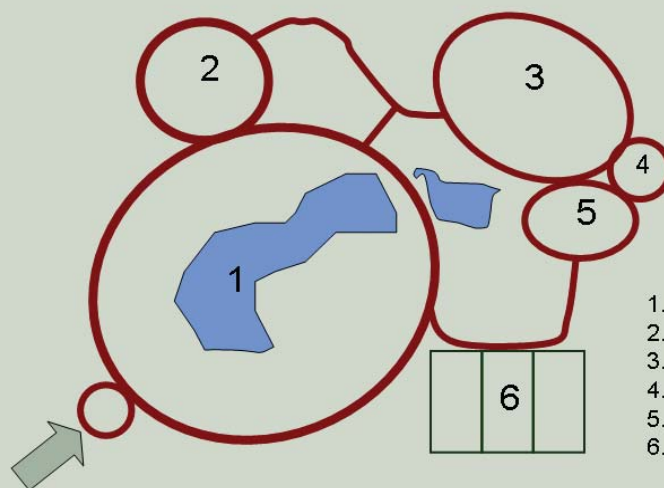
Wayfinding & Circulation



Jon Coe Design, P/L

Public Circulation Concepts

Traditional Victorian Park



Advantages

- Fits natural features

Disadvantages

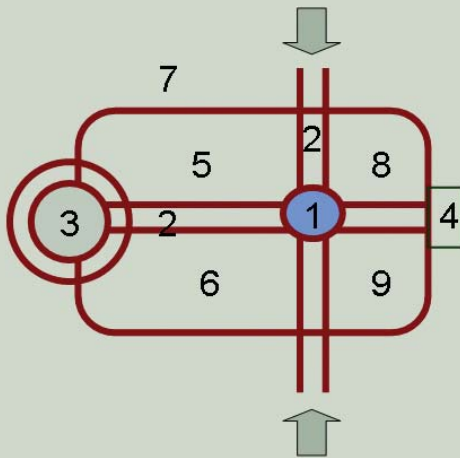
- Subjects not related
- Wayfinding difficult

1. Lake
2. Aviary
3. Bears
4. Reptiles
5. Big cats
6. Hoofstock

Jon Coe Design, P/L

Public Circulation Concepts

Traditional Formal Park



1. Fountain
2. Alee'
3. Goat Mountain
4. Restaurant
5. Elephants
6. Birds/Reptiles
7. Hoofstock
8. Big cats
9. Bears

Advantages

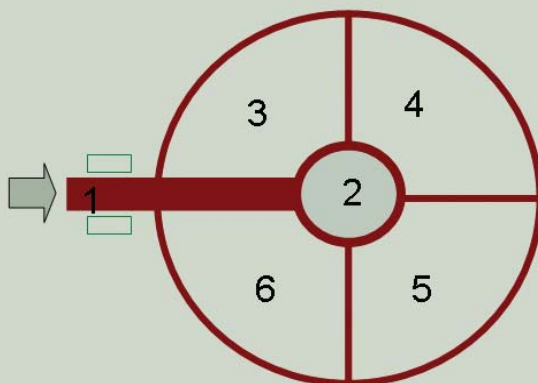
- Wayfinding is easy
- Relationship of areas is clear

Disadvantages

- Monumental landscape overwhelms exhibits

Public Circulation Concepts

Recent Hub and Spoke



1. Mall
2. Castle
3. Frontier Land
4. Fantasy Land
5. Tomorrow Land
6. Adventure Land

Advantages

- Wayfinding is easy
- Relationships of areas are clear

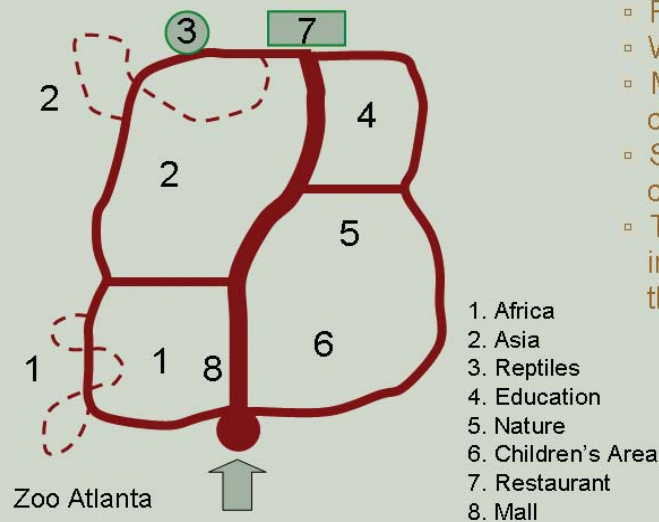
Disadvantages

- Monumental architecture overwhelms exhibits

Disney's model

Public Circulation Concepts

Recent Mall and Loop



Jon Coe Design, P/L

Advantages

- Fits site
- Wayfinding is easy
- Mall-primary circulation connects visitor precinct
- Secondary loop paths connect all themed areas
- Tertiary loop paths immerse visitors in themed exhibits

Public Circulation Concepts

Recent Loop and Sub-loop



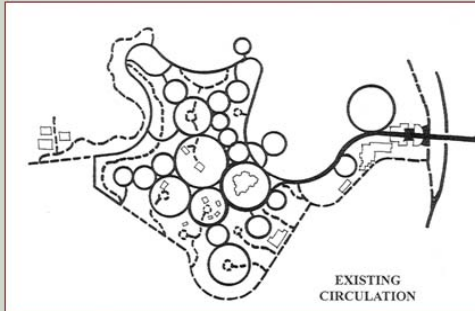
Woodland Park Zoo

Jon Coe Design, P/L

Advantages

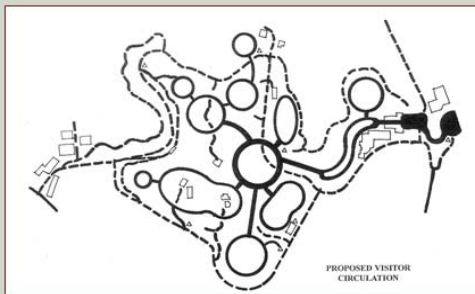
- Fits site
- Wayfinding is easy
- Allows multiple entries

Circulation Hierarchy



Bad Example

- All paths are the same size
- All loops look the same
- “Y” intersections cause back tracking



Good Example

- Clear hierarchy of paths
- All loops are distinct
- Intersections are clear

Los Angeles Zoo circulation planning

Jon Coe Design, P/L

About Exhibits Types



Exhibit Types

Modernism

Immersion

Cultural

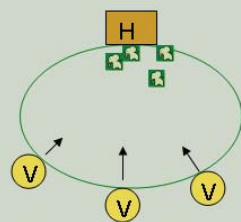
Rotation

Affiliative

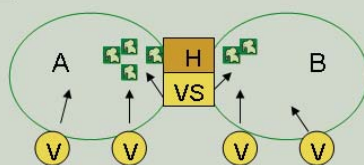
Unzoo



Potential Exhibit Layouts



Traditional Exhibit



Alternative Exhibit

Advantages

- Separates visitors from service areas

Disadvantages

- Animals spend most time at holding building distant from viewers
- Holding building difficult to conceal

Advantages

- Separates visitors from service areas
- Themed view shelter hides holding building while giving close-up views of animals
- Animals can rotate between exhibits A and B



Trends in Display and Holding

Typical Outdoor Space Allocation

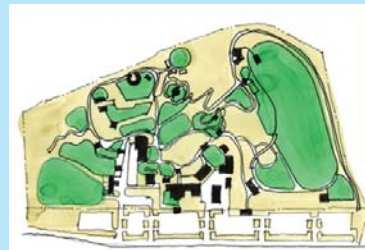
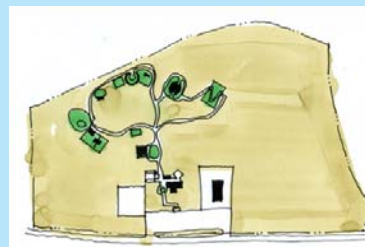
Example: California Living Museum

Before Re-development

Animal space	10-15%
Public space	75-85%
Service space	5-10%

After Re-development

Animal space	40-50%
Public space	20-30%
Service space	15-20%



Animal Space:



Public Space:






Service Space:

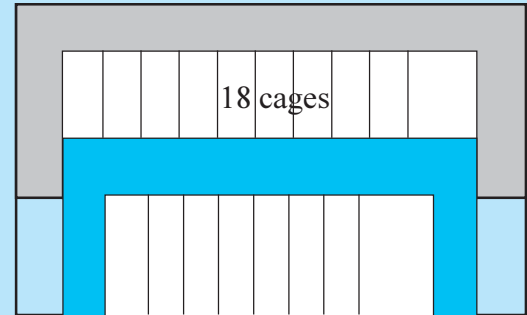


Trends in Display and Holding

OLD: Postage Stamp Collections

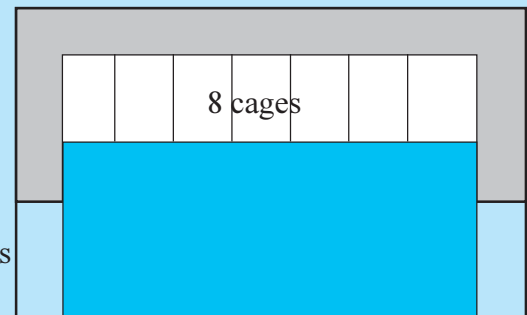
Maximum number of species in
Minimum space
Breeding on display

-  Service/Conservation
-  Display Areas
-  Public Viewing



NEW: Larger Displays of Fewer Species

Regional integration of breeding programs
Breeding in off-display



Typical Interior Space Allocations

For indoor display facilities for reptiles, birds, insects, small mammals, nocturnal houses etc.

30% Public areas

30% Display areas

30% Off-display, conservation, breeding,
keeper (walk/access) and storage areas

10% Mechanical equipment

Trend: Off-display breeding/conservation areas
are becoming larger and more expensive

Planning for Growth



Planning for Growth Attendance Targets

■ Present annual attendance	Models from the USA	
■ Long term trends	Toledo Zoo attendance	1 million
■ Regional population growth	Toledo regional population	618,000
	Market penetration	160%
■ Market growth (families with children or grandchildren)	Woodland Park Zoo	1.2 million
	Seattle regional population	2.4 million
	Market penetration	50%
■ Market penetration (<i>how many visitors in your area attend</i>)	Wildlife Conservation Society	
	3 zoos in New York City	4.2 million
	NYC regional population	9.3 million
	Market penetration	45%
Attendance ÷		
Potential Market =		
% of market penetration		

Planning for Growth Annual Attendance

Annual Attendance	500,000
Extreme Peak Day Attendance	20,000
Typical Peak Attendance	12,000
Design Day (85%)	10,200
Maximum simultaneous attendance (75%) (visitors in park at one time)	7650

Planning for Growth: Car Park

Arrival in private car 20%* (* test all in your own facility)

$7650 \times .20 = 1530$ people

$1530 \div 4$ per car* = 382 parking spaces

382 spaces $\times 25$ m² per space = 9550 m² for car parking

Arrival by motorcycle 50%*

$7650 \times .50 = 3852$ people

$3852 \div 2$ per motorcycle* = 1913 parking spaces

1913×3 m² per space = 5739 m² for motorcycles

Arrival by coach 30%*

$7650 \times .30 = 2295$ people

$2245 \div 40$ per coach* = 58 coaches

58×130 m² per coach = 7540 m² for coach parking

Total minimum parking area

Cars = 9,550 m²

Motorcycles = 5,739 m²

Coaches = 7,540 m²

Total excluding roadways to parking area = 22,829 m²

Planning for Growth Entry and Ticketing

7650 maximum simultaneous attendance on design day

arrive in maximum 3 hour period*

3 hours = 180 minutes

7650 maximum arrival \div 180 minutes = 42 transactions/minute

2 transactions per minute* = 21 transactions

5 minute queue time = $21 \div 5 = 4$ ticket booths

* *Test these assumptions in your own facility*

Planning for Growth: Food and Beverage Service

7650 maximum simultaneous attendance

Visitors using "sit down" service 60%*

(much lower if visitors are allowed to bring picnic baskets)

4590 people \div 6 people per table* = 765 tables

Turnover per table = 3 per hour for 2 hour peak*

765 tables \div 6 = 128 tables required

Table + aisles = 5 m² per table

128 tables x 5 = 640 m² seating area

Outdoor seating: 66% of 640 = 426m²

Indoor seating: 33% of 640 = 211 m²

Fast Food Facilities (USA)

Kitchen and support areas 20% of total area

Indoor eating areas 27% of total area

Outdoor eating areas 52% of total area

Total Facility 100%

Planning for Growth Toilets

7650 maximum simultaneous attendance

Male users per peak hour = to be determined*

Female users per peak hour = to be determined*

7650 maximum simultaneous attendance (3 hour period)

50% male (?)* = $3825 \div 3 \text{ hours} = 1275 \text{ per hour}$

50% female (?)* = $3825 \div 3 \text{ hours} = 1275 \text{ per hour}$

Test existing good facility; males per hour; females per hour(?)

$1275 \div (?) = \text{male toilet facilities}$

$1275 \div (?) = \text{female toilet facilities}$

Family rooms and Handicapped facilities

Architect can determine building sizes

Test all assumptions in your own facility.

Consultants

Types of Consultants

Physical Planning

- Planners
- Designers
 - Architects
 - Landscape Architects
 - Exhibit Designers
 - Graphic Designers



(Larger firms may combine some of these services in-house.)

Business Planning

- Financial Planning
- Marketing
- Development (fund raising)

Management & Operations

- Curatorial
- Operations
- Security
- Sustainability

Sources of Consultants

Private Zoo Specialist Firms

- Most knowledgeable and up-to-date
- Least available

Mainstream Architects and Engineers

- General technical competence
- Don't understand zoos or "big picture"
- May be biased by their own culture

Exhibit Designers

- Good for small, detailed projects
- Not usually suitable for master planning

University Staff and Students

- May be good on theory
- Short on practical experience
- Students need strong directions

Other Zoo Professionals

- Good regional knowledge
- Improve regional cooperation
- May not have "big picture"

Working with Architects & Engineers

Give Clear Complete Instructions

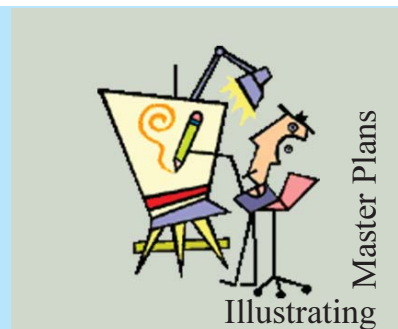
- Clear, detailed project brief
- Clear contract
- Instructions, review and approvals in writing
- Avoid both zoo and architectural "jargon"

Visualization

- Require understandable early sketches and plans
- Require sketch models or virtual "walk-through" simulations early in each project, not just as final presentations
- Require cost estimates early in each project

Clash of Cultures

- Don't be influenced by architectural styles or culture
- Animals and landscape are more important than architectural expression



Typical Illustrations



Typical Illustrations

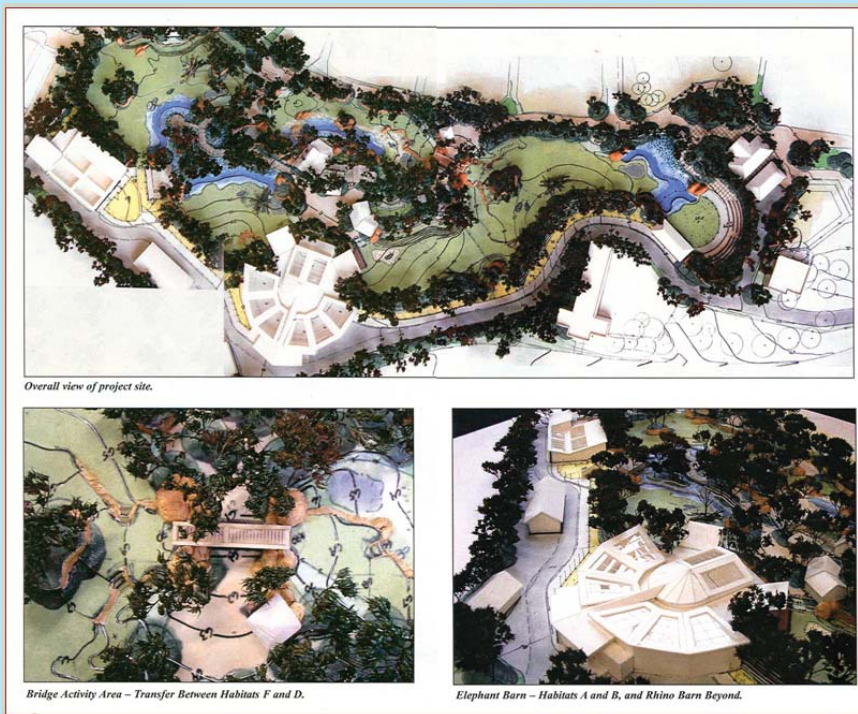
SITE CONCEPTS & EXHIBITRY



Typical Illustrations



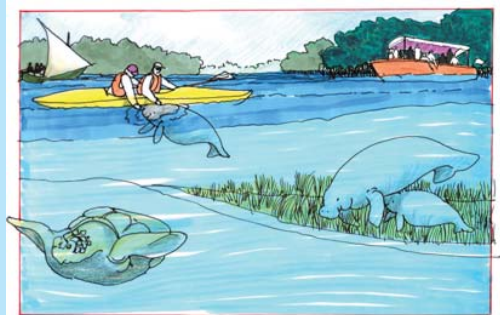
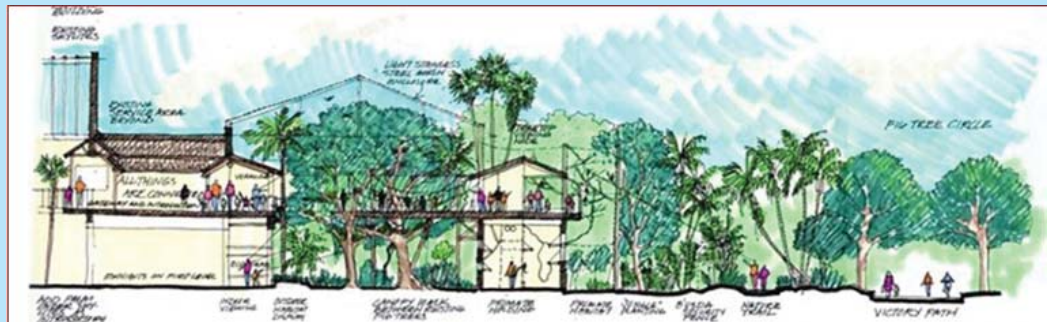
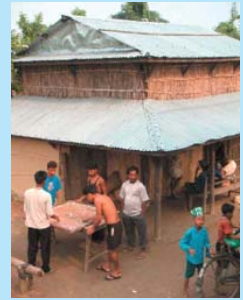
Schematic Design Model



Additional Illustrative Tools



Models
and Reference
Photographs



Kayak, glass-bottom boat and traditional dhow viewing experiences.

Cross-sections
Concept sketches

Prioritizing Goals for Master Plans of Existing Zoo and New Zoo

SPEAKER

S.K. Patnaik

Former Addl. PCCF (Wildlife)
and Chief Wildlife Warden,
Orissa and now, Member,
Technical Committee, CZA



Initiating the talk with the concept of Management Plan, various components were described in detail by Sri S. K. Patnaik. The conceptual and operational areas of importance for achieving the essential components of Management Plan were explained with the inputs from his vast experience.

- Having Known about what a master plan is it is necessary to prioritize its goals to make it an useful document. It is not meant just to satisfy the requirement of Recognition of Zoo Rules

It should be able provide guidance for

- Modernizing the zoo with latest zoo concept.
- Save money, time and energy.
- Should provide excellent ambience for animals & visitors.
- Provide scientific information to visitors

The Master plan should prioritize its goals keeping in view

- Land available.
- Financial support anticipated.
- Landscape.
- Climate.
- Existing technical capability.
- Anticipated flow of visitors.
- Staffing pattern (Administrative setup) .

This will be different for new/existing zoo.

The priority shall be different according to the objective/theme

The first priority will be a proper layout plan keeping in mind

- Available land area
- Topographical features
- Approach/Existing Roads/Paths
- Existing structures
- Vegetation
- Water bodies
- Collection plan
- Visitation

Animal Collection Plan shall very strongly influence the master plan which shall depend on

- Climate
- Animal species found locally in the wild.
- Veterinary facility including specialized treatment available.
- Funds/Space for suitable exhibit.
- Skill & experience to handle particular endangered species.
- Funds for feed & up keep
- Availability of surplus stock available with other zoo to procure

Landscape planning, lawns, gardens, paths, toilets, drinking water, rest shed, kiosks need attention also. That would depend on :

- General Landscape & Topography.
- Visitation.
- Area of the park.
- Climate.

Zoo education need to be given due priority. They may include

- Interpretation centre
- Signage
- Brochure
- Guide Service
- Recorded commentary
- Information Kiosk

Panning Administrative setup and deployment of technical and non technical staff and their phasing shall depend upon

- Number of species/number of animals to be displayed
- Number of enclosures planned
- Area and dispersal activities.
- Other ancillary facilities.

Safety, Security and disaster management are important for master plan and may include

- Protective fencing
- Security staff
- Safety equipments
- Warning signals
- Disaster preparedness and drill

Research is an important component of modern zoo. The master plan should keep provision for required.

- Infrastructure
- Equipments
- Scientific & support staff

While it is much easier to prioritize components in case of a new zoo, it is difficult for an existing or very old zoo,

- The existing facilities need be evaluated
- Financial position for taking up desired changes need be examined
- Experience of the zoo personnel & short coming noticed to be taken in to consideration for prioritizing the components

Zoo Master Plan Why & How?

S.K. Patnaik

Former Addl. PCCF (Wildlife)
and Chief Wildlife Warden,
Orissa and now, Member,
Technical Committee, CZA

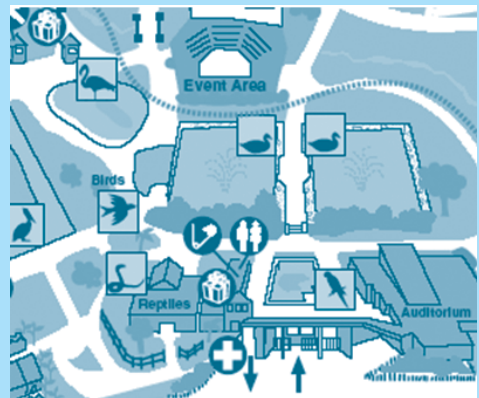
Master Plan

Master Plan is a document which outlines the proposed all round development of a zoo for a reasonably long period of about 10 to 20 years. However the factors to be kept in mind are;

- Space available
- Landscape
- Funding support
- Expectation of Visiting People

Master Layout Plan

Master Layout Plan is a detailed landscape map of the existing zoo or site, It's available facilities and development proposed during the plan period. This is drawn to appropriate scale say 1:1000 to 1:5000 with appropriate contour interval based on landscape indicating all salient features of the site. (0.5m to 2.00 mt based on topography)



Collection Plan

Collection Plan, is a plan, listing animals and their numbers, which the zoo intend to procure and house in the zoo. While doing so, care should be taken to see that smaller number of species in large social groups are planned to be kept, Priority should be given to the locally occurring species and those, which are from similar climatic conditions. This collection plan should keep in mind the space, facility and expertise with the zoo, and species which can be procured from other zoos of the country or abroad without difficulty.

Why prepare a Master Plan?

- To plan development as per theme, collection plan, conservation priorities and convenience of management.
- To prevent unplanned growth based on individual whim or uninformed public demand.
- To facilitate preparation of management plan/budget.
- To make proper personnel planning.
- To plan arterial roads and visitor amenities.
- For sustainable, judicious and aesthetic use of scarce land resource.
- Priority allocation of scarce financial resource.

Before drafting the master plan it is of utmost importance and crucial to set your goal for the zoo, by the end of the plan period and planning shall follow keeping that goal in mind.

- What will be the theme
 - ▶ Eco system approach
 - ▶ Will it house a particular class or order?
 - ▶ High altitude species
 - ▶ Paranoiac disposition
- Conservation breeding centre
- Amusement park
- Safari park
- Nature education centre
- Etc...

Master Plan

Part I – Existing Situation

Part II – Planning

Master Plan - Existing Situation

- a Location and approach
- b Topography
- c Vegetation
- d Legal status
- e History of zoo or site
- f Water & power Source
- g Existing structure & facilities
- h Visitation
- i Facilities in different sections and their management
- j Visitor amenities

Planning

- Master layout and plan
- Animal collection plan
- Proposed development – unit wise:
 - i Administrative pattern
 - ii Animal section
 - iii Veterinary section
 - iv Lawns & gardens
 - v Internal roads
 - vi Stores
 - vii Maintenance section
 - viii Revenue section
 - ix Research
 - x Education
 - xi Tourist amenities
 - xii Water supply
 - xiii Sanitation including disposal of solid & liquid waste
 - xiv Power supply
 - xv Other sections

How to Prepare a Master Plan?

- 1 In house consultation with:
 - ▶ Present senior zoo staff
 - ▶ Former senior zoo staff
 - ▶ Biologists (From Universities etc.)
 - ▶ Architects and landscape planners
 - ▶ Local leadership
 - ▶ Visitors in process
 - ▶ Vegetation
 - ▶ Other stake holders

Consultations to be facilitated by outside consultants, if required

- 2 Through External Consultants:
 - ▶ When it is a new zoo
 - ▶ When no local expertise is available

Consultants can be provided with different inputs to make their efforts easier. There should be arrangement of review its functioning and course correction, if required periodically, may be every 5 years.

Master Plan of Nandankanan Zoological Park History, Background and Future Development

SPEAKER

S K Sinha
Director,
Nandankanan Zoological Park
and Member, IUCN-SSC-CBSG



Photo: Brij Kishor Gupta

Nandankanan Zoological Park is one among the few foremost zoos of the country with an approved in operation. It is essential to understand the process of development of the zoo and identify emerging issues and trends in zoo management for the preparation of a good, integrated and holistic Master Plan which ensures strategic vision and mission of the zoo. All these aspects were covered with reference to Nandankanan Zoological Park in this lecture/presentation by S.K.Sinha, Director, Nandankanan. This presentation was also designed to meet the introductory requirements of explaining various aspects of this zoo for field exercises on Master

Planning (conducted subsequently at Nandankanan Zoological Park as per the programme). The presentation covered the introductory information, mission, history and background, development process from 1960 onwards and development as on present date, present scenario, future development etc. The strength and weakness, keeping in view the requirements of good master planning were also discussed for future development and for providing an insight to these details in the learning process and taking advantage of the same while developing master plans of the respective zoos.

MASTER PLAN OF NANDANKANAN ZOOLOGICAL PARK

HISTORY, BACKGROUND AND FUTURE DEVELOPMENT



NANDANKANAN

- Amidst Natural Forest along the banks of Kanjia lake lies Nandankanan that got its name from “Nandan Van” meaning the “Garden of Gods”. **Nandankanan Zoological Park**, one of the premier large zoos, is set in a beautiful natural setting and is one of the finest Zoos in the country. The Zoological Park together with Kanjia lake and Botanical Garden, is notified as **Nandankanan Wildlife Sanctuary**.
- The zoo spreads over a large expanse of undulating topography with natural forest, water bodies and other natural features which help the inhabitants of the zoo to live in a habitat close to their natural one. Such features also help in making the entire area of Nandankanan more natural and create proper ambience.

Category	Date of Establishment	Area in (in Sq.Kms)	Location
Nandankanan Zoological Park	29.12.1960	3.62	Between 20°23'14" to 20° 23' 35" North Latitudes and 85° 49'1" to 85° 50' East longitudes along the East Coast Railway's Kolkata (Howrah) – Chennai Line near Barang Rly. Station, 15 kms. from Cuttack Rly. Stn. & 18 kms from Bhubaneswar Rly. Stn.(About 10 kms from Northern fringe of BBSR City) by road. ORISSA, INDIA
Nandankanan Wildlife Sanctuary	03.08.1979	4.37	As above

MISSION

“To achieve and promote the conservation of wild animals and their habitats.”

Nandankanan pursues this mission by:

- **Keeping and presenting wild animals** in accordance with suitable conservation practices
- Taking up **conservation breeding** of different species of wild animals, particularly the endangered species belonging to the region
- **Rehabilitating/establishing endangered species** of wild animals in their natural habitats whenever appropriate and desirable
- **Increasing public understanding** of wild animals and their welfare and of the issues involved in their conservation
- Maintaining **Education and Information Programmes** for visitors, particularly for school children/younger generation
- Undertaking **Field Conservation Programmes**
- Providing a platform for **Research and Scientific Study**
- Organising **Training Programmes** in management of wild animals, *ex-situ* conservation of species, Zoo design/planning etc.

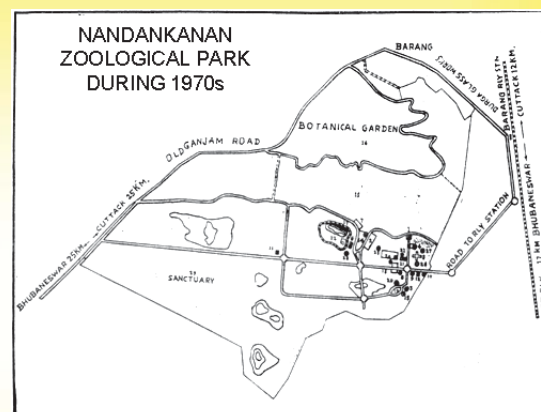
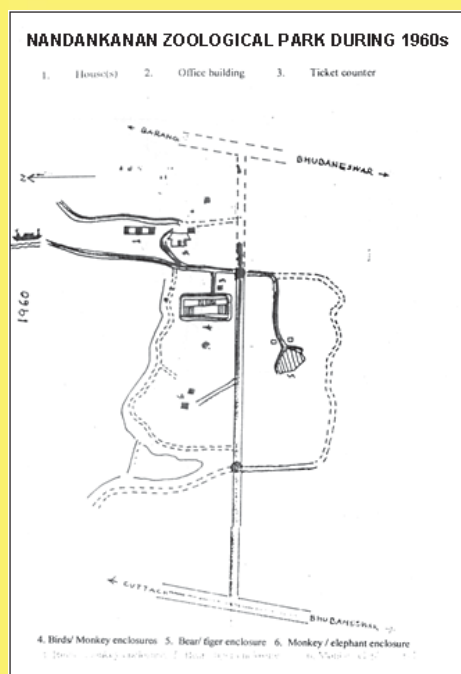
- Fulfilling its various roles through publications, scientific meetings/lectures, promotion of conservation policy/ planning etc.
- **Complementing and strengthening the national efforts** in conservation of rich biodiversity of the country, particularly the wild fauna
- Rendering **assistance** in rescue, rehabilitation and treatment of wild animals at the time of need.

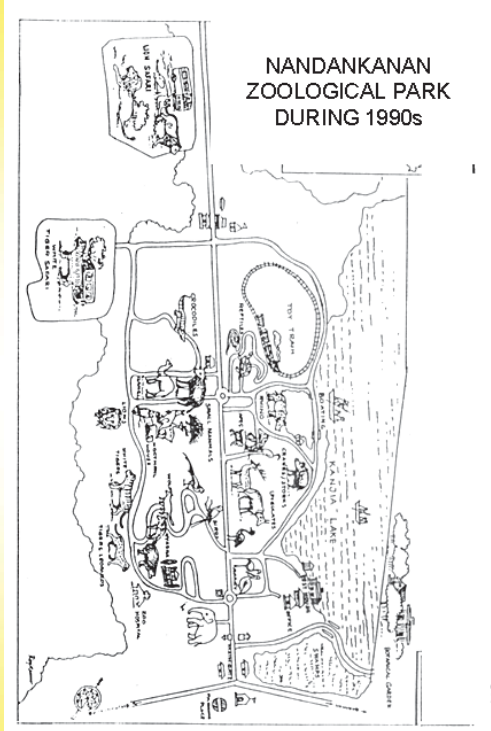
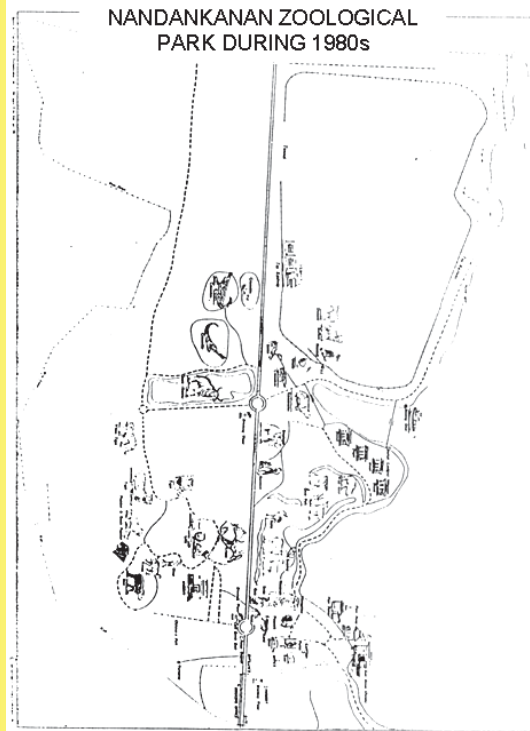
As a result of various activities undertaken, Nandankanan has emerged as a vibrant centre for wildlife conservation.

HISTORY AND BACKGROUND

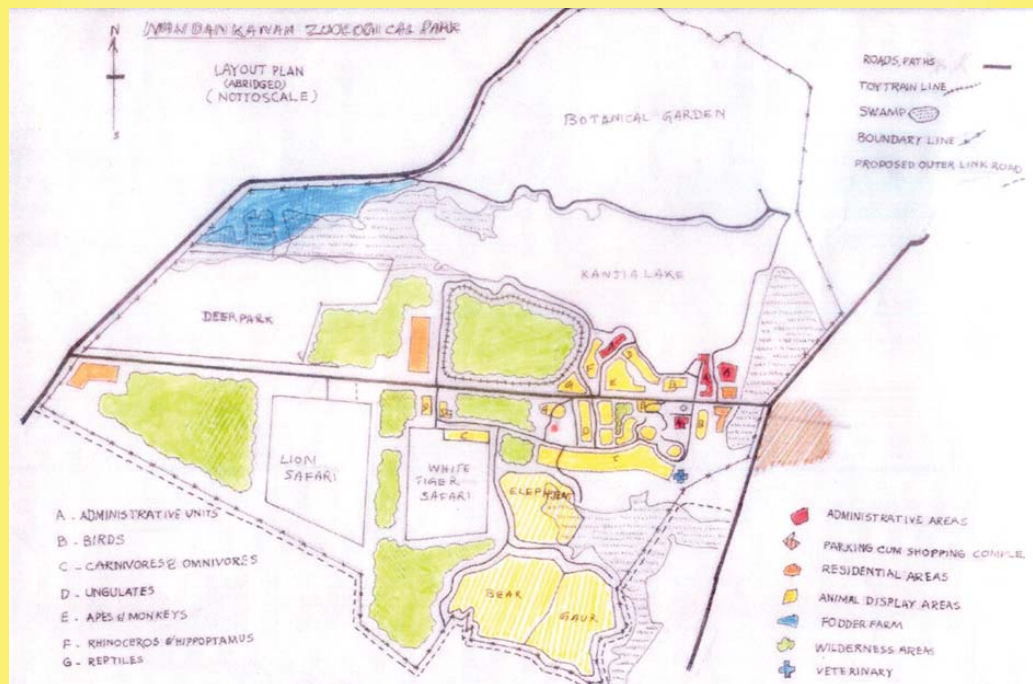
- Started with a few animals as small zoo in 1960 but planned to become major Zoological Park in the country. In the World Agriculture Fair organized in New Delhi in Jan – Feb. 1960 — animals collected from different parts of the state. After the fair, animals kept at Khandagiri – water scarcity (main problem) – thought of relocating at convenient place.
- The then Chief Minister, Dr. Hare Krushna Mahatab and Minister for Development Dr. Radha Nath Ratha alongwith senior forest officers located the present site along Kanjia lake in Jujhagarh and Krishna Nagar Demarcated Protected Forest.

- On 29th December, 1960, Sri S.K.Patil, the then Minister of Food and Agriculture, Govt. of India inaugurated the New Biological Park named as Nandankanan.
- 1963: Botanical Garden established on the other side of Kanjia lake.
- 1967 : Late Saroj Raj Choudhury prepared one Master Plan for the zoo in August, 1967 for the next 20 years
- 1972: a five year plan prepared by Sri R. Mishra, the then WLCO.
- 1973: Zoo Expert Committee set up by Govt. of India, categorized it as ‘B class’ zoo
- 1979: Declared as Sanctuary under the provision of Wildlife (Protection) Act, 1972.
- Subsequently, Nandankanan Biological Park renamed as Nandankanan Zoological Park on recommendation of Orissa Legislative Assembly Committee on Estimates, 1981-82.
- Gharial breeding (1980), White tiger(1980), Kanan (1967), Lion Safari (1984) – 20 ha. White Tiger Safari (1991) – 12 ha. etc
- Other facilities/services developed over the years.
- 1999 – Super Cyclone.
- Restoration phase (2000 onwards)
- First integrated modern master plan, 2001-2020





Layout Plan (Present Master Plan)





PRESENT SCENARIO & FUTURE DEVELOPMENT SALIENT FEATURES

The Zoological Park covers an area of 362.1 ha. including the water body of Kanjia lake spread over 66.1 ha. Out of this, the present coverage of the area for different purposes are as follows:

- Roads & paths (5.6km + 7.52 km over 4 ha.)
- Animal house including shelter & caves (over 75 ha)
- Residential quarters (5.57 ha)
- White Tiger safari (12 ha)
- Boating station (0.0114 ha)
- Nature trail (Herbivore safari) (36ha)
- View point (0.0093 ha)
- Water supply arrangement (0.40 ha)
- Nocturnal animal house (0.03 ha)
- Railway line and Station (1.58 km + 0.0206 ha, total over 0.86 ha)
- Booking office (0.002 ha)
- Zoo office (0.0017 ha)
- Lion Safari (20 ha)
- Children's park (0.4725 ha)
- Reptile park (1 ha)
- Zoo hospital (0.3595 ha)
- Stores (0.0447 ha)

- Prioritizing wild animal species
- Collection Plan
- Housing
- Enrichment
- Arrangement of display
- Co-operative Management (eg: single species, New blood line, Exchanges etc)
- Conservation breeding
- Looking towards lower phyla of animals (amphibians, fishes, invertebrates)
- Modifications or Rearrangement of existing enclosures : Recommended with details (Many incorporation time to time)
- Enrichment of enclosures
- Construction of New Enclosures (eg. Aviary for aquatic birds, Moated enclosure for elephants etc)
- Phasing out of surplus animals.
- Health Care Management
 - ▶ Various recommendations - most of them under implementation.
 - ▶ Various facilities created in phases.

- Sanitation and cleanliness (eg: Schedules and protocols, Waste management, Regulation for use of polythene, Disposal of liquid waste etc.)
- Environmental amelioration measures (eg: Lawns and Gardens, Nursery, planting of Seedlings of various tree species, Orchidarium etc.)
- Fodder Cultivation:
 - ▶ Fodder farm : 33 Acres, Managed : 15 Ac.
 - ▶ NB-21, Stylo, Various other Grasses – Common and Para grass, Maize, Miscellaneous crops etc
 - ▶ Average per day yield :12 to 15 quintals.
 - ▶ 4000 – 4500 quintal production annually.



Nursery



Fodder farm

- Landscaping and beautification
- Visitors' amenities (eg: Parking place, visitors' movement and other facilities and Services etc.)
- Education and Awareness. (eg: Programmes, Publications, Nature shop, Interpretation centre, Nandankanan Zoo School etc.)
- Research
- Management & Development of Swamps/Water bodies
- Managing Human resources (eg: Zoo Manual, training etc.)
- Zoo emergencies and Contingency plan
- Data base management and Information system
- Acquired Area/Site Development
- Other Miscellaneous Considerations.
- Society for management and development of Nandankanan Zoological Park
- Integrating the services of other organisations (OVC, University, NGO, OREDA)
- Kanjia Lake development – wetland management and wet land value, desiltation, outlet through channels, embankment etc.
- Water rides, underwater viewing, cultural connections, local biomes, lake safari, Lake pavilion, animal island, education etc.
- Holistic & Integrated development of entire Nandankanan complex — Both Zoo and Botanical garden – many possibilities to be explored.



Experiment on assisted reproduction in collaboration with CCMB, Hyderabad



Pangolin (*Manis crassicaudata*)



Macaque, Lion-Tailed (*Macaca silenus*)



Python



Tiger (*Panthera tigris*)



Sloth Bears



Water Monitor Lizard (*Varanus salvator*)



Gharial (*Gavialis gangeticus*)



Mouse Deer (*Tragulus memmina*)



Chameleon (*Chamaeleon zeylanicus*)



Indian one horned Rhinoceros



Lions in Lion Safari



Cobra (*Naja naja*)



Peafowl, Indian (*Pavo cristatus*)



Orang Utan



Ratel (*Mellivora capensis*)



Sarus Crane (*Grus antigone*)

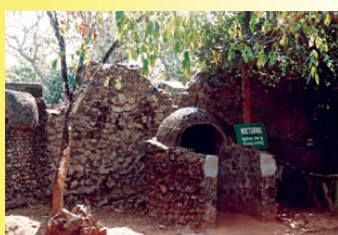


Chimpanzee



NOTABLE ATTRACTIONS

- A variety of wild animals, particularly the rare endangered species
- White tiger and Lion Safari
- Reptile Park • Aquarium
- Aviary for aquatic birds
- Nocturnal animal house
- Nature interpretation centre
- Boating • Deer Park
- Lake view and Natural Trail
- Educational/Awareness Programmes
- Film Shows • Library
- Elephant Ride • Toy Train
- Aerial Ropeway



GLIMPSES OF SOME OTHER FEATURES



Kanjia Lake & Boat Ghat



Visitor's shed



Entrance gate



Boat Ghat



Toy Train



Nursery



Visitor's shed



A sit out in natural ambience



A naturalistic rest area



Conservation education in collaboration with Z.O.O



Students on educational tour



Participating students of N.K. Zoo School



Zoo Library



AWARDS & HONOURS

Pollution Control Appreciation Award - 2003

Nandankanan Zoological Park received “Pollution Control Appreciation Award – 2003 “ (a State level award instituted by State Pollution Control Board, Orissa) in appreciation for implementing effective Pollution Control Measures and adopting good environment management practices and constant efforts being put for further protection of environment. The award was received on 03.12.2003 by the Director from Hon’ble Minister, Energy, Science, Technology & Environment.



Other Awards and appreciation:

Nandankanan received 46 awards and appreciation in annual flower shows organized by various organizations in different categories during 2005-06

How to Prioritize Animal Collection Planning?

SPEAKER

Bernard Harrison

Principal Partner
Bernard Harrison & Friends Ltd.
Singapore

Topics Covered

- How to prioritize animal collection planning?
- Planned breeding programme in zoos and its role in *ex-situ* conservation
- Identifying the effective Education Awareness Strategies and Programmes for Zoos
- Developing a good zoo administration model in the master plan

Outline of Talk

- Strategic review of animal collection
- *Ex-situ* conservation objectives and tools
- Education
- Ethics & Welfare
- Create new ideas & directions in zoo displays

Why Plan an Animal Collection?

- To give a theme for the visitor experience
- To make the most effective & efficient use of the animals spaces in the zoo
- To assist in the educational experience
- To ensure that the high standards of welfare & ethics are maintained
- To create new ideas and directions in zoo displays.

Types of Collections

- Main stream zoos
- Specialist collections
 - ▶ Native animals
 - ▶ Habitat i.e. Desert
 - ▶ Aquariums
 - ▶ Bird parks
 - ▶ Reptile parks
 - ▶ Butterfly parks
 - ▶ Nocturnal

The Master Planning Process

- The key to good concept & master planning is:
 - ▶ Involvement of key stakeholders
 - ▶ Ensure its realistic - implementable
 - ▶ Flexibility – the master plan can change
 - ▶ Periodic review to ensure its relevance

Strategic Review of Animal Collection

Weigh the importance of maintaining some species in the collection in relation to:

- The recommended space & maintenance costs existing species presently occupy & the operating costs they generate
- The space a *truly great display* requires (different from recommended space or minimal requirements)
- The intangible contribution such *truly great displays* make to the attractiveness of the zoo to regular & potential visitors
- The iconic attraction value that some selected species can contribute towards making the zoo a *truly and great world zoo*
- The animal collection in relation to other zoo collections in the India & South Asia
- Present commitments to existing global studbooks, local stud books and *in-situ* conservation links

Space Allocation Plan

- Often a zoo is designed on a purely functional, architectural basis, which has not taken into account, animal based exhibits
- Landscape architecture and landscape ecology - two relatively new fields in zoo design - allow for more fluidity & the introduction of sustainable vegetation in exhibit design
- Use nature as a yardstick for end product's achievement
- Once a strategic species collection plan has been developed, the existing zoo's concept plan will be reviewed and changes made, because of the need to:
 - ▶ Add much larger and more complex habitats offered to some existing species
 - ▶ Delete a variety of animals species from the collection
 - ▶ Possibly delete some species of charismatic mega-vertebrates from the collection if there is a space constraint
 - ▶ Introduce new habitats for completely new species to the collection
 - ▶ Review exchange, disposal and euthanasia policies
 - ▶ Will result in a new species list and a space allocation plan of where and how these species will be displayed

Ex-situ conservation objectives & tools

World Zoo and Aquarium Conservation Strategy

Calls on individual zoos:

- To shift the use of available space from more common species to space for threatened species in coordinated programmes
- To ensure that every animal in the collection has a function within the framework of the objectives of the zoo & ensure that conservation goals are an objective

Tools Individual

- ARKS • ZIMS
- ▶ CZA should be using this National & Regional
- REGASP
- ▶ CZA should be using this

ZIMS

Zoological Information Management System

- ZIMS will replace the current ISIS software applications to provide a more accurate, comprehensive database
- Web-based application, will allow users to see collections of animal data in real-time from any authorized computer anywhere in the world

SPARKS (Single Population Analysis & Records Keeping System)

- Studbook/species management software
- Software supports studbook management and species analysis
 - ▶ Are there regional Indian or SAZARC studbooks?

ARKS (Animal Records Keeping System)

- Used for institutional animal record keeping
- Allows members to conveniently contribute their data to the pooled ISIS database made available to members through the ISIS Web site
- Produces numerous powerful reports based on member's own records

REGASP (Regional Animal Species Collection Plan)

Zoos determine the number of specimens of each taxon which they:

- Plan to hold
- Aim to replace
- New ones they aim to acquire

Updated REGASP files are submitted to the central pool to aid regional collection planning

Prevention of Unwanted Breeding

- Physical separation
- Chemical birth control
- Vasectomy & castrations

WZACS

Education

Urges all zoos to:

- Ensure that education is a central part of their *raison d'être*
- Provide adequate support and resources to enable this role to be fulfilled

WZACS

Vision for Ethics & Welfare

- All zoos should follow ethical principles and maintain the highest standards of animal welfare in order to:
 - ▶ Establish and sustain viable populations of healthy animals for conservation purposes
 - ▶ To convey credible conservation messages to the public

Webster's Five Freedoms of Animal Welfare

Freedom from:

- ▶ Hunger & thirst by ready access to fresh water & a diet to maintain full health & vigour
- ▶ From thermal & physical discomfort by providing an appropriate environment including shelter & a comfortable resting area
- ▶ From injury & disease & pain by prevention or rapid diagnosis and treatment
- ▶ To express most normal patterns of behaviour by providing space, facilities & company of the animals' own kind
- ▶ From fear and distress by ensuring conditions and treatment that avoid mental suffering

Rational for Strategic Animal Collection Planning

Zoos that fail to carefully plan their collections will face a multitude of animal welfare concerns, from overcrowded exhibits to the wrong animals being placed together, to an inability to provide respite for older or infirm animals

- Terry Maple

Fewer Animals and Improved Quality of Life

Zoos must not give up high-moral ground for a short-term benefit. Animals living in captivity have served humanity and are part of a global conservation mission. They deserve a good life from beginning to end.

- Terry Maple

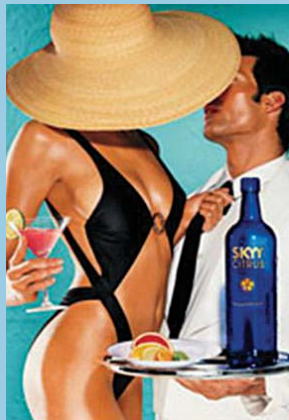
Trading Spaces for Better Animal Welfare

Some people think the key to zoo animal welfare is to provide large, natural enclosures. An exhibit may look great, but it isn't doing much for the animal unless it also incorporates a choice of behavioral opportunities, variety and novelty.

- John Coe

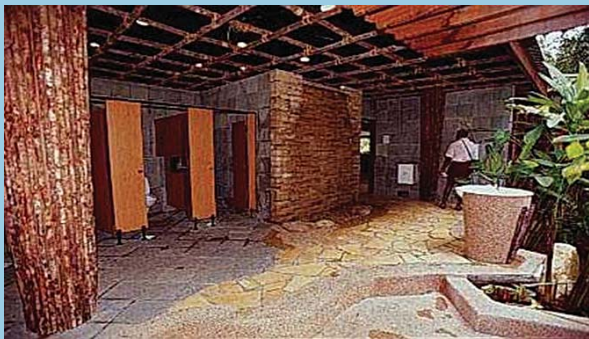


A Paradigm



A Paradigm Shift

Create new ideas and directions in zoo displays



An accepted paradigm
zoos have smelly toilets

An accepted paradigm

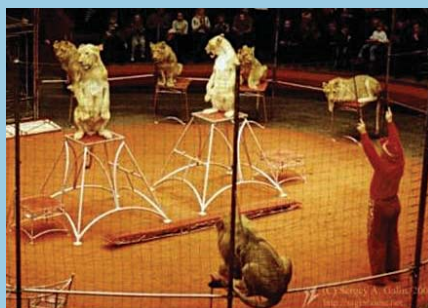


Zoo's have lousy food



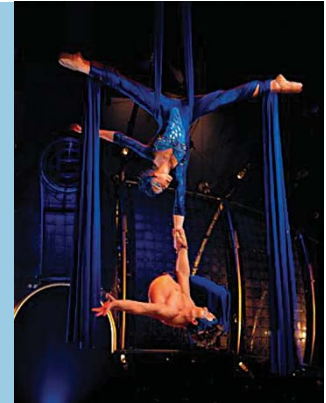
Zoos open at 9am
& close at 5pm

Old Paradigm
Circuses are *Passé*



New Paradigm *Cirque du Soleil*

Paradigm shifts in the zoo world



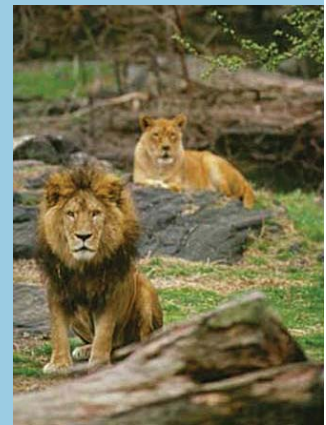
Paradigm Shift 3:
Lion Safari Parks



Paradigm Shift 1:
Moated Revolution



Paradigm Shift 2:
Marine Parks



Commercial parks took away market share from zoos

Paradigm shifts in the zoo world



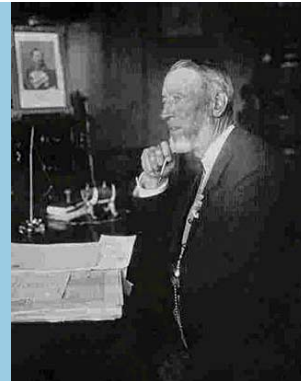
Paradigm Shift 4
Night Safari



Paradigm Shift 5
Disney's Animal Kingdom

Why paradigms.....shift!

- A biologically driven concept for a new zoo, such as a biopark, will almost certainly come from outside the zoo industry
- Has to be self sustaining - commercially viable



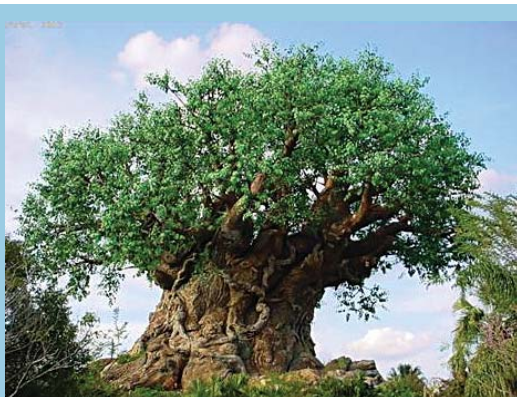
Sea World had....



Night Safari had.....



Chipperfield had.....



Animal Kingdom had.....



Do we have a problem?.....



Why don't we come up with paradigm shifts?
Got to adapt – think smart

Are we going to be like
cockroaches?



Or the giant panda –
on the way out!



Yardsticks from
the wild
So what's with
the wild?



Nature as a benchmark?



Why can't we do this in zoos?



We Need To Be Story Tellers

We need to have stories to tell
And we need to tell them well



Hunting



Extinction



Earthquakes
and super volcanoes

Stop our obsession with
charismatic mega-
vertebrates



How to
exhibit a
bullfrog



Tiger Island
Dream World



We need to tell
the story well





Primates shows captive and wild



Dolphin shows



have clever ideas...

to be innovative...

to be even more
innovative...



to be a little irreverent...

to be a little crazy...



Assignment briefing on development of conceptual master plan for participating zoos and visit to Nandankanan zoological park for master planning exercise

FACILITATORS

S.K.Patnaik
Jon Coe
Bernard Harrison.

The trainees (participants) were briefed by the facilitators on development of conceptual master plan for participating zoos prior to the visit to Nandankanan Zoological Park (referral to master plan exercise during the training programme) on 12th, April,2006. Various issues involved in this exercise were explained in detail. The interactive master planning exercises were conducted during the visit to Nandankanan Zoological Park.



Advances in the Design of Great Ape Facilities for Animal Well-Being

Jon Coe

Landscape Architect and Zoo Planner
Australia



Physical Survival



Green Tile Period

Natural Habitat Display

An animal cannot be isolated, even conceptually, from the particular environment to which it has become adapted during eons of geologic time without a serious misunderstanding of its true nature.

– Mary Akeley 1936





Emotional Survival & Reproduction

Willie B. – Zoo Atlanta



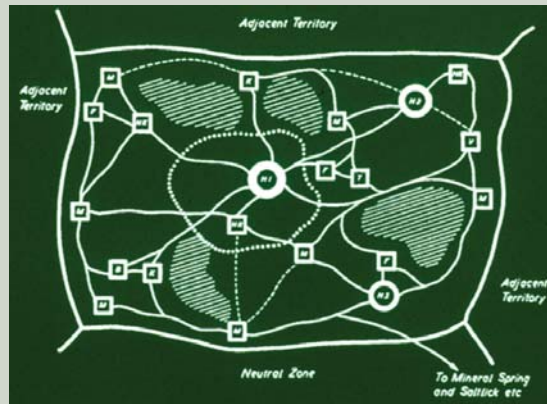
Is Green Space Enough?

Criticism of Immersion Exhibits

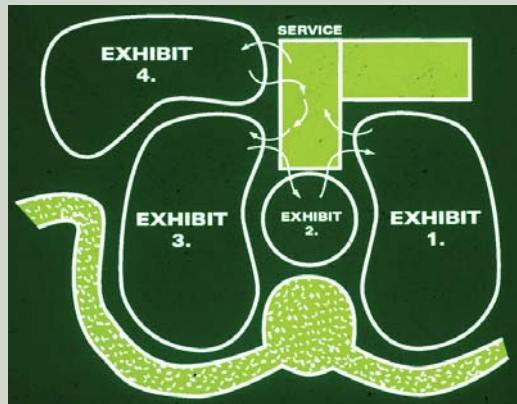
- Cost of Exhibits
- Animal Visibility
- Restrictions to Management Practices



Activity-Based Design



Hediger's Concept of Territory



Great Ape Rotation: Zoo Atlanta

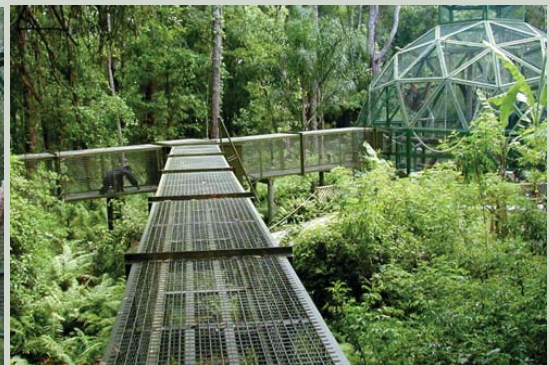


Great Ape Rotation: Toledo Zoo

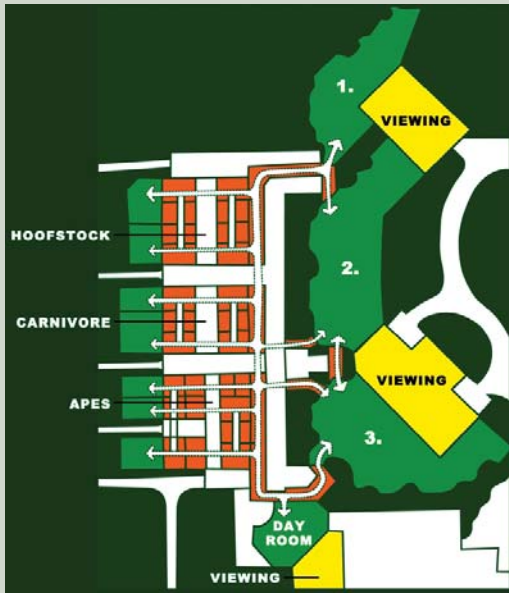


Gorilla Forest: Louisville Zoo

Center for Great Apes Wauchula, Florida



Islands: Louisville Zoo's Rotation Concept



Training



Transfer

Rotation Exhibits

PLUS	MINUS
<ul style="list-style-type: none"> • Animal Benefits • Staff Benefits • Zoo Visitor Benefits 	<ul style="list-style-type: none"> • Added Cost • Increased Complication • Increased Risk



The Competent Ape



The “O” Line –
National Zoo, USA



Affiliative Design

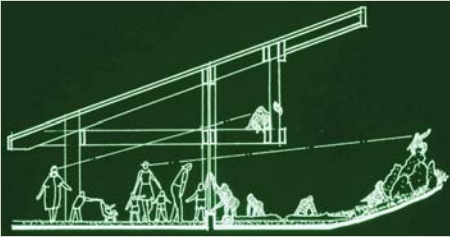
The arrangement of activities, spaces and features in collaboration with management practices, which encourages affiliative behavior among people and other animals.



Moat barriers, a line “drawn in the sand,” may trigger aggression.



Avoid locating public areas above apes who may respond by throwing objects at visitors.



Chimpanzees at the Los Angeles Zoo share a simulated lumber camp with zoo visitors. The chimps have the high ground.

Chimp Holding – Los Angeles Zoo

“Chimp Shower” Controls – Los Angeles Zoo



“Howdy Crates” Philadelphia Zoo



Humane Design



What’s Needed

- Space?
 - Microclimate?
 - Access?
 - Social Opportunity?
 - Delight?
- Respect?
 - Freedom?
 - Choice?
 - Self Determination?

Technical Session

III

Blackbuck (*Antelope cervicapra*)



Planned Breeding Programmes in Zoos and Their Role in *Ex-situ* Conservation

Bernard Harrison

Principal Partner
Bernard Harrison & Friends Ltd.
Singapore



Outline

- Integrating conservation
- *In situ* conservation
- Small population management
- Focusing on exhibit themes
- The usual outcome of small populations is extinction
- Extinction as a zoo exhibit
- *Ex situ* conservation
- Living fossils

Why have planned breeding programmes?



WZACS

Integrating Conservation

- This will achieve the greatest sustainable conservation benefit for threatened species, their habitats and their human neighbours
- The major goal of zoos is to integrate all aspects of their work with conservation activities
- The fundamental elements of each organization's culture should be the values of sustainability, conservation & environmental responsibility
- These values should permeate to all aspects of a zoos operation

In situ conservation

- Preserving individual species in human care is not enough to protect the world's biodiversity
- Conservation of intact ecosystems is the only chance for survival of our planet's wildlife
- More zoos have recognized that the real problem of nature conservation is saving the habitats:
 - ▶ Operate parks or reserves
 - ▶ Participate in their founding & management.

- It is the aim of WAZA to increase the number of zoos involved in habitat conservation & make zoos the primary non-governmental field conservation organizations

Concepts of Global Conservation

No nation on this planet has made conservation a high priority and much more remains to be done. Zoos are moving in the right direction. We're beginning to see how we can impact the world when we accept our responsibility of good stewardship

- Michael Hutchins, Director of Conservation and Science, AZA

Ex-situ Conservation

- 182 International Studbooks
- Coordinated by the Zoological Society of London
- A primary goal of *ex situ* programmes is support (including demographic and genetic reservoirs) for *in situ* conservation

International Stud Books

- Molluscs 1 • Amphibians 1 • Fish 0
- Reptiles 4 • Birds 29 • Mammals 147
- Management decisions are developed through studbooks
- Population data at International Species Information System (ISIS) is supported by registration & analysis software

WZACS

Small Population Management

- *Ex situ* populations need to be:
 - ▶ demographically stable
 - ▶ well-maintained
 - ▶ capable of self-sustaining reproduction
 - ▶ distributed among several institutions
 - ▶ sufficient size to maintain high levels of genetic diversity
- Many wild populations are like *ex situ* ones i.e. small size with limited gene flow between them
- Small population management developed primarily for managing *ex situ* populations is thus of direct relevance to field conservation
- All zoos should be centres of expertise in small population management
- Involved in global or regional cooperative breeding programmes



Douc Langur

- Based on sound knowledge using the latest available data on:
 - ▶ Reproductive biology
 - ▶ Genetics
 - ▶ Behaviour
 - ▶ Physiology
 - ▶ Nutrition
 - ▶ Veterinary care & husbandry
- Many programmes have:
 - ▶ Too few founders & participating institutions
 - ▶ Depleted genetic diversity
 - ▶ Poor breeding success
- Strategies to enhance viability include:
 - ▶ increasing breeding spaces
 - ▶ expanding from regional to global programmes
 - ▶ increasing the intensity of genetic management
 - ▶ improving husbandry practices through research
 - ▶ importing founders from the wild or other regions

The usual outcome of small populations is extinction

Extinction - Zoo Exhibit

- The story of extinction is one of the most powerful to be told
- It is close to our hearts
- It is a process - like our own death - which is inevitable

Extinction -

Getting the right perspective

- 99% of all the species that ever lived are extinct
- More species alive now than at any time in the past
- Most terrestrial species last an average of 1m years
- Marine species last 10m years
- Often dynastic – with one species giving rise to many

Javan rhino



Spix's macaw

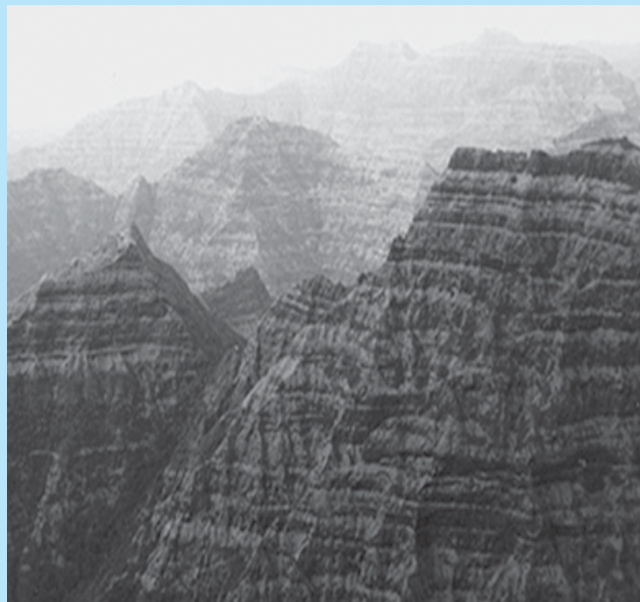


Supervolcano - Deccan Traps

- Released 2,000 km³ of magma
- Covering 1.5 million km²
- Non violent eruption

Extinction

- Combination of asteroid and super volcano changed weather patterns causing prolonged volcanic winter
- Lead to decline of dinosaurs
- After a great implosion nature recovers biodiversity
- Takes millions of years (10m)



Mammals Inherited The Earth

- Rat-sized
- Unspecialized
- Filled niches left by dinosaurs



Large Grazing Reptiles

Triceratops

- 68mya
- 7 tons
- North America
- 8m long
- Social herbivore



Large Grazing mammals

Brontotheres

- 55 - 30mya
- First large, plains-living animals
- North America & Asia
- 2.5m at shoulder

The Eruption Of Super Volcano Toba

Toba – Super Volcano Eruption



- 75,000BC
- Water filled caldera, 100km by 30km
- Caused volcanic winter
- Initiation of last glacial period

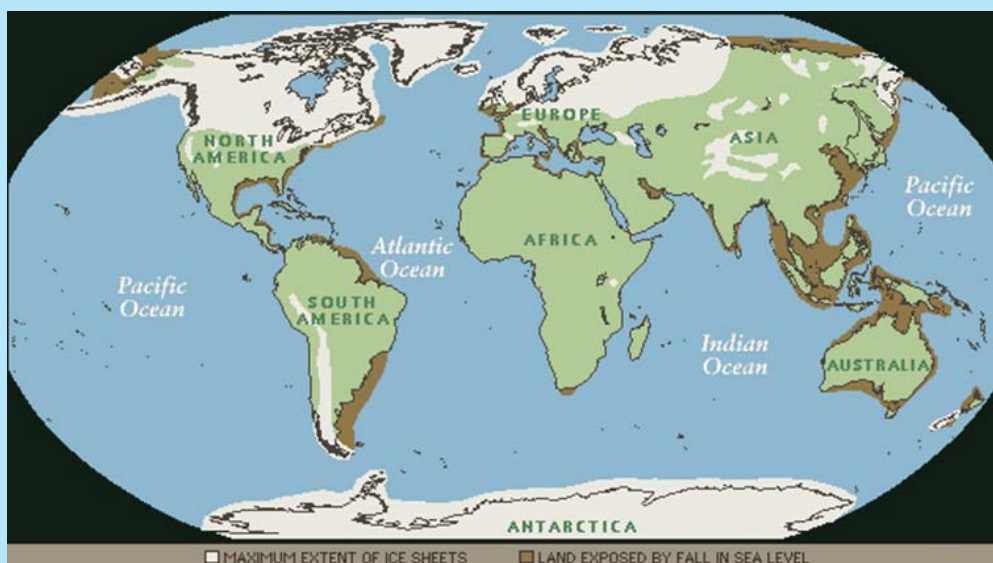
Homo sapiens



- 100k BC- present
- Near extinction
- 70k BC- Prolonged drought followed by volcanic winter
- Man made almost extinct
- Survived in Africa

The Ice Age Opened Land Bridges

The Ice Age Pleistocene 1.5 to 0.1mya



Three Continents

- During the Ice Age there were only 3 continents:
- Africa-Eurasia-America
- Sahul (Australia & New Guinea)
- Antarctica
- Connections possible due to:
 - Continental drift & connection i.e. N & S America
 - Ice sheets connections i.e. Bearing Straits
 - Lowering of the ocean levels by 100m

Dymaxion Map of the
World Unfolded.



Man's Spread Over The World - Human Radiation



Africa



- Man evolved in Africa
- Animals evolved with & *learnt* to avoid him
- Thus, Africa still retains about 70% mega vertebrates

North America megafauna extinction



North American Mastodon



- 35m years to 12.5k BC
- 2.4m at shoulder
- 4.5m long • 5.5tonnes

Irish Elk in Europe



- 40m years to 11k BC
- 2.1 meters at shoulder
- 3.5m antler span

Diprotodon in Australia



- 1.6m -25k BC
- Largest marsupial
- Males 2500 kgs
- Related to wombat

Ground Sloth In South America



- 1.9m years to 8k BC
- 6m long
- 4 tonnes
- Could walk erect

Moa in New Zealand



- 2.5m-1600 AD
- 200kg
- 11 species made extinct

Living Fossils

Animals that could be displayed in a zoo either in person
or with special effects



Oysters



Atlantic Hagfish



Millipede

Ammonites - Nautilus



Cockroaches



Hellbender-350 mya



Horseshoe Crab-250 mya



Vegetable Dinosaur Ginkgo
250 mya



200 million years-200 mya



Tuatara-200 mya



Alligator Snapping Turtle-200 mya



Great White Shark-135 mya



Huon Pine

- 135 mya
- Grow for 10,500 years



Sierra Redwoods

60 mya

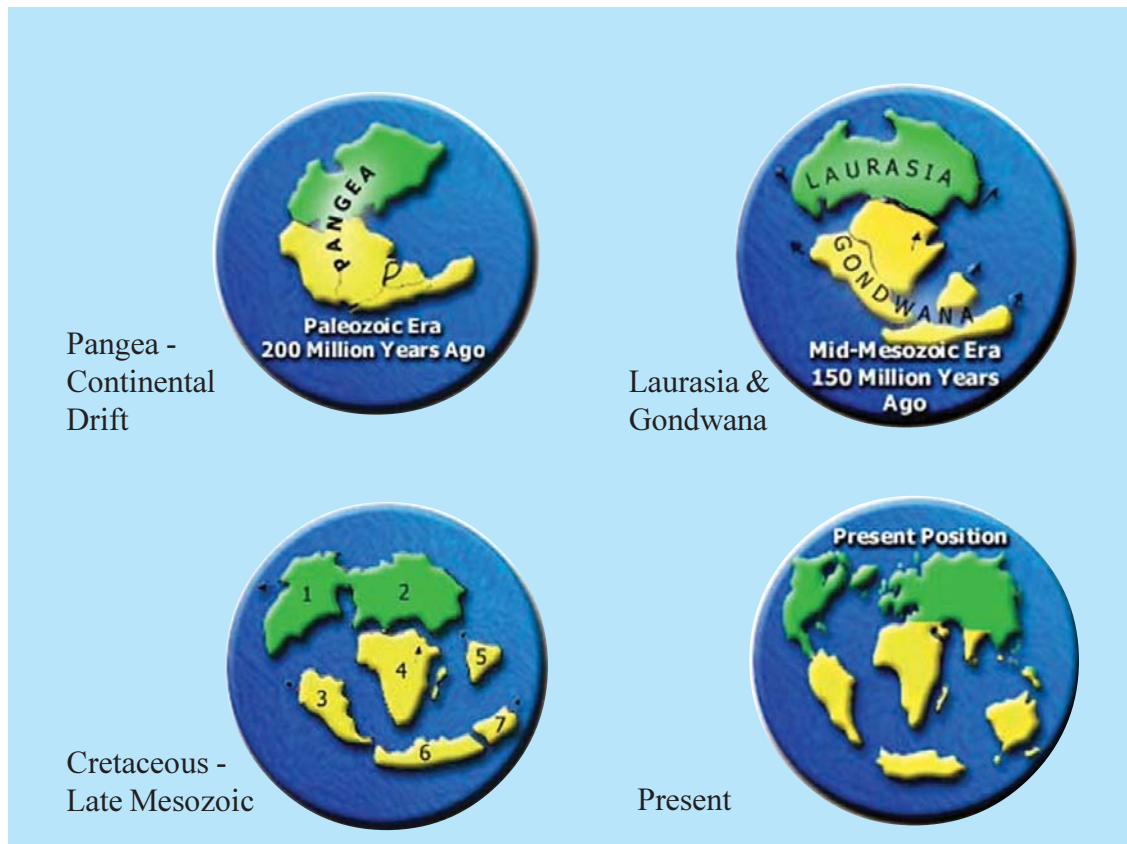
- Largest tree -110m
- Girth 30m



Living Fossil Manatee 50mya



Sandhill Crane 10mya



Tall Browser

Brachiosaurus

- 149mya
- 25m long
- 13m high
- 70 tonnes
- Africa & North America



Indricotherium

- 25 – 30mya
- 10m high
- 30 tonnes
- Rhino closest relative
- Asia





Large Carnivore

Tyrannosaurus

- Late Cretaceous
- 5m high
- 14m long
- 5 tonnes
- North America & Asia



Medium Carnivore

Andrewsarchus

- 60-32mya
- Largest land mammal carnivore ever
- 1.8m high
- 5m long
- Asia



Giant Ape

Gigantopithecus

- 6.3m-200k BC
- Largest ape
- 3m high
- South East Asia



Australopithecus

- 4.5 -1.5mya
- Walked upright
- Southern & Eastern Africa

Homo heidelbergensis are



- 600-100k BC
- Developed abstract thought
– Homo sapiens

Homo sapiens



- 100k BC- present
- Near extinction
- 70k BC- Prolonged drought followed by volcanic winter – Toba's explosion
- Troop to tribe transition
- Man Evolves into a Killing Machine
- Pleistocene overkill hypothesis
- Keystone species

Africa

Man evolve with mega vertebrates- Extinction of Megafauna

- Woolly Mammoth
- 135-11k BC
- 3m high at shoulder
- Eurasia
- Big means bad luck





Irish Elk

- 400– 9BC
- 2.1 meters at shoulder
- 3.5m antler span



Woolly Rhinoceros

- 500k-10k BC
- 2m at shoulder
- 3.5m long
- Sumatran rhino closest relative

South America

3mya land bridge to North America



Ground Sloth -Megatherium

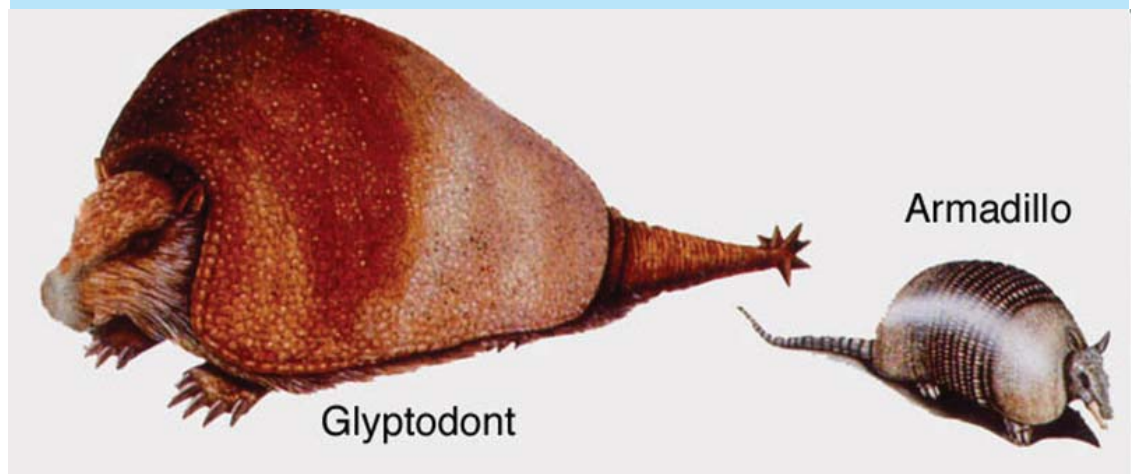
- 1.9m-8k BC
- 6m long
- 4 tonnes
- Could walk erect



Terror bird

- 27m- 15kBC
- 2.5m tall
- Carnivore – filling vacuum of mammal carnivores

Glyptodont



Argentavis magnificens



- 1.5m tall
- 1.2m wing length 3.4m beak to tail
- 120kg

Australia



Demon Ducks & Giant Rippers

- Demon Duck
- 200-250kg
- Giant ripper lizard
- Replaced mammals
- As carnivores
- 5.5m 400kg



Diprotodon –

- 1.6m -25k BC
- Largest marsupial
- Males 2500 kgs
- Related to wombat

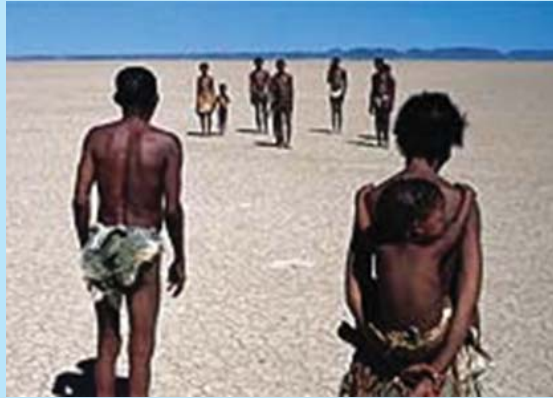
New Zealand

Polynesian seafarers arrived 900yag



Elephant Bird

- 1700 extinct
- Largest bird
- 500kg
- Madagascar



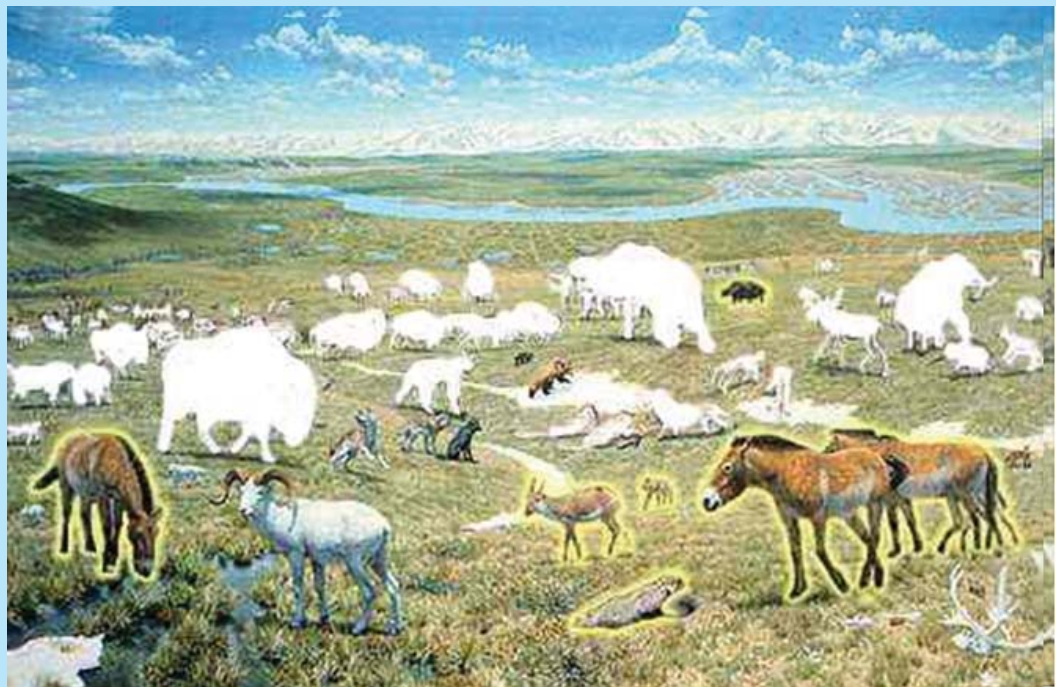
Human Radiation

Spread from Africa to
Eurasia, Australia, North
America &
South America

Major Extinctions of Animals coincides with man's arrival

• Africa & S E Asia	50,000
• Australia	50,000
• North Europe	15,000
• North America	11,000
• South America	10,000
• West Indies	4,000
• New Zealand	900
• Madagascar	800

Megafauna extinction



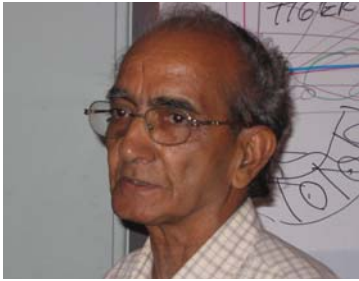
Health Care and Management inputs in planning a Zoo

SPEAKER

Dr. L. N. Acharjyo

Former Senior Veterinary Officer,
Nandankanan Zoological Park
and Member Technical Committee, CZA

Photo: Brij Kishor Gupta



A detailed account on Health Care Management as inputs for the development of Master Plan and Management Plan was discussed and explained by Dr. L.N. Acharjyo with his wide and varied experience.

Healthcare and Management Inputs in Planning A Zoo

- Preparation of a comprehensive plan and design of a zoo can be better achieved through inter-disciplinary approach.
- Main thrust of any planning of a zoo is its inhabitants i.e. zoo animals
- Therefore, the entire planning process for a zoo should be conducive to ensure quality of life, maximum longevity, procreation and welfare of zoo animals.
- Healthcare and management of zoo animals are interlinked and form an important part of any master plan/plan of zoo.
- Healthcare and management inputs will mainly depend upon the number and type of species and number of individuals of a species proposed to be displayed in the zoo (Animal collection plan of the proposed zoo)
- For providing inputs on these aspects, one must have clear understanding of basic concepts on healthcare and management of wild animals in captivity.
- By “Health” it means the State of Complete Physical, Mental and Social well-being of an individual and not merely the absence of disease.
- Amendment of Wildlife (Protection) Act, 1972 in 1991 and framing of “Recognition of zoo rules 1992” with up to date amendments made mandatory provisions of minimum standards for
 - Proper housing
 - Proper Feeding & upkeep
 - Veterinary /health care for zoo animals

National Zoo Policy, 1998 on Health Care Of Zoo Animals states –

“Zoos shall ensure availability of the highest standards of veterinary care to all the animals in their collection”.

STRATEGIC VISION – 2010 – Evolved at Strategic “Future Search Workshop” organized by Central Zoo Authority held at Hyderabad during December 3-5, 1999 was as follows –

“Our zoo will have healthy animals in ecosystem based naturalistic enclosures, supportive to in-situ conservation with competent and contented staff, good educational and interpretative facilities, the support of people and be self sufficient”.

Indian zoos maintain numerous species of wildlife (both indigenous and exotic) from the smallest birds like Munia to largest land mammal – the Elephant and at times even Fishes.

Maintenance of optimum **health of animals** is a must to achieve the objectives of modern zoological parks

Every zoo has the onerous responsibility of maintaining all the zoo inmates in optimum health free from diseases so that the objectives of the zoos can be achieved.

Maintenance of zoo animals in good health is one of the important and difficult tasks in any zoo.

Daunting Task:

- Detection of illness
- Diagnosis
- Handling and restraint
- Treatment and post-operative management once they fall sick
- Inadequate knowledge about the biology of a wide variety of Wild Animals exhibited in zoos may heighten their Health/Disease/Mortality problems.
- Therapeutic approach of sick zoo animals may not always yield the desired results.
- At times the new emerging animal health problems in a zoo kept ahead of our ability to control or eliminate the existing diseases / mortality.
- Scope of animal health measures in a zoo covers the entire period from the entry of the animal into the zoo till its final disposition.

- Health and mortality of zoo animals are directly or indirectly influenced by:
 - * Housing
 - * Feeding
 - * Sanitation
 - * Routine day to day management
 - * Disease control measures
- Inadequate and improper implementation of these practices adversely affect the health of zoo animals resulting in sickness or death.

Housing

- Adequate natural habitat simulating living space as per the need of the species under display for free movement and exercise with provision for protecting them from adverse climatic fluctuations is one of the basic needs for the welfare of zoo animals.
- Quality and type of living space may vary from species to species. For designing the enclosure, the zoo animals can be broadly divided into four main groups:
 - Animal that lives above the ground** (flying or climbing on trees, rocks etc.) e.g. monkeys, bears, birds, etc.
 - Animal that lives on the ground** (walking, hopping, crawling etc.) e.g. deer, antelopes etc.

Animal that lives in the ground which may be permanent or temporary (burrowing or digging) e.g. fox, Indian pangolin, burrowing snakes etc.

Animal that lives mostly in water or sometimes needing access to water (swimming, diving etc.) e.g. dolphin, otter, crocodile, tiger, water fowl etc.

While designing the zoo animal enclosure priority has to be given to:

- Physical capabilities/activities (Like jumping, climbing, burrowing, swimming etc) of the species
- Climatic factors of the locality
- Biological factors and social requirements of the animals under display
- The enclosure should effectively confine the animals to prevent escape
- Must prevent interaction between visitors and animals specially dangerous ones. This will also prevent transmission of zoonotic diseases from visitors to zoo animals and vice versa
- Must ensure safe conduct and easy day-to-day management of animals therein.
- Must facilitate easy viewing of animals for monitoring, capturing, crating, shifting or treatment.

- Should facilitate easy viewing by visitors for better appreciation of animals and to lesson the incidence of vandalism by visitors
- Must avoid display of prey – predator animals in adjacent enclosures as that induces constant stress resulting in health problems among prey animals
- If moats (dry or wet) are designed to confine the animals, provision has to be made to allow the animals into it or out of it as otherwise the animals specially the young ones may fall into the moat and are likely to sustain injury or get drowned or face difficulty to get out of the moat.
- Nocturnal animals has to be exhibited in nocturnal house only to avoid stress related health problems.
- Reptile enclosures should have special provision for protecting them from extreme heat and cold as they are exothermic animals (sensitive to extreme fluctuations in atmospheric temperature) affecting their heath and mortality.
- Good drainage system to flush out the excreta, food refuses, other debris and rain water is a must.
- Visitors should not be allowed to see the animals from all sides of the enclosure as animals also need privacy and undisturbed atmosphere.

- Impact of improper housing on health among zoo animals can be minimised or eliminated by providing suitable housing facilities meeting all the biological needs, behaviour and physical activities like jumping, climbing, swimming, burrowing etc.
- This can be achieved through enrichment of the animal enclosures to meet the needs of the species under display.
- Unlike the animals in the wild, zoo animals suffer from lack of activity leading to boredom and stress resulting in poor health, stereotypic movements, aberrant sexual behaviour, abnormal maternal care, self injury, etc.
- Behavioural abnormalities and physiological stress increases susceptibility to diseases and affect their health & breeding.

Examples

- Hard ground for hoofed animals to avoid excessive growth of hooves.
- Soft ground for soft footed animals to avoid sore paw.
- Trees or logs for sharpening the claws of wild cats to avoid injury to foot pad due to curved-in condition of claws.
- Hiding places like dens, burrows, pools, caves, bushes etc. to hide or escape to overcome stress from fear/disturbances of visitors/intruders must be provided.
- Materials for stimulating activity like play objects, vegetation, trees, swings, raised platforms, sand, soil, etc. may be provided.

Feeding

- Animals in the wild have the freedom to gather and eat their choicest food items from innumerable flora, fauna, mineral and water sources available in wild to meet their requirements.
- In contrast the animals in captivity are dependant upon the food supplied to them.
- Selection of diet of zoo animals depends upon the feeding behaviour and nutritional requirement. They may be carnivorous, herbivorous, omnivorous, frugivorous, insectivorous, etc.
- Adequate quantity of nutritious species-specific food is a must for maintenance of good health and vitality, satisfactory reproductive status and ability to withstand diseases and ward off nutritional stress.
- If the food is not suitable it may lead to digestive and nutritional disorders.
- Therefore, the diet selection should be proximate to the natural diet of the involved species as in the wild.

Quality, quantity and kind of food have a direct bearing on health.

So food should be: Hygienic, Clean and fresh, Palatable and adequate, nutritious, must meet the physiological & psychological needs, regularity of timely supply

- Ruminants like deer and non-ruminants like elephant with functional caecum need large amount of roughages to keep the gastrointestinal tract efficient and healthy. Lack of roughage may lead to constipation and telescoping of intestines.
- Feed of big cats with only carcass meat without liver, bones, etc. may lead to avitaminosis and mineral deficiency.
- Birds of prey need both roughages and minerals in addition to protein, so they prefer whole animal food.
- Quantity of food required depends upon age, size, sex and physiological status like pregnant and nursing mothers.
- Young and growing animals consume more quantity of food as they utilise the food more efficiently and have greater requirement of vitamins, minerals and energy producing food. They are more susceptible for nutritional deficiency diseases.
- New born animals must receive colostrums (initial milk secretion).
- Feeders and water troughs should be arranged in such a way to avoid contamination with faeces and urine.
- Adequate hygienic storage of food, zoo kitchen, food preparation and distribution facilities must be ensured.

- Spoilage of stored items of food by rats, insects etc. must be avoided by proper storage facilities
- There are group feeders (deer and antelope) and individual feeders (tiger, panther etc.)
- Nocturnal feeders (Indian pangolin, slow loris, etc.) and diurnal feeders (monkeys).
- Continuous feeders (Gallinaceous birds) and occasional feeders (king cobra, Indian python etc.)
- Most of the zoo animals are euryphagous (those that eat varied diet) and others are stenophagous (those that eat specialised diet). Some others are monophagous (eating one particular kind of food).
- Presentation of food is equally important as it affects the intake of food e.g. giraffe, flamingo etc.
- To avoid injuries due to fighting or otherwise and to ensure proper intake of food -they should be fed accordingly.
- Clean water from protected water supply system may be ensured for prevention of water borne health problems.

- Cold storage facilities to store perishable food items like beef, fruits, vegetables etc. To overcome difficulties in case of unforeseen disturbances in the locality such as transport strike, general strike, staff strike etc.
- Hygienic transportation of food items in sealed cover from the food distribution center to the animal enclosures in the quickest possible time must be ensured.
- Food storage, preparation of food centre, kitchen etc. facilities should be located in such a place of the zoo so as to ensure frequent inspection of all the food items and easy supply from outside into the zoo premises.

Sanitation and Hygiene

- Infectious agents remain in highly dormant form in nature and in highly concentrated form in zoos because of confinement.
- Accumulation of solid and liquid wastes, decaying vegetation etc. inside zoo premises can act as reservoir and breeding ground for the disease causing microbes and vectors.
- Excreta and food refuses of animals and all sorts of solid and liquid wastes have to be cleaned daily and quickly disposed off at appropriate places followed by disinfections.

- General sanitation and hygiene of animal enclosures and surrounding areas and visitors' utility places must be ensured.
- Disinfectants should be selected on the basis of effectiveness and safety.
- Attempts should be directed to reduce or eliminate stress to minimize stress related morbidity and mortality in zoos.
- Losses or traumatic injuries resulting from infighting during mating related activities, feeding, capture/shifting operations, incompatibility etc. can be prevented/reduced by keeping compatible pairs/groups and well managed capture operations.
- Neonatal deaths can be controlled by identification of causes. (e.g. Inbreeding, disturbance during advanced stage of pregnancy and nursing period, stress, infection, etc) and adopting remedial measures.
- Losses due to cannibalism in young ones can be prevented by separating the pregnant / nursing mothers specially in carnivores.
- Majority of deaths in zoos are noticed within a month of their arrival/birth. Therefore, special care during this period is of utmost importance.
- Predators like snakes, civet cats, jungle cats, mongooses, foxes, rats, feral dogs and cats, monkeys are responsible for deaths of small mammals and birds. Further, they deprive the zoo animals from their full quota of diet.

- Vector and pest control:- ticks, lice, mosquitoes, flies, cockroaches, snails, rodents, crows, cats, stray dogs, etc. are the constant companions/intruders to zoo animals/premises and many of them act as vectors of transmissible diseases. Their periodical eradication has to be on the top agenda in any zoo.
- Prevention of ill effects of inbreeding:- ill-effects of inbreeding like still-births, congenital anomalies, early mortality, abortion and infertility can be minimized or eliminated by planned breeding programme.

Disease control measures

- Disease is the manifestation of disturbances in the normal physiological process leading to structural and functional alterations in the cells of a living body of an individual and arise as an aftermath to the collusion between pathological agents and a susceptible host.
- All diseases are influenced by several factors such as environment around the host (air, water, food, climate, space for movement and social surroundings etc.), inherent resistance, senility
- Proper understanding regarding the pathogenesis and as how exactly the extraneous factors interfere with health is essential in order to institute effective disease control measures zoo animals like the domestic animals suffer from various kinds of diseases. Prompt and accurate diagnosis of diseases of sick zoo animals is essential for adopting appropriate preventive and therapeutic measures in time

A disease may have the following stages:

Host animal or bird	Incubation or pre - pathogenesis which may be apparent or sub-clinical	Symptoms observed (Clinical stage which may be mild, moderate or severe)	Treatment or vaccination or both	Recovers or Dies
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Many wild animals have their domestic counter parts which should be taken into account along with their habits, behaviour, body weight and size while managing the disease problems

EXAMPLES

- | | |
|---|---|
| <ul style="list-style-type: none"> • CATTLE AND BUFFALOES • SHEEP AND GOAT • HORSE AND ASS • PIG • DOG • CAT • POULTRY • DUCK | <ul style="list-style-type: none"> • DEER, WILD BOVIDS • SMALL ANTELOPES, WILD SHEEP AND GOAT. • WILD ASS, ZEBRA • WILD PIG, WART HOG, PECCARIES • WILD CANIDS • WILD FELIDS • WILD FOWL • WILD DUCK, GEESE, SWAN |
|---|---|

- Veterinary intervention is essential in managing health/disease problems of individual sick animals through appropriate therapeutic measures.
- Besides, other preventive health-care programmes usually adopted for the zoo inhabitants to overcome health/disease problems are;
- **Quarantine** -it is now mandatory to keep all the newly received zoo animals in quarantine. Usually they are kept for 30 days. Besides preventing the spread of infections if any from new arrivals to healthy zoo inhabitants, quarantine also helps the animal to adjust to new environment, builds up strength, offset the ill effects of trapping, crating and transportation
- To enforce the quarantine procedure effectively, one need to have a fair working knowledge of the regulations and also about the diseases occurring in various species of wild animals to be quarantined
- Separate facilities for drainage and disposal of solid and liquid waste must be arranged
- Isolation ward - for housing and treating the resident animals suffering from infectious diseases.
- Quarantine and isolation wards should be located far away from each other and away from animal display areas and zoo veterinary hospital

- **Vaccination** - vaccination is commonly practiced to induce immunity against future invasion by specific infectious agents responsible for causing infectious diseases of bacterial or viral origin.
- No separate vaccines are available specially for wild animals other than those commonly used in domestic and pet animals and birds.
- **Killed**, vaccines should always be preferred for zoo animals
- **Control of rabies** : deaths of lion, leopard - cat, wild dog, blue bull, jaguar, one-horned rhinoceros etc. have been reported from Indian zoos.
- Source of infection is attributed to the bites of stray dog, mongoose, fox and jackal.
- Prevention of interaction of rabies carrier animals with zoo animals can control rabies to a great extent.
- **Control of tuberculosis (TB)**: it is common in many Indian zoos among primates, deer and antelopes.
- Confirmed TB cases are to be isolated and treated.
- Mass treatment with multidrug therapy using anti-tuberculous drugs like isoniazid, rifampicin, pyrazinamide and thambutol in the recommended doses along with feed for 2-6 months has been able to control the infection.

- **Control of parasitic diseases:** parasitic infestations cause considerable morbidity and mortality in zoo animals especially in young animals.
- As it is impossible to eliminate parasitic infestation in zoo animals, attempts should always be made to keep the parasitic load below danger level.
- A de-worming schedule is usually practised in most of the Indian zoos.

Health monitoring: zoo animals require keen day to day observations for health monitoring. After detection of illness, diagnosis of disease followed by suitable action by improving the management practices, appropriate therapeutic measures or both can be taken. Animal keepers / caretakers have to be trained for detection of illness, abnormal behaviour at the initial stage and on principles of preventive medicine and environmental sanitation.

Zoo personnel health & hygiene: animal keepers are to be screened and their health status monitored periodically during employment for infectious diseases so that chances of infection from keeper to animal or vice versa could be avoided or minimised.

Zoo veterinary hospital: should be properly equipped with facilities for disease diagnosis, handling, restraining and treatment of sick animals.

Zoo Veterinary Hospital (ZVH) complex should have rooms for veterinarians and other supporting staff

Diagnostic laboratory with required equipments and provisions

Operation theatre with all equipments and provisions

X-Ray room

Indoor facilities for sick animals with squeeze cages of different sizes

Medicine dispensing room

Store room

Rearing facilities for the mother rejected/orphaned zoo babies

ZVH Complex should be located away from quarantine-isolation wards, postmortem room and carcass disposal complex in a suitable area of the zoo premises.

Postmortem examination room and carcass disposal facilities

Postmortem room with proper equipments and provision for conducting postmortem examination (PME) should be made available.

For carcass disposal after PME –There should be a special grave yard or an incinerator for disposal of carcasses after PME to prevent the spread of infection.



White Tiger (*Panthera tigris*)

Role of Infrastructure Development Plan and Concept of the Zoo Architecture

Prof. Rommel Mehta
Head, Department of Landscape
Architecture School of Learning
and Architecture
New Delhi



Photo: Brij Kishor Gupta

MY UNDERSTANDING AND SUGGESTION

Let us review the 'Zoo' in the Indian Context for the 21st Century

- 1 Zoo is a multifaceted entity.
2. It is not a natural element – it has to be created.
- 3 Process of creation requires a multidisciplinary team to analyze and design with natural and man made factors specific to a site.
4. The process of creation of master plan is through a sequential process of 'site planning'. Brainstorming and generation of ideas is an essential pre-requisite.
- 5 Since it will be a group working towards an objective, it requires a person to co-ordinate and lead. This person should be someone trained to manage such projects- such as a Landscape Architect under the overall management of the Zoo Director and the Central Zoo Authority.
6. A vision and mission statement – an expression of philosophy behind the master planning, landscape planning, landscape design and landscape detailing – requires to be followed with a 'vision and mission statement' for a specific zoo in a specific region.

7. Many experts make their specific contributions at various stages of preparation of zoo master plan.
8. The Landscape Architects contribution is widespread and stretches beyond the completion of the zoo to transcend over to maintenance periods. (shaping and pruning of vegetation, warranty period repairs, ensuring the validity of assumptions made during design, Bronx Zoo example)
9. Landscape Architects work is different from those of other disciplines since landscape planning and design deals with living entities.
- 10 Zoo Directors and Managers would fully appreciate the complexities involved and the time it takes for creations to mature and prove their design and creative worth.
11. The process of landscape planning and design is not comparable to the work related to other infrastructural facilities such as electrical, plumbing, sewage treatment etc.



MY EXPERIENCE

- All concerned or related in any way have the same objective - a well designed zoo.
- The process to achieve the same needs to be articulated to align it with the present thinking on zoo design and left to be coordinated by a person(s) professionally trained for the purpose under the combined coordination of the professional and the Zoo Director
- A paradigm shift is required, in thinking, design and execution of Zoo's in India to step into the 21st century.
- This does not mean history and valuable experience is disregarded

STAGE 1: Prior to conceptualization

SITE STUDY AND ANALYSIS

Involves a thorough understanding of the site and the design requirements through a process of the study of natural and man-made – on site and off site - components.

This should be undertaken by a Landscape Architect along with the Zoo Director or Curator.

The above includes an assessment of the topography, drainage patterns, vegetation, geological and geo-morphologic structure, surface and subsurface hydrology, aspects, soils, culture, history, economy, requirements of enclosures, storage infrastructure, staff conveniences, barriers requirements etc.

STAGE 2: 1st INTERACTION

The coordinator – preferably a Landscape Architect would then organize an interaction to elicit the views of the concerned specialists – biologists, zoologists, ecologists, conservation specialist, veterinarians, zoo officials etc.

STAGE 3 or 4 – INTERACTIONS

These stages would provide further details to the conceptualised master plan.

BASIS OF SITING OF ELEMENTS

- The Site
- Design Brief from conceptualisation
- Development Program

STEP BY STEP: THE DESIGN PROCESS

- Feasibility/ Programming
- Schematic Design/ Preliminary Layout
- Site Analysis
- Conceptual Design

SITE ANALYSIS

- Topography, Slope, Soils
- Property Configuration
- Hydrology, Drainage, Water, Wetland, Floodplains
- Views, Visual Characteristics
- Climate, Site Orientation, Exposure
- Adjacent Land Uses
- Utility Locations, Existing, Estimates
- Existing Development, Encumbrances
- Other Regulatory Requirements
- Existing Vegetation
- Access, Circulation Patterns



Unidentified Spaces

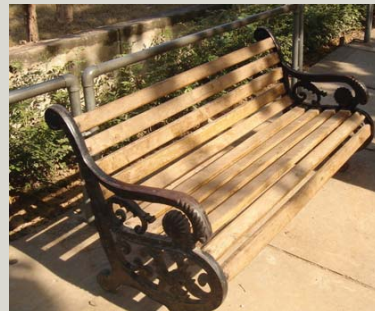
Land Surface
And Land Form



Constructural Details



Street Furniture and Lighting



Vehicular And Pedestrian Circulation

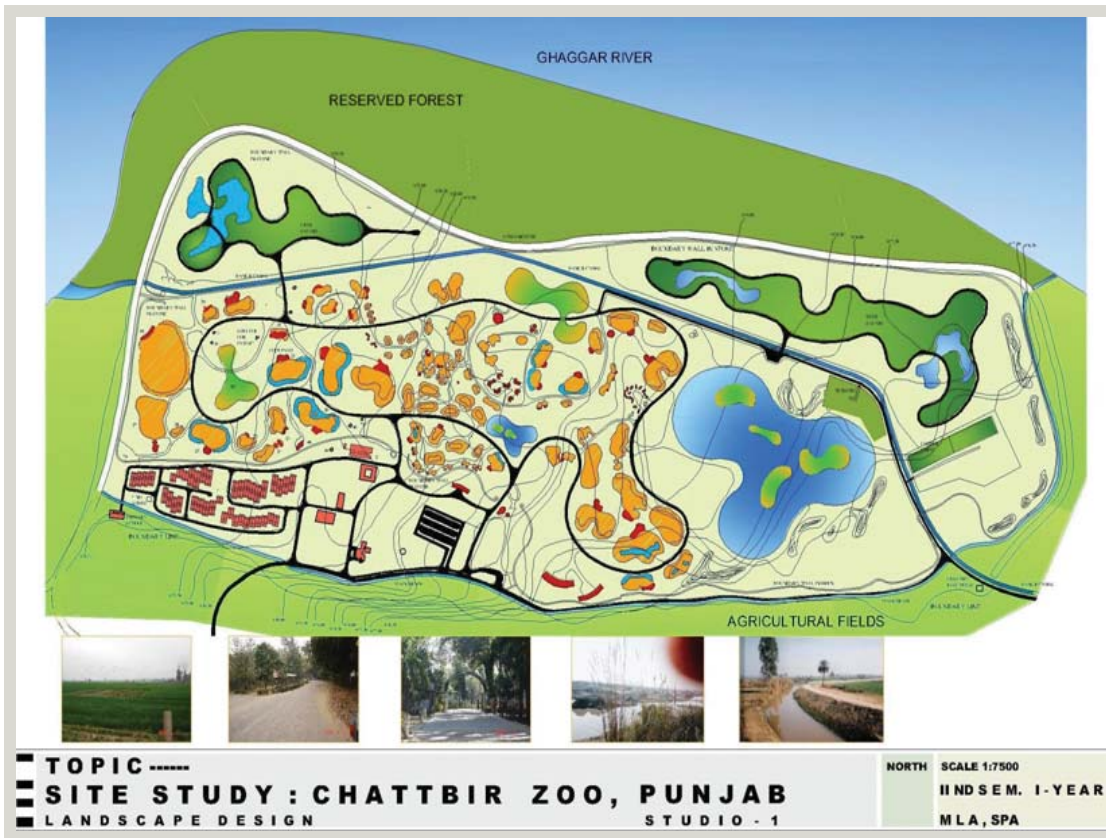


Parking & Entry Area

Area provided is far beyond the requirements of parking standards



Construction of circulation systems - vehicular roads and pedestrian paths require expertise of survey, layout, vertical & horizontal alignment, design aspects, planting and electrical and plumbing services.



Water management principles

Strategies which can be used are:

- To use available water more carefully
- To design or redesign a landscape so that less water is required.
- To apply water to plants much more carefully and precisely.

The above water requirements are proposed to be fulfilled by :

- Municipal water supply
- Ground water extraction
- Treated Waste water

Following points are to be kept in mind for water planning for zoological parks :

- Potable water for animals, staff & visitors
- For watering the lawn and garden and the existing vegetation
- For animal habitats; essential and non-essential
- For amenity use

Hydrological Results of Development of Zoological Parks

Large areas, over which most zoological parts are laid out, may either have inherent water logging problem or may result in such areas after development. Landscape development and other construction activity effect surface changes which result in changes in water levels of bodies such as streams, ponds, lakes, reservoirs and at occasionally of rivers. This is a result of modification of permeabilities, infiltration rates and runoff volumes and rates. The quantum of change depends on the intensity of development.

The quantity of surface runoff will be increased typically because of increase in area of pavements and reduction in vegetative cover from its original situation. Large areas, over which most zoological parts are laid out, may either have inherent water logging problem or may result in such areas after development. Landscape development and other construction activity effect surface changes which result in changes in water levels of bodies such as streams, ponds, lakes, reservoirs and at occasionally of rivers. This is a result of modification of permeability, infiltration rates and runoff volumes and rates. The quantum of change depends on the intensity of development..

The quantity of surface runoff will be increased typically because of increase in area of pavements and reduction in vegetative cover from its original situation

By way of storm water conservation zoological parks provide an ideal situation because of following reasons:

- Large areas for receiving precipitation.
- The relatively dense vegetation particularly lower storey provides for reduced run-off velocities encouraging infiltrating of water into the aquifer.
- Space availability for first flush collection of storm water and to provide flow equalization when required.
- Opportunities for trade/collected water for being used for a wide range of uses having varied quality requirements.

Landscape Development & Water Use

Landscape development is one of the first areas cut back during time of shortage for at least two reasons.

- It is a visible use of water
- Landscape development is regarded as a luxury.

Quality of water

- | | |
|---------------------------|----------------------------------|
| • Bacteriological quality | • Salinity |
| • Chemical quality | • Physical quality |
| | • Quality criteria for water use |

Strategy - 1

Control water falling on the site to use it most effectively and efficiently
Planted areas should be used as a water collector. The surface planting should prevent rapid run-off and allow for percolation of the falling water into the soil. This is the surest, least expensive and most environmentally correct strategy to conserve water and to use available water most efficiently.

This can be done in the following ways:

1. Slow down falling water so that it can be absorbed into the soil.
2. Direct the flow of falling water through proper grading.
3. Channelise falling water into the soil where it falls or where it is required on site.
4. Store the precipitation received on the site. Do not let it to run off the site.

Strategy - 2

Use of Drought Resistant or Drought Tolerant Vegetation

Basically, the purpose is to replace water requiring plants in the landscape with those which require less water and irrigation.

Strategy - 3

Leave Plants in Stress Condition

In essence, this strategy involves just barely watering the landscape plants enough to keep them alive, but not enough for them to grow and flourish apart from the available natural water resources.

Strategy - 4

Erecting Wind Barriers

The concept is that by reducing wind speed less of available water will be transpired out of the plant into the atmosphere.

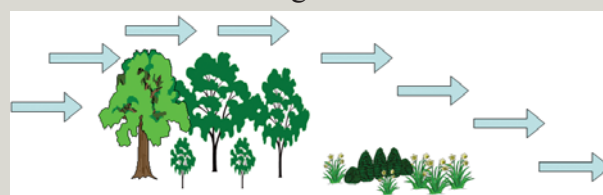
Strategy - 5

Redesign or Renovate to Reduce Water Requirements

Specific plants which require too much water, whether it be a tree, a shrub, ground cover or even a turf variety, may have to be replaced in times of extreme water Shortage.

This can be done in the following ways:

1. Provide shade by non-vegetative means.
2. Depress turf areas adjacent to walks to hold water.
3. Don't put trees on turfed berms.
4. In seeking to conserve water or to use available water more efficiently it may be necessary to regrade to allow water to percolate into the soil rather than running off.



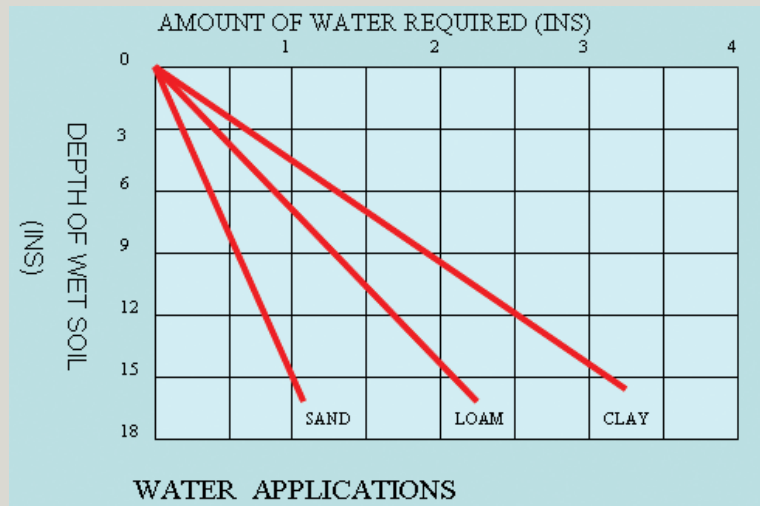
Strategy - 6

Soil Modification

An ideal soil for conserving water or using water most efficiently would be one with a high percentage of organic matter and which is deep friable loam.

This can be done in the following ways:

Adding organic matter to your soil as an amendment or conditioner that you incorporate into the soil - or as a mulch that you spread over the top of the soil.



Strategy - 7

Expand the use of mulch

Mulch is used for water conservation as it:

- prevents weeds
- keeps water in the root zone
- controls erosion
- uses no water as would a ground cover planting

Strategy - 8

Re-use of Water

The utilisation of waste water is a re-use of what would otherwise be waste water in the irrigation of landscape plants in the grounds areas.

This can be done in the following ways:

1. Be just clean enough
2. Cause no damage to the environment
3. Cause no danger to human health
4. Cause no harm to the landscape

‘Water Related Problems’ Encountered In Zoological Parks And Their Solutions

1. Water Logging
 - A. Can be resolved by suitable grading
2. Waste Water Disposal from Wet Moats and Enclosures
 - A. Recirculation after treatment
 - B. Used for irrigation of lawns and plants with the help of pumps
3. High Water Table Areas
 - A. Planting of species which survive in high water table areas and those having high evaporation rates
4. Low Lying Areas
 - A. Suitable grading is required to be done to ensure accumulation of water in predetermined areas.
 - B. Raising of useable areas by initial filling, if possible, largely through soil acquired from within the site.

Run off from Zoological parks can be reduced considerably by:

- A. Ensuring the existence of a permanent vegetative groundcover.
- B. Maintaining minimal surface gradients (varying from 2% to 4%). If natural topography has steeper grades than the sheet flow or channelised discharge should be retained within the site.
- C. Maximum contact between flowing surface water and soil.

Participatory Planning for Zoo

Vinod Kumar

Special Secretary
Forest and Environment Department
Govt. of Orissa



Photo: Brij Kishor Gupta

Master planning at Nandankanan

- Participation of persons of varied experience, expertise and practical knowledge.
- Was a hard work, at times painful.
- However, the period was one of the most stimulating and gratifying one in the life of NKZP and myself.
- Result has been a 20 years perspective – towards *ex-situ* conservation of biodiversity.

Requirements

Each zoo shall prepare a long-term master plan for its development (Recognition of Zoo rules, 1992)

- Zoo shall prepare a long-term master plan for development to ensure optimum utilisation of land, water, energy and finance.
(The National Zoo Policy, 1998)

Participatory Process

Master Planning requires the skills and input from a wide range of professional fields: owner's (mostly government bodies) representatives in facility management and administration, research, fundraising, visitor services, marketing, education, engineering and in zoological instances, animal management/husbandry professionals and veterinary sciences.

Why and How

- Count on these consultants, experts in the field and the owners perspectives/ capacity to bring forward the needed criteria to make the plan fit the application.
- Using an interactive format, weave together all of the important elements to create individually tailored Master Plans for our zoo.

Careful planning & designing

- Zoological facilities be totally committed to the safety and comfort of all animals exhibited.
- The sensitive design of animal environments should provide habitats that are conducive to natural animal behavior and allow the exhibited species to feel secure and comfortable in a familiar environment.
- At the same time, the accomplishment of these goals should produce exhibits that are interesting, exciting and educational for the zoo visitor.

In addition to the careful planning and design of animal environments, other critical subjects of attention should be for the overall success of the zoo

- clear and comprehensible land use,
- circulation patterns, and
- relationships between adjoining exhibits and their service facilities

Essential

- Comprehensive and creative landscape design be an integral part of the zoo development process
- Water services, water resource management, water systems and drinking water quality
- Biological criteria programming
- Habitat design
- Animal security systems
- Animal life support systems
- Interpretive/educational design
- Visitor services design

Visitor Services Design

The following represent a summary of the visitor services that are part of master plan designed and prepared at Nandankanan.

- Entry Plaza/Ticketing • Gift Shop • Restaurant • Rides • Special Presentation Area • Special Shade/Comfort Areas • Playground • Restrooms

Ecotourism Planning

Through participatory planning, ecotourism can provide economic incentives to rural communities around many zoo.

In other areas, Community-based ecotourism can work in conjunction with *in-situ* conservation programs to help save wildlife, forests, wetlands, and seas throughout the world, empowering local residents as independent or collaborative managers of these sites and attractions.

Utilise available experience and skills to facilitate stakeholder communication and provide technical assistance to ecotourism destinations and local communities.

Aspects to be looked into

- Ecotourism Development
- Guide Training
- User Surveys
- Economic Assessment Studies
- Facility Design and Operations
- Tourism Impact Analysis

Projects to be continued

Involvement of Local People in Ecotourism, Eco-guide Training and Development, Impact on Feeding/Feeling Wildlife by Tourists, Women, Crafts and Conservation Attitudes

Master planning

Information Technology Services

At the dawn of a new millennium, facility operations rely on vast quantities of information such as operating and maintenance data, financial reports, projections, plans, drawings, specifications etc. Whether you control and use that information efficiently in an increasingly complex operating environment or are overwhelmed by information overload - determines the success of your enterprise.

- Asset management
- Information management
- Facilities information web
- GIS - a Powerful Tool for Managing Utility Systems

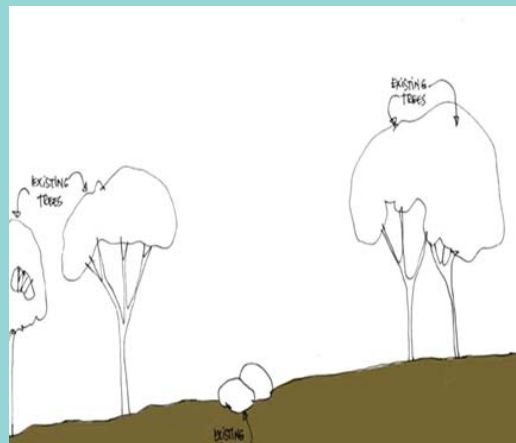
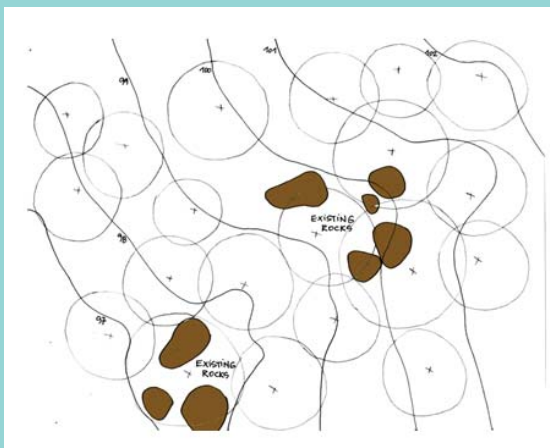
Barrier Design for Zoo Exhibits

Bernard Harrison

Principal Partner
Bernard Harrison & Friends Ltd.
Singapore

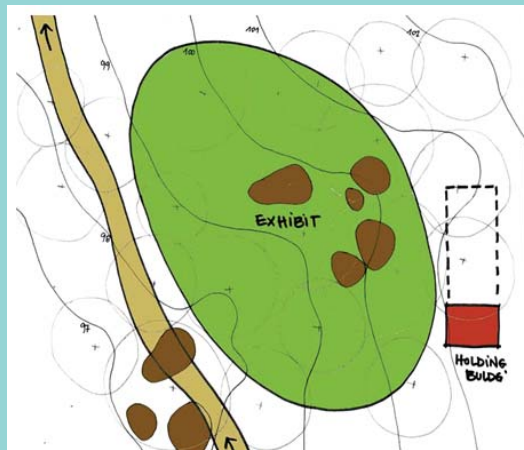
Planning Process

- Existing Conditions
- Master Plan
- Schematic Design
- Detailed Design
- Construction Documents

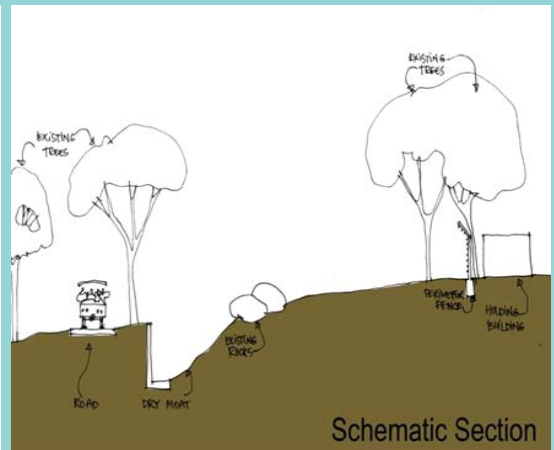


Existing Conditions

Master Plan



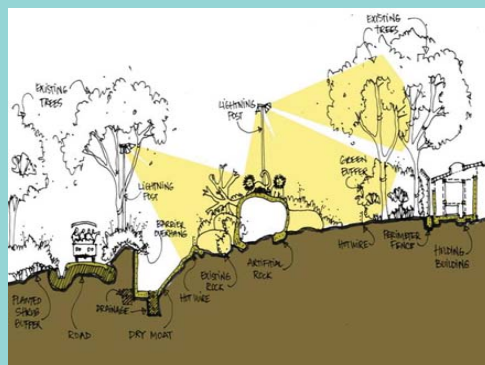
Schematic



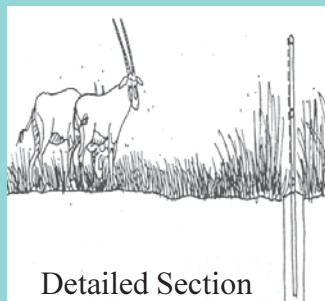
Detailed Plan



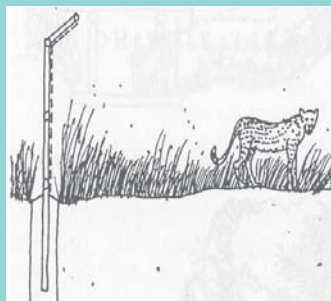
Detailed



Vertical fence



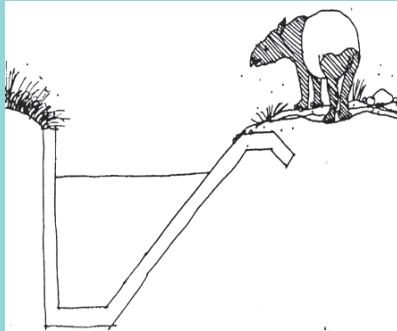
Mesh fence with overhang



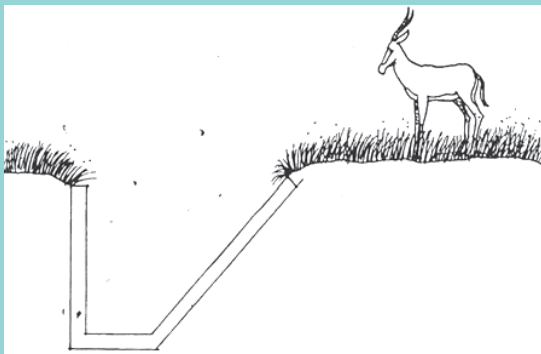
Depressed vertical fence barrier



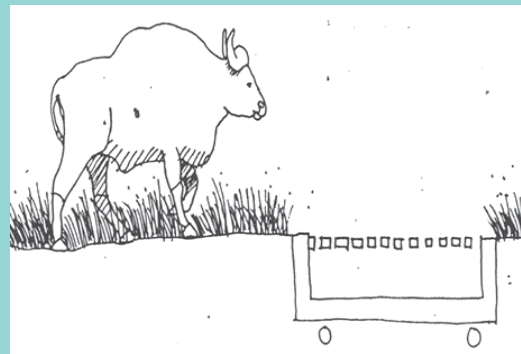
One-sided water moat



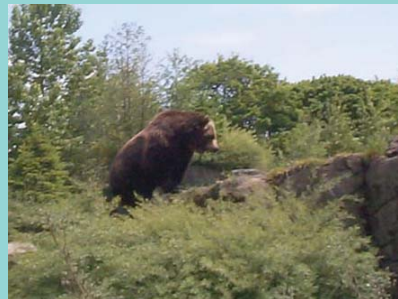
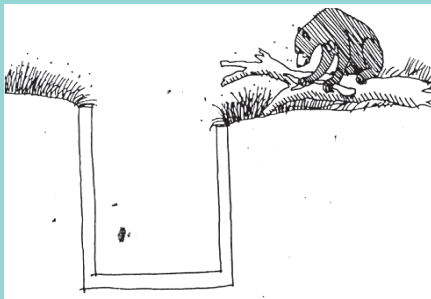
One-sided dry moat



Cattle grid barrier



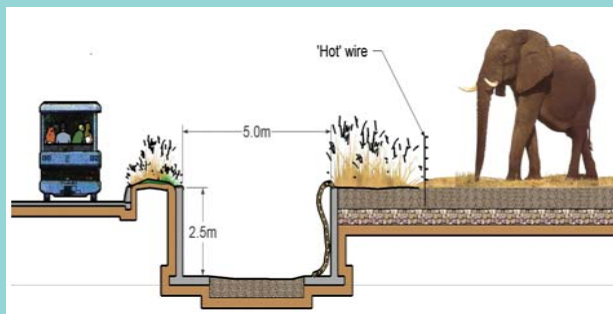
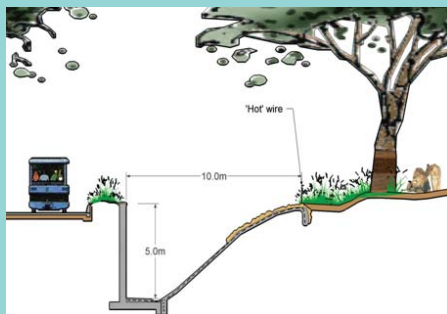
Two-sided dry moat



Moat Type

Big cats

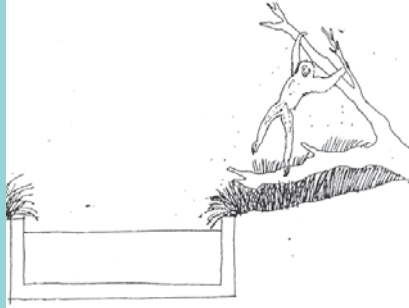
African elephant



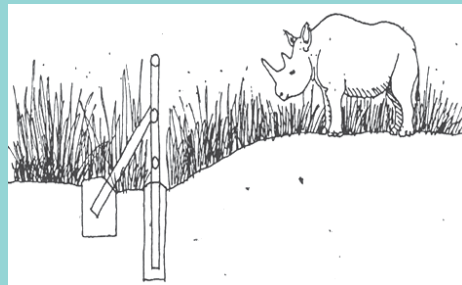
Moat Type M1

Moat Type M7

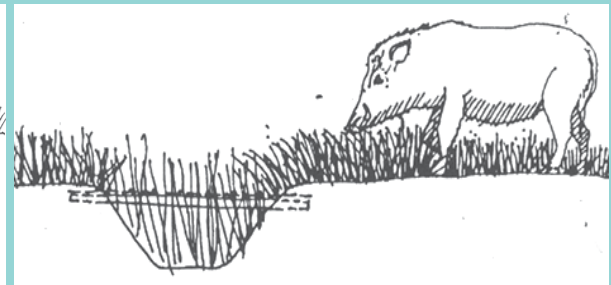
Shallow wet moat



Reinforced pipe barrier



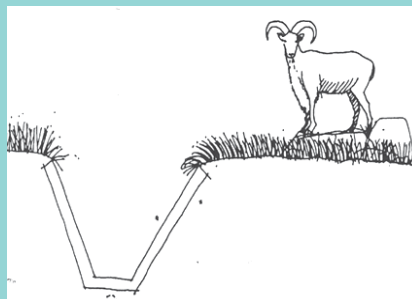
Horizontal fence



Wall barrier



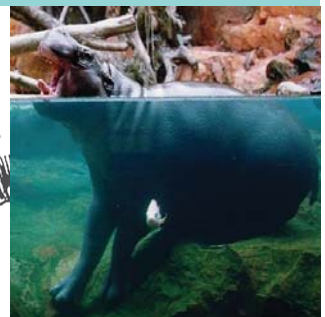
V-shaped moat



Edge viewing



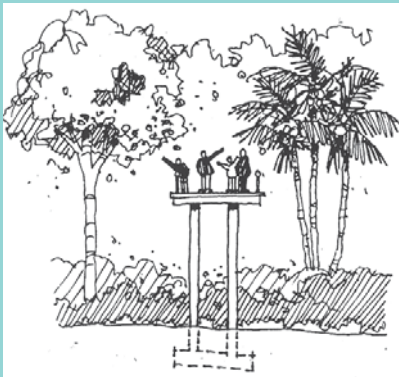
Underwater viewing



Boardwalk – Walk-through



Elevated boardwalk



Aviary – Elevated boardwalk



Viewing through mesh



Glass viewing with structure



Bunker viewing



Glass viewing



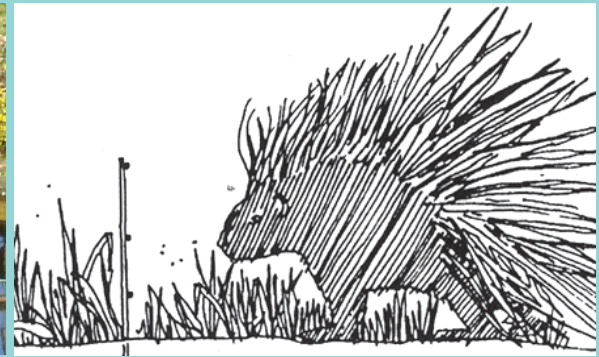
Pop up
viewing



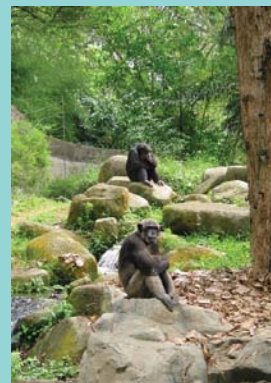
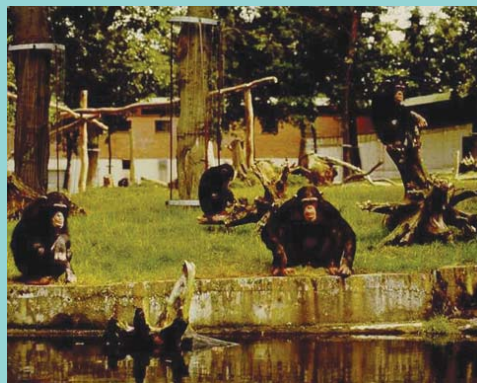
Hot wire



Psychological restraint



Hot wire tree protection



Free ranging
animals

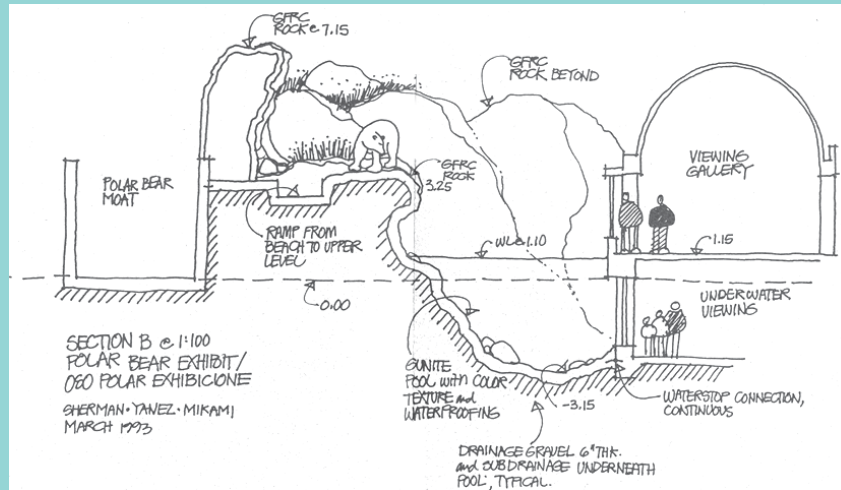




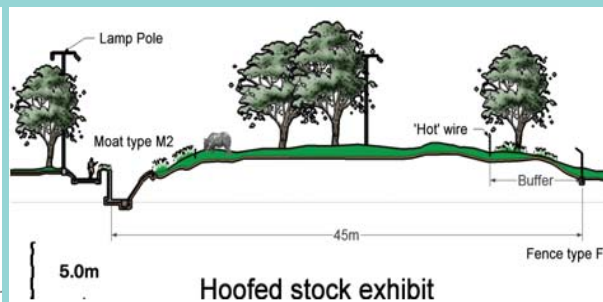
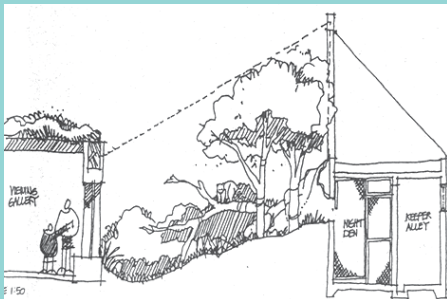
Orchestrated Random Encounters

Random Encounters

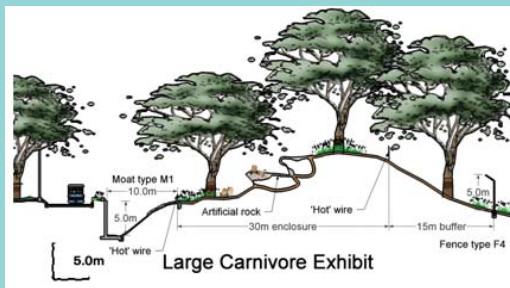
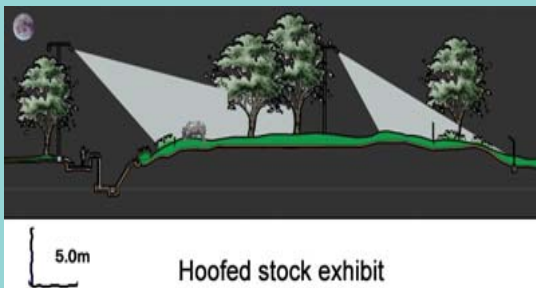
Under
&
above
water
viewing



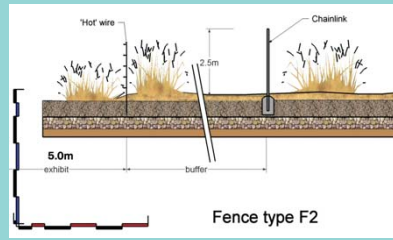
Exhibits



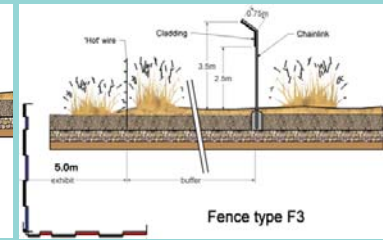
Concealed dens



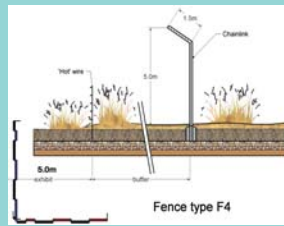
Fence Type



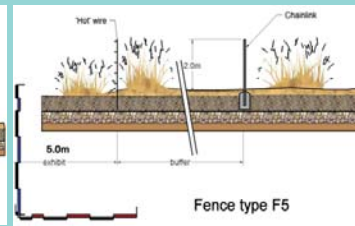
Ungulate, pigs, rhinoceros



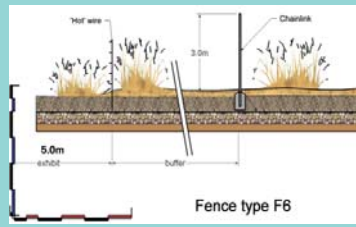
Sloth bears



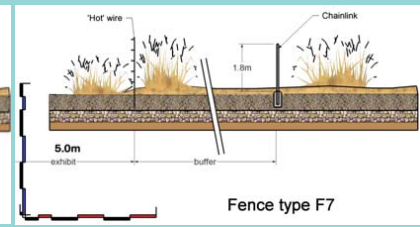
Big cats



Small ungulates

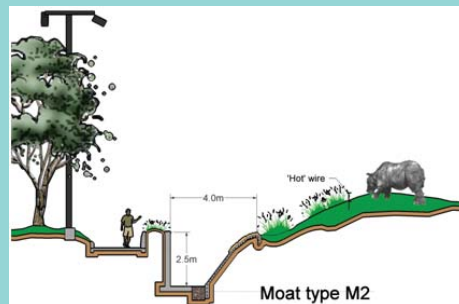


Dhole, fishing cat

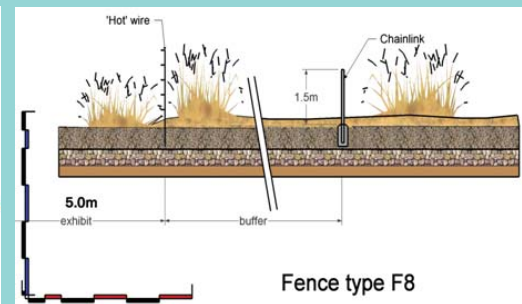


Mongoose

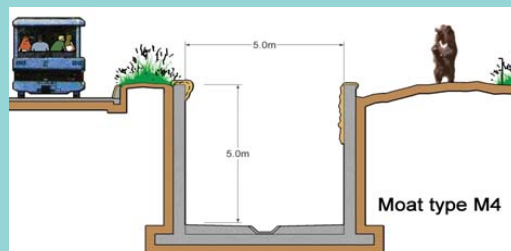
Moat Type



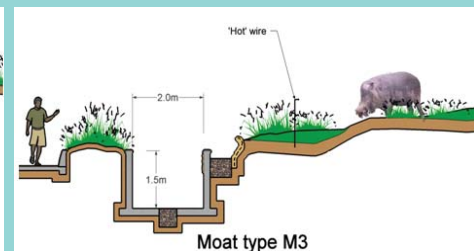
Ungulates, rhinoceros, gaur, tahr



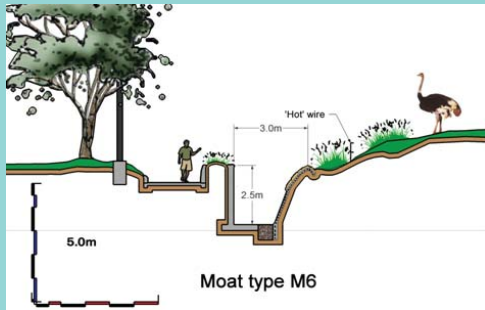
Gharial



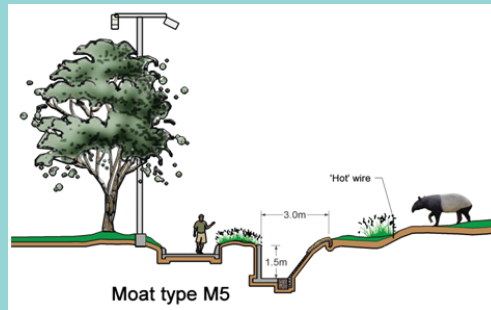
Large bears



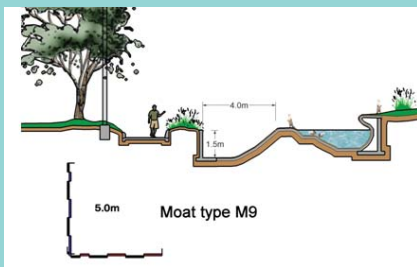
Pigs, tapir, otter, porcupine



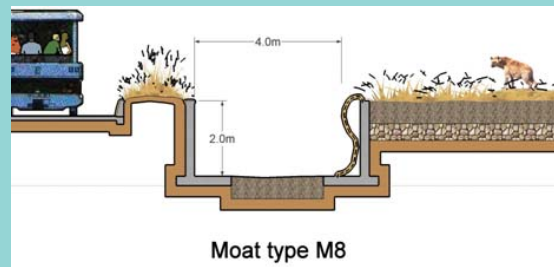
Cheetah, ostrich



Tapir, pygmy hippo

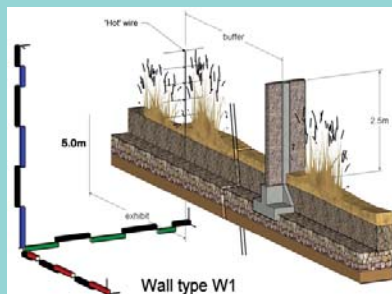


Otter

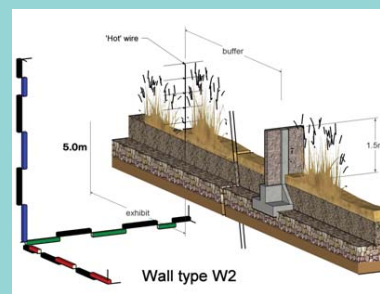


Hyaena, hunting dog, dhole

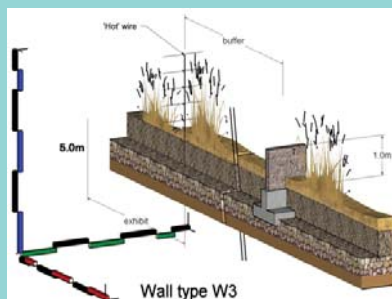
Wall Type



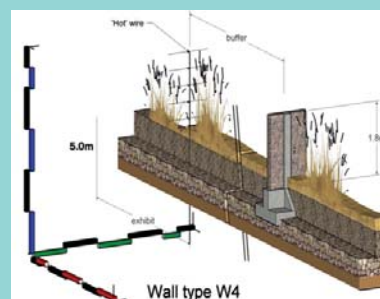
Pygmy hippo



Ungulates, rhino, giraffes



Tamandua



Technical Session

IV



Rhinoceros (*Rhinoceros unicornis*)

Effective Education Awareness Strategies and Programmes for Zoos

Bernard Harrison

Principal Partner
Bernard Harrison & Friends Ltd.
Singapore

Effective Education Awareness Strategies and Programmes for Zoos

Conservation Through Awareness

- Probably the most important contribution a zoo can make to conservation

Vision For Zoos

- Zoos have unique resource of live animals, expertise and links to field conservation
- Zoos should expand the training of their own staff and of others engaged in *in-situ* and *ex-situ* conservation
- Zoos can make a significant conservation contribution by acting as leaders in relevant formal & informal education
- Thus, influencing people's attitude & behaviour towards wildlife and environment locally & globally

Key Role

Central role for all zoos - be part of their organizational strategy:

- ▶ Defined education policy
- ▶ Making a strategic development plan for education
- ▶ Demonstrate environmental sustainability

Education goals should be integral to:

- ▶ Planning collections – Designing exhibits
- ▶ Developing conservation programmes
- ▶ Planning visitor services

Educational role is to:

- ▶ Interpret living collections
- ▶ Inspire & enable people from all walks of life to act positively for conservation
- ▶ Explain human impact on wildlife in both local and global contexts

WZCS Recommendations

- Ensure that education is a central part of their *raison d'être*
- All zoo associations should develop an education policy
- Provide a coordinated approach to education - both formal and informal
- Dedicated to expanding the educational impact of zoos and aquariums worldwide

Its dual mission is to:

- ▶ Improve zoo education programmes
- ▶ Provide members with access to the latest thinking, techniques & information in conservation education

Conservation Education

- The need to change mindsets in visitors about conservation
- Conservation messages are shifting from endangerment & captive breeding to the importance of saving habitat
- Zoos are looking toward more commitment to *in-situ* conservation & the educational message should reflect this important shift

The Message

- Currently the predominant messages from zoos emphasize habitat destruction, pollution, over hunting and introduced species - all important but all secondary causes

Conservation Education: The Method

- All venues at our institutions can be educational
- Exhibits create the strongest impressions for the majority of visitors to zoos.
- What messages do they take away?
- What actions do these ideas foster?
- How can graphic and interpretive presentations improve the experience by debunking myths and enhancing understanding?
- What place do other techniques such as theater have on our grounds?

- Where is the line between informative and sensational?
- How can we promote our institutions to a broader audience so that our educational reach can be extended?

Zoo Educational Facilities

- Zoos are building libraries & teacher resource centers to improve access to and quality of educational materials & information
- Classrooms are being developed to reflect:
 - ▶ Habitat ▶ Biogeographic ▶ Expedition
 - ▶ Other themes that enhance learning objectives
- Zoos are using auditoriums and interactive exhibits to extend their educational reach
- Contribution to improving the visitors' experience and understanding hands-on laboratories
 - ▶ Interactive technology
 - ▶ Computer simulations
 - ▶ Teleconferencing centers
 - ▶ Discovery rooms
 - ▶ Immersion exhibits

Conservation Education Zoo Design

- Educators are essential members of exhibit development teams
- The educator's analytical approach can help mold the volumes of information into effective conservation messages
- Educators' expertise:
 - ▶ audience definition and assessment
 - ▶ defining audiences
 - ▶ selecting methods of exhibit interpretation
 - ▶ careful crafting of conservation messages

WZACS emphasises the use of variety of educational techniques, facilities and considerations, together with knowledge, creativity and inventiveness, can make zoos highly interesting, attractive and effective places for environmental, conservation and holistic life system education

The National Zoo Policy (1998), framed under Wildlife Protection Act 1972, stipulates that "Each Zoo should have a drawn up plan for educating the visitors as well as others in the community."

Information Offered

General Knowledge of species exhibited

- Habitat
- Population status
- Biodiversity conservation
- Research:
 - ▶ Identification
 - ▶ Food habits
 - ▶ Reproduction
 - ▶ Life cycle
 - ▶ Intra and inter - spp. behavioural pattern – herd / solitary habit
 - ▶ Living habits - arboreal/ terrestrial/ burrowing / aquatic, swimming and running capability



Interpretation Centre

- This Centre should be in the form of an education hall, located near the entrance, inside the Night Safari. Inside this hall, life-size models of animals (fibre glass/POP) and paintings with relevant information of the spp., should be exhibited to enable the visitor to have touch-like look.
- Audio-visual facility for showing video films on wildlife and nature conservation and also for talks/lectures on related subjects, should be provided.
- Digital touch screen facilities for disseminating knowledge regarding animals/birds, exhibited inside the safari should be provided. Themes like animal adaptations, behaviour, reproduction, nutrition, food habits and complex subjects like evolution and ecology, food chain, conservation issues should also be explained in the centre show models and charts
- Photographs/painting of animals/birds
- Audio visual aids for showing wildlife films
- Scheduled talks, lectures, workshops etc.
- Nature Trails

Signs & Graphics

- Map/s of the Night Safari
- Directional boards
- Interpretive boards giving scientific information of each spp., fixed near the exhibit, boards spelling out the Do's & Don'ts, boards indicating public facilities like toilets, water taps, restaurants, kiosks, tram/riding stations and parking etc. The signages should be prepared with the help of Communications Interpretive firm, to make them attractive, eco-friendly and aesthetical. They have to be properly lit to make them readable at night.

Publication and Publicity Material

- Publicity material should be carefully designed by defining its purpose, choosing the right type of format (print or electronic) and eco-friendly material. The material can be in the form of booklets, pamphlets, brochures, folders, stickers, badges, caps, neck-ties, T-shirts, hand bags, paper bags and picture post cards etc. In the electronic form it can be CD, DVD and touch screen monitors etc.

- An illustrative Night Safari booklet giving its layout-plan, area, information reg. spp. exhibited, times of opening and closure, entrance and ride fee, and facilities provided inside, is a must and should be reasonably priced. Brochures and folders could be prepared for a group of animals, trail wise. Stickers, badges, caps, neck-ties, T-shirts bags and picture post cards may display preferably with endangered spp., with the message - “Live & Let Live” or in hindi “Jiyo Aur Jine Do” . CDs and DVD should be a thematic production of either the whole visit of the Safari or of a particular trail.
- There should be a well designed souvenir shop near the Entrance Plaza of the Safari, where all types of publicity material and publications should be available for sale to the visitors.



The Nature Trails

- Preferably loop trails • Exhibits of smaller animals • Ranger stations for interpretation • Trained staff should conduct the group of visitors, educating them, regarding exhibits.

Training

- Keepers
- Teachers
- Rangers/Guides
- Volunteers

Arazpa

To provide exemplary learning opportunities that connect people with nature. These experiences enable the community to better understand and contribute to a future where humans live in balance with the natural world

Influence on Human Life

- Man’s existence depends upon nature’s equilibrium. If disturbed affects human life adversely
- Bio-diversity ensures a clean and healthy environment, conducive for a good quality of life. Survival of human life is not possible without plant and animal life, and hence the popular logo suggested for Night Safari could be:
- “Live and let live”
- Jiyo Aur Jine Do - in Hindi



Do zoos need a new paradigm ?
Is a zoo a zoo?

How to exhibit a bullfrog

- Naturalistic
- History
- Meaningful
- Aesthetical
- Sensory
- Conservation and collective concern

What is metamorphosis?

- Abrupt developmental change subsequent to birth
- So many frogs –
So few princesses

We need to introduce display and interpretation techniques from more industries like.....



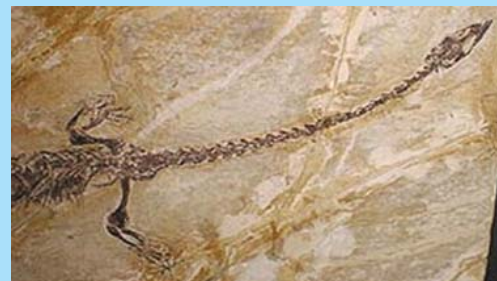
Aquarium techniques



Museums Techniques Graphics & Imax



Dioramas



Fossil Displays



Botanic Gardens & Arboretums



...theme park interactive rides



Robotic dinosaur park



Digital Museum



Computer generated imagery

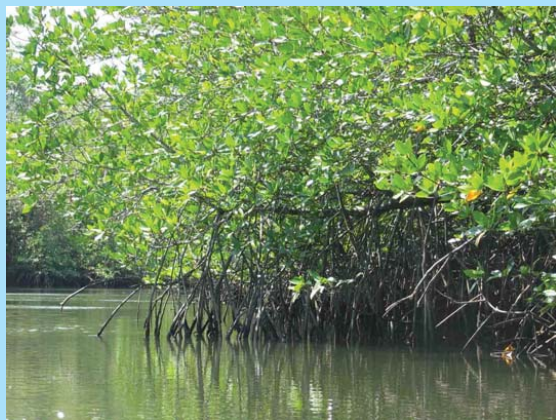


... draw from the theatre



Different exhibition techniques

Realson & lumiere



.....look at nature more often



....and walk our animals around a bit



... use safaris as a bench mark



Balloons & Safaris

Designing of Interpretation and Signages

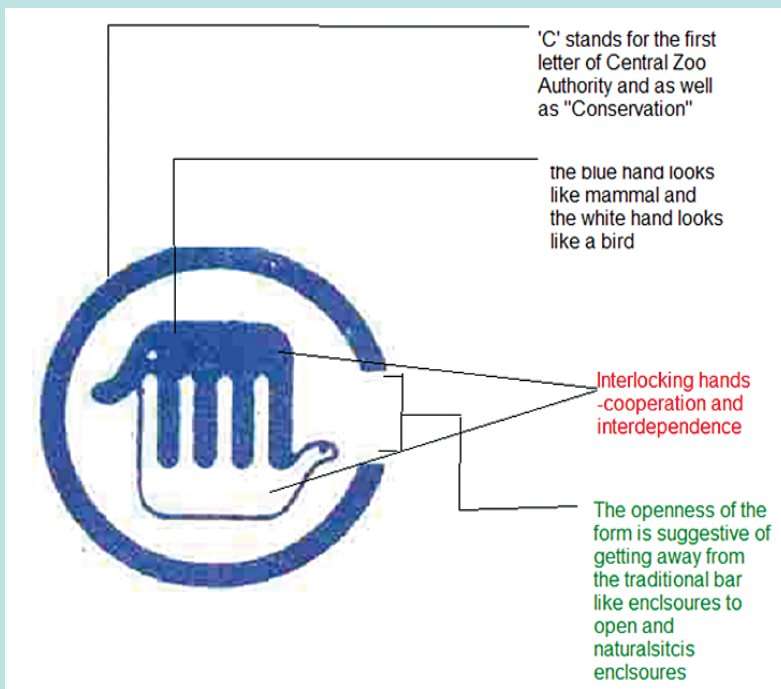
SPEAKER

Brij Kishor Gupta

Scientist
Central Zoo Authority
New Delhi



Designing of Interpretation and Signages



Definition

Interpretation?

- Interpretation is defined as educational activity, which aims to reveal meaning and relationship through the use of original objects by first hand experience, and by illustrative media, rather than simply communicating factual information. In a zoo, such programme helps visitors to understand the uniqueness of each animal and its relationship to its surroundings.

How the interpretation can be done in zoos?

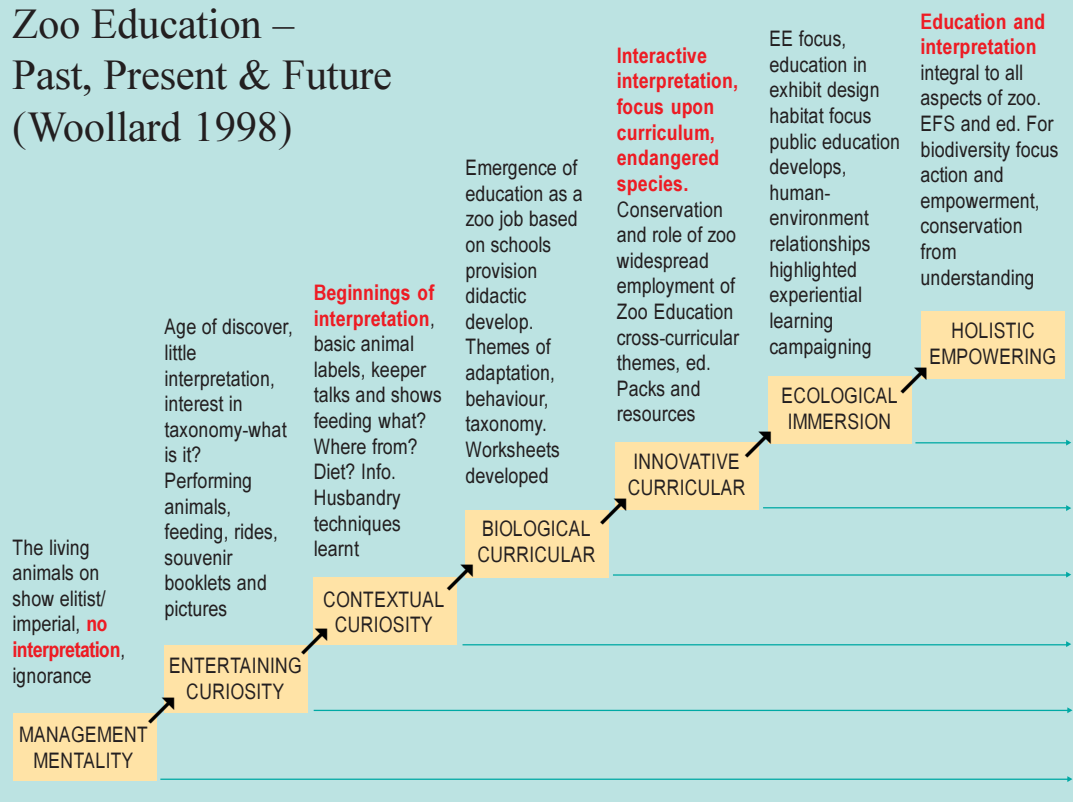
- Interpretation can be done through a variety of means and media -
 - exhibits
 - publications
 - brochures
 - signages
 - booklets
 - guided tours etc.

Scope of interpretation in zoos

- Zoos are visited by millions of people from diverse groups
- Living animals have enormous power of attraction.
- People visiting zoos are interested about the animals, their habitat, behaviour and conservation status.



Zoo Education – Past, Present & Future (Woollard 1998)



Interpretation

- Interpretation is a tool as well as technique for education and communication.
- Interpretation programme will enhance the number of people visiting the zoos

Interpretative signage

- Zoo Interpretation and Exhibit design
- Enrichment
- Interpretative graphics for zoo visitors



Los Angeles Zoo

If an exhibit does not attract attention, the signage will be of little value



Make your signage asking questions



Signage can teach behaviour and ecology of animals



Interact and Learn - children favourite



Teaching experiences

Exhibits

- Recognition of Zoo Rules 10 (15) - animal enclosures, designs, dimensions and other essential features
- Designed fully to ensure safety of animals, visitors and caretakers
- Should meet the biological requirement of the animals
- Simulate the conditions of natural habitat of the animal in enclosure as closely as possible.

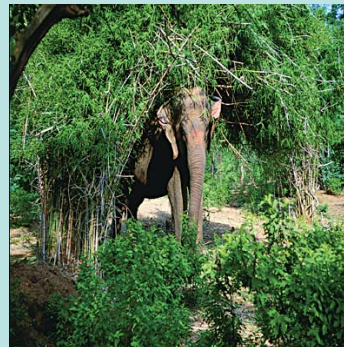
Exhibit speaks for itself?



Exhibit speaks for the animals habitat



VJB Zoo, Mumbai



Visakhapatnam Zoo



Melbourne Zoo



Melbourne Zoo



Chhatbir Zoo



Amar Circus

Bad enclosure may lead to wrong interpretation?



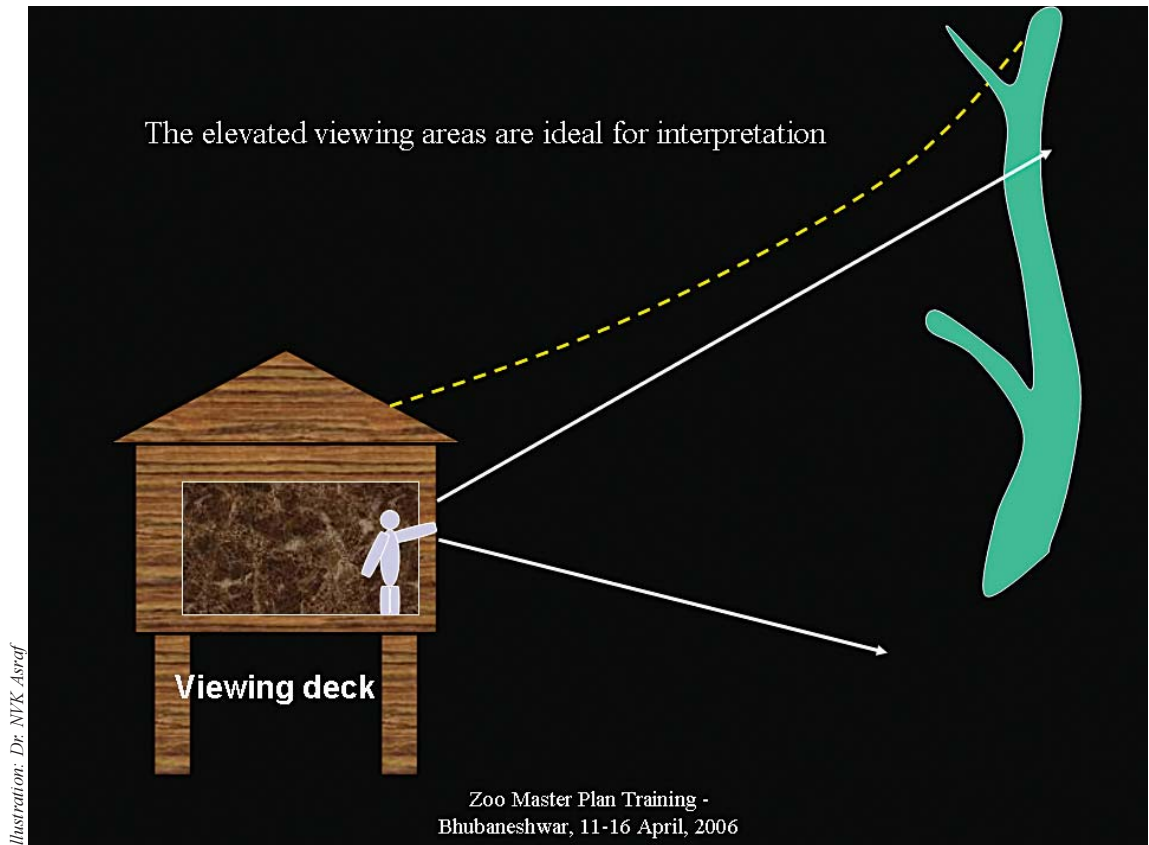
Many times naturalists enclosure does not require interpretation



Where to place you signage -



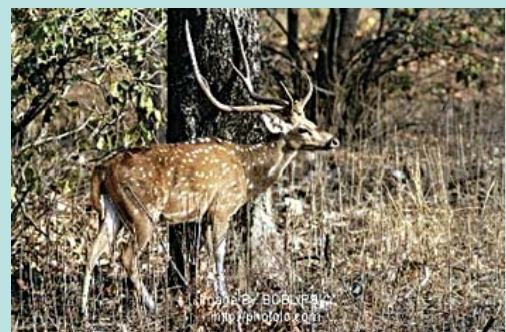
Illustration: Dr. NTK Asraf



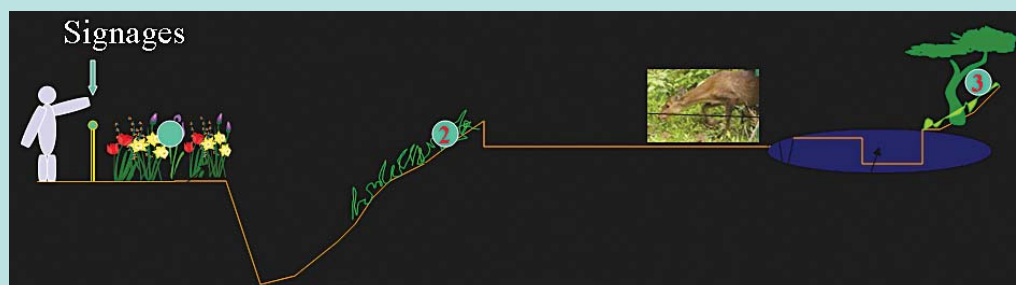
Deciding on placement of signages,
relate the message *ex-situ* & *in-situ*



In captivity



In the wild



Education Recognition of Zoo Rules 10 (45 & 46)

- Every enclosure in a zoo should bear sign board displaying scientific information regarding the animals exhibited in it.



Examples of bad signages



Bad signages also make your sponsor unhappy



Signages-on-site interpretation

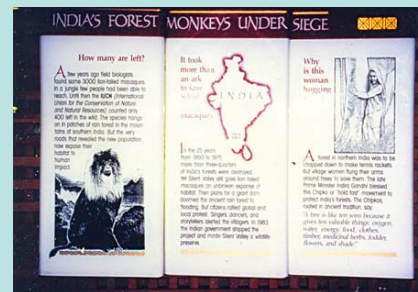
by providing interactive, structured educational signages at animal enclosures or wayside exhibits, highlight interesting features like their diet, longevity, behaviour and conservation status. These signages will enhance the visitors knowledge about the animals, their status and the need to protect the species



Signs should be written in such a way that the visitors are forced to look at them

Signage with themes

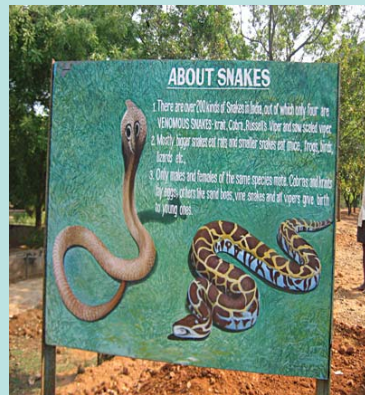
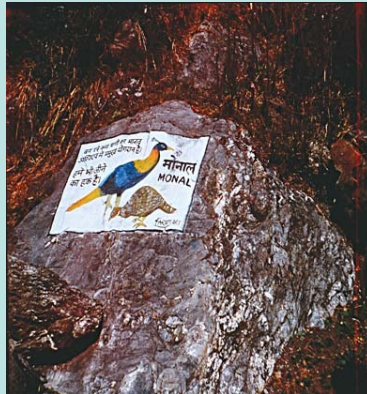
- Focusing upon a local species (lion tailed macaque)
- Taxonomic group
- Biogeographic zone (Nilgiri Biosphere Reserve)



Signages should motivate the visitor



Singnages - examples



Keep your message short



Signages should merge with the animal habitat



Signages can explain why the animals are here

Signage should report on ongoing conservation work also



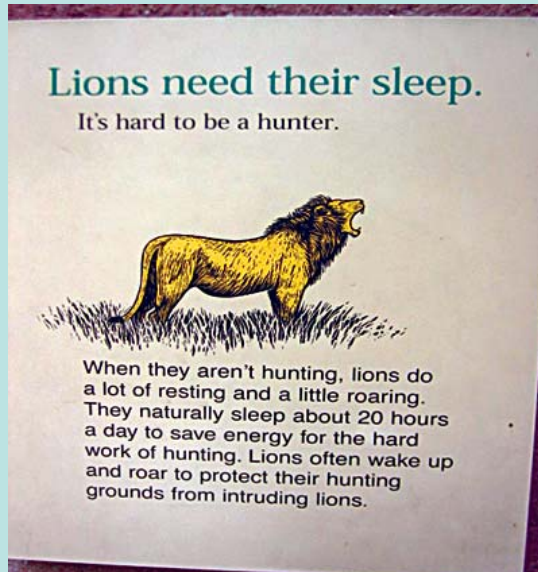
Make your signage attractive, weather-proof, visitor-proof, should be kept updated and repainted regularly



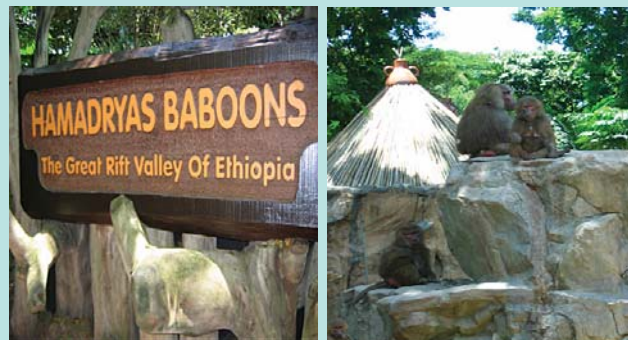
Location of signages makes differences



Using much of taxonomy may not interest most visitors, highlight the answers of common questions



At baboon enclosure visitors can be heard asking what is wrong with these baboons, why do they have such swollen red behinds, are they sick? Clarify it!



Signage with information on why their habitat is threatened





Disney Animal Kingdom

Satisfy your visitors' demands by providing informal signages



Signage may relate history

Directional signage play important role



Signage finding your way are very important



Location map should not be neglected



Placement of signages - very important

Interpreting the past and future of the zoo



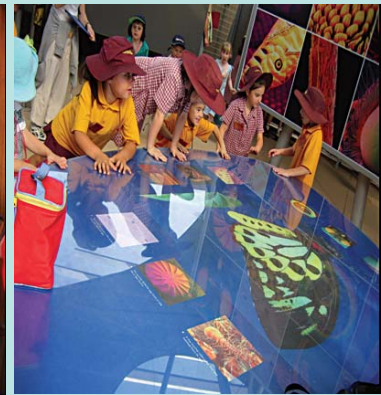
Zoos as Museum



Interpretating
the animal habitat



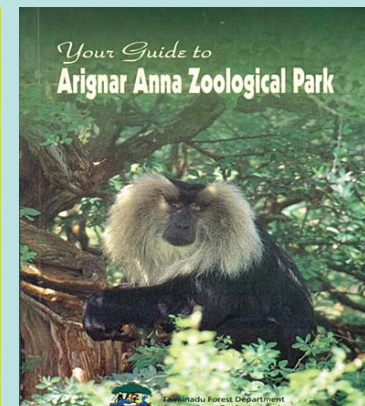
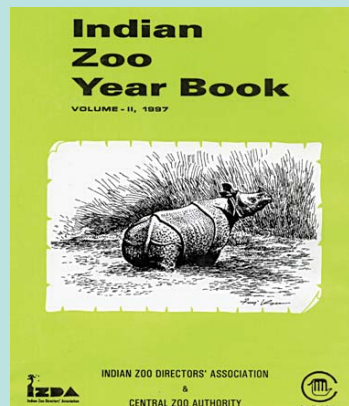
Education on
animal husbandry-
live animal



Signage at exit points
very important

Publications

- Rule 10 (47)
- Every zoo shall publish leaflets, brochures and guidebooks and make them available to the visitors, either free of cost or at reasonable price



Education and Eco-awareness – Zoo School programme



Conducted Tours



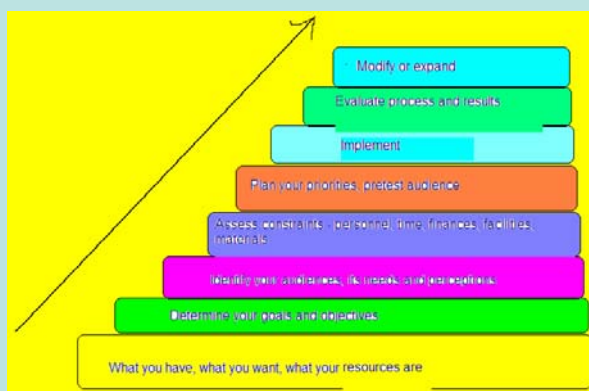
Informal interpretation

- Keeper's talk
- Hand-on-experience
- Exhibits with a clear biological theme
- Discovery centres
- Nature trails



Biological Themes
Adaptation, population dynamics evolution, conservation breeding and conservation management techniques, wildlife trade

Evaluation of interpretation programme is essential



Strengths, Weaknesses, Opportunities and Constraints While Implementing the Vision of the Zoo

SPEAKER

P.C. Tyagi

Former Director,
Arignar Anna Zoological Park, Chennai



Photo: Brij Kishor Gupta

National Zoo Policy 1998 objectives

- Conservation of endangered species
- Co-ordinated breeding under *ex-situ* conditions and raise stock for rehabilitating in the wild
- Create understanding and awareness about the need for conservation of natural resources - maintain ecological balance
- Undertake scientific studies and research relevant for conservation
- Creation of database – share amongst organisation in *in-situ* and *ex-situ* conservation
- Zoo to function as rescue centre for orphan wild animals

Zoo endeavours to integrate 3 major conservation tasks

- Education ■ Research ■ Species & habitat conservation

Animal collection in Indian Zoos

- Cumulative area of zoos - 9,000 ha(App)
- Total animal collection about - 50,000
- Total number of species - 600
- No. of Recognized zoos - 164
- De-recognized zoos - 91
- Zoos modernized - 14

Conservation status of species of animals held in Indian zoos

- Critically endangered - 1%
- Vulnerable - 4%
- Endangered - 3%
- Low risk category - 8%
- Lowest risk least concerned -84%

Enriching animal collection in zoos

- Capture (Prior to 1972)
- Exchange between zoos
- Orphan animals/Rescued animals

Status of animal exhibits in Zoos

- Single sexed animal
- Low number-skewed sex ratio
- Natural groupings absent
- Sick/injured/weak animals
- Aberrant/ stereo type behaviour
- Inappropriate enclosure
- Lack of enrichment
- Animal information/display boards

Conservation Breeding of Captive stock of Animals in Zoos

- Develop self-sustaining captive and stable population – For exhibiting or exchange
- Conserve the species gene pool which is threatened, endangered or extinct in wild

Strategy for self-sustaining & stable population

- Acquire animals
- Breed over a long period
- Selectively inbred strains – homogeneous genetic source
- Not suitable for re-introduction
- Acquire male/female of different genetic source
- Will it introduce genetic variability?

Zoo stock- Genetic variability

- Zoo genetic lines/inbred strains has:
 - high risk of loss of vigour , reduced vitality , vulnerability to disease, low fertility & growth rate.

Result –Population failure

Strategy for conserving gene pool

- Maintain genetic variability as in wilderness
- Estimate genetic variation or heterozygosity scientifically
- Aim to minimize inbreeding and maximizing genetic variability
- Two alternative
- Combine two genetic inbred lines to recreate wild gene pool
- To manipulate mating using males from distinct genetic lines
- Acquire founder animals for breeding programmes for infusion of new bloods into inbred groups (sec 3.2.1 NZP)

Conservation Priority

- Conservation action for the endangered endemic species
- Conservation Linkage - Link *ex-situ* and *in-situ* breeding programmes, which link *ex-situ* captive bred species and *in-situ* population

Collaborative captive breeding programme

- Traditional conservation - inbreeding of the existing captive population in zoos for several generation
- Zoos regionally need to collaborate and pool their resources for breeding programme
- Raise stock suitable for reintroduction - contains maximum genetic diversity as in wild

Zoos Conservation Mandate Unaccomplished

- Zoos mandate not limited to captive breeding but extends to linking *in-situ* and *ex-situ* conservation-species and habitat management
- Assembled a number of species without clear collection and breeding plan
- Inadequate space-animal > Carrying capacity
- Insufficient enclosure enrichment and with surplus population
- Animal collection is mainly for exhibition education, learning and recreation
- Used as reserve centres for orphaned rescued animals



Animal exhibits for education

- Should excite, enthuse and create interest
- Should encourage understanding of conservation issues
- Provide range of experience for diverse visitors
- Revitalize focus on education, maximize educational activities
- Develop appropriate resources
- Use variety of interpretation techniques
- Increase visitors receptivity for programmes

Zoo education outcomes

- Zoos affect human emotion and thinking and change their behaviour
- Empowers people to act positively on Wildlife and Environment issues
- Zoos help people to appreciate, understand and respect nature

Zoo - A learning centre

- Biological Science
- Animal Husbandry
- Ecology
- Genetics
- Captive Breeding
- Ethology
- Bio-diversity
- Cultural Enrichment
- Nature Conservation
- Wildlife Management

Informal education

- Presentation
- Keeper's talk
- Bio-theme exhibits
- Graphics
- Immersion exhibit design
- Hands on experience

Formal education

Associate with Schools/Colleges/Universities

Prepare exciting, interactive, structured, education programmes

Customize for a category/class

Interlink with school curriculum

Cross curricular – incorporate arts with socio-economic features of environment & nature

Develop links and partnership with NGOs

Extension programmes - Visit schools and colleges

Themes for Education

Animal classification

Discussion about species, habitats, behaviour & conservation

Understanding of importance of eco-system

Socio-economic value of species and habitats

Impact of human behaviour on wildlife & conservation

Biological themes

- Population dynamics
- Adaptation
- Evolution
- Natural selection
- Conservation breeding
- Conservation management techniques

Cultural themes

- Species in cultural and religious beliefs
- Domestication of species
- Good husbandry
- Appropriate nutrition
- Appropriate habitat

Zoo communication with visitors

- Display boards
- Interpretation staff
- Volunteers
- Electronic communication, Information screen
- Internet - Touch screens

In-situ conservation education

- Zoo exhibits to generate understanding and appreciation for *in-situ* conservation
- Co-ordinated captive breeding programme for re-introduction
- Zoos and NGO to work in partnership for *in-situ* conservation programme

Evaluation

- Aids in planning for effectiveness of education programme
- Reflects change in people's attitude
- Use variety of methods to evaluate education programme
Casual observation, Surveys, Questionnaire

Zoo Exhibit Evaluation

Visitor's perception of good exhibit. (Visitor Survey)

- Length of stay
- Healthy animals
- Understanding the message
- Return visits
- Increase in visitation
- More support from people

Zoo staff training

Zoo education requires

Skill, Creativity, Inventiveness

- Use wide variety of education techniques
- Professional approach
- Knowledge of composition and motivation of zoo public
- Formulate education plan

People Expect

- Healthy animals
- Easy to see
- Appropriate settings
- Good information
- Safety

Visitor Reception

- Meet their needs
- Allow them to move freely by following signage
- Welcome feeling
- Little fun
- Listen patiently
- Learn new things
- Allow visitors to exercise own choice, interest, own masters, own control

Zoo Research

- Zoo research is basically systematic collection, collation and analysis of biological data from animals and habitat.
- Zoo permits non invasive and non manipulative research.

- Whether zoo research has aided conservation of the threatened species or it is mainstream academic research.
- UK study shows 15 subjects are popularly researched - Beh-40%, Env Enr-18%, Repro-8%, Genetics-Ecology-Conservation-5%.
- Nutrition and behaviour are relevant but should focus on linking *ex-situ*, *in-situ* conservation.
- Reproduction relevant only for threatened species.
- Findings of zoo research are of not much value as it is conducted in unnatural conditions with small samples.
- Recent trends - emphasis on repro studies, nutrition and growth, behaviour and enrichment.
- Field conservation oriented topics are little researched, example: Eco and Bio conservation and reintroduction, taxonomics, genetics and biology.
- Zoos not capable of building research facilities and employ full-time researcher.
- Must collaborate with research universities and organisations.

Animal health care

Mandatory provision of minimum standards for animal health care in

- Proper housing
- Upkeep
- Veterinary health care (WLP Act, Zoo rules, NZP)

Maintaining good health of animals requires tremendous effort

- Detection and diagnosis of illness.
- Handling and restraint
- Treatment and post care
- Therapeutic approach to treatment not effective

Health directly related to maintenance

- Housing
- Sanitation
- Prophylactic measures
- Any deficiency results in sickness or death
- Feeding
- Keepers' care

Zoo veterinary hospital - properly equipped

- Quarantine
- Isolation ward
- PM room and incinerator

Zoo Management Constraint

- Zoo staff vacancy
- Inadequate essential support staff
- Inadequate budget
- Surplus animals
- Animals not fit for exhibition
- Zoo education infrastructure revamping
- Zoo modernisation – ageing infrastructure, renovation are required
- Enhance quality of care for animals
- Mobilisation of resources - Zoo authority

Zoo's Role-Strength

- Large visitation
- A real world of wildlife
- Innovative exhibits
- Creative education programmes
- Animal health care
- Rescue centres
- Relevant research programmes
- Operate zoos to highest ethical standards
- Increase inter-institutional cooperation

Developing Visitors Facilities in Zoo

SPEAKER

Brij Kishor Gupta
Scientist
Central Zoo Authority
New Delhi

Visitor facilities

- Visitor experience
 - ▶ Arrival, transfer, motor cycle/car/bus park
 - ▶ Way finding – circulation
 - ▶ Amenities
 - toilets
 - shade and shelter, rest areas
 - drinking water points

■ Views and vistas

■ Visitor services, food, beverage, gift sales

Recognition of Zoo Rules, 1992 vs

Visitor facilities

Rule 10 (48)

- The operators shall provide adequate civic facilities like toilets, visitor sheds, and drinking water points at convenient places in the zoo for visitors.

Rule 49

- First-aid equipments including anti-venom shall be readily available in the premises of the zoo.



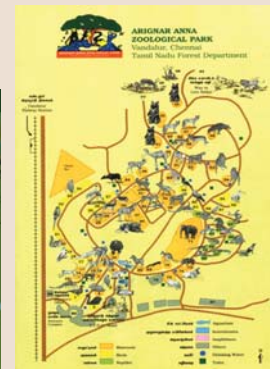
Rule 50

- Arrangements shall be made to provide access to the zoo to disabled visitors those in the wheel chair
- The Central Zoo Authority in its XIXth meeting held on 27th January, 2005 discussed the needs of the zoo visitors and decided to take suitable steps to make zoo visitor-friendly, by way of providing better & modern visitors' conveniences, safe drinking water, rest sheds, easy mobility in the zoo by providing trams (pollution free), bicycles etc and good cafeterias.
- CZA vide its letter dt. 1.8.2005 had communicated to all CLW and all zoo in-charges to consider the same and these facilities should be energy efficient and convey to the visitors the need for conservation of our nature.

Zoo arrival/ Exit points



Way finding, circulation



Information on
Zoo and its
activities

Amenities - Shade and shelter, rest areas



Garbage collectors

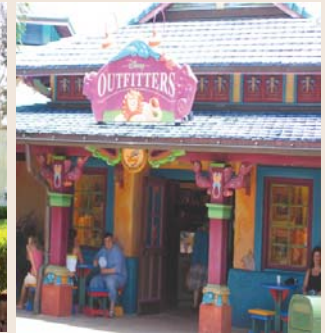


Drinking water points



Toilets/ Rest rooms

Visitor circulation



Visitor services - cafeterias



Other services- lockers

Wheel-chairs for physically challenged and young ones



Zoo's adjoining areas

Bank/ATM services

Marketing and fund raising at zoo, involvement of corporate and others: A case study of Mysore Zoo

SPEAKER

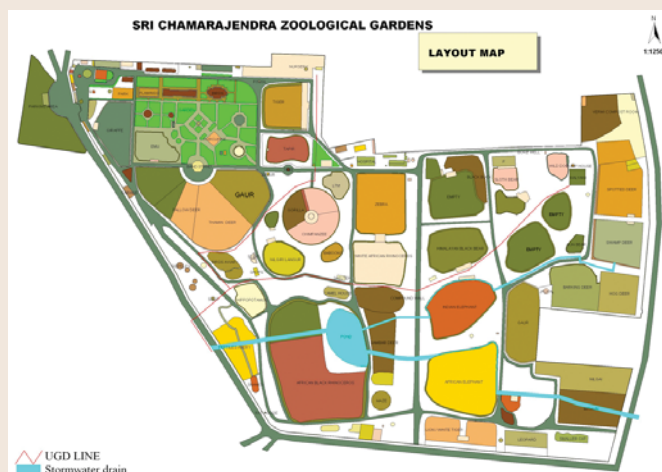
Manoj Kumar
Executive Director
Sri Chamarajendra Zoological Garden
Mysore



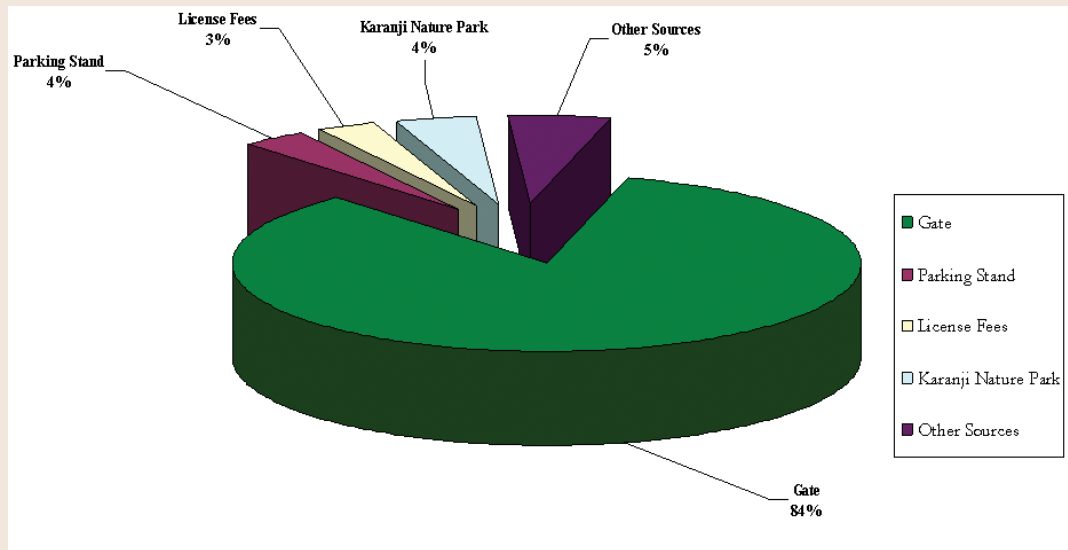
Photo: Brij Kishor Gupta

Mysore Zoo

- One of the very reputed zoos of the country, spread over an area of around 90 acres.
- Housing more than 900 individuals, comprising 112 different species.
- To manage the zoo and Karanji Nature Park, there are around 250 personnel, including security staff.
- With 1.6 million visitors, nearly Rs. 4 crore of revenue is generated.
- The maintenance cost alone comes to around Rs. 4 crore.

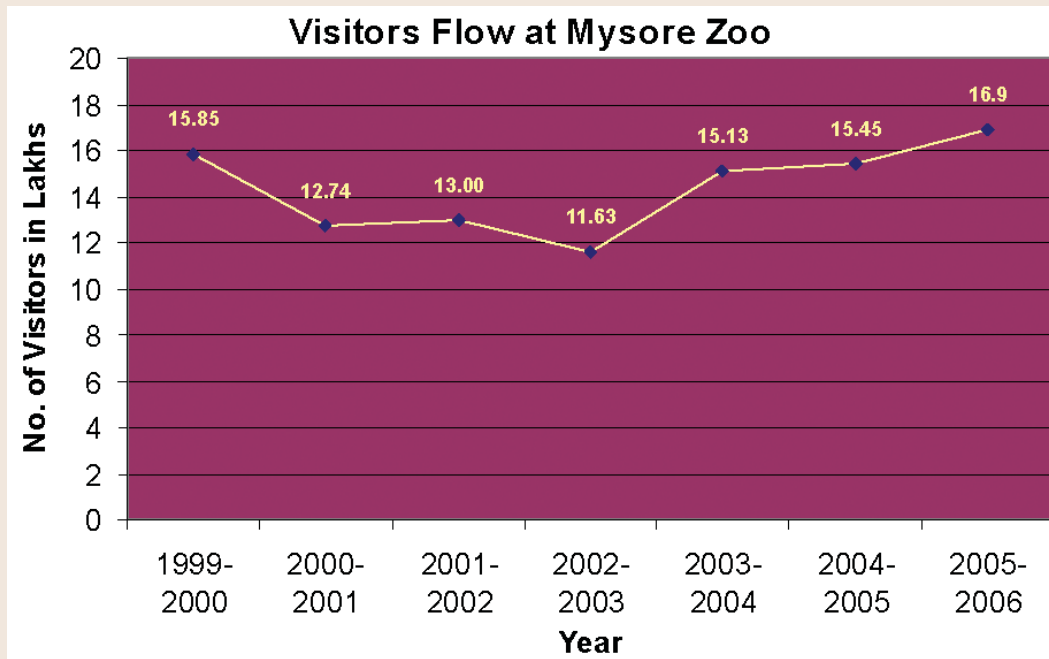


Sources of Revenue



Sl. No.	Year	No. of Visitors (Lakh)	Gate Revenue (Lakh Rs)
1	1999-2000	15.85	131.93
2.	2000-2001	12.74	159.17
3.	2001-2002	13.00	166.09
4.	2002-2003	11.63	157.73
5.	2003-2004	15.13	208.45
6.	2004-2005	15.45	288.25
7.	2005-2006	16.90	323.08

The gate revenue earned in Mysore Zoo is the highest for any zoo in India.

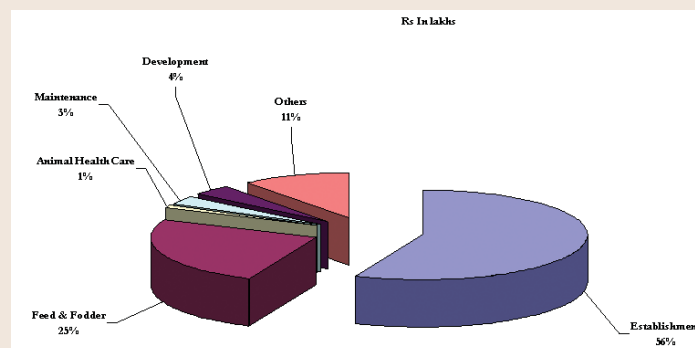


Budget

Rs in Lakhs

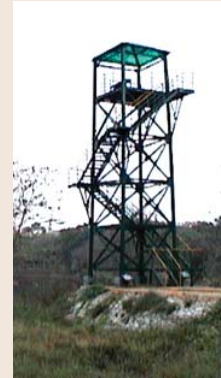
Year	Revenue	Expenditure	Grants from GoK	Grants from CZA
2001-02	204.07	287.36	102.68	0.00
2002-03	199.91	327.26	97.50	16.07
2003-04	244.73	323.34	100.00	42.80
2004-05	354.16	354.65	0.00	25.00
2005-06	405.00	381.00	0.00	25.75

Expenditure



Avenues for Revenue

- Karanji Nature Park
- Adoption Scheme
- Tourism passport
- Vermicompost
- Branding of Zoo
- Parking Stand
- Wildcard
- Selling of ornamental plants
- Sponsorship



Watch Tower



India's largest Aviary
outside view



Inside the aviary



Children's park



Resting place



Cafeteria & Milk parlour

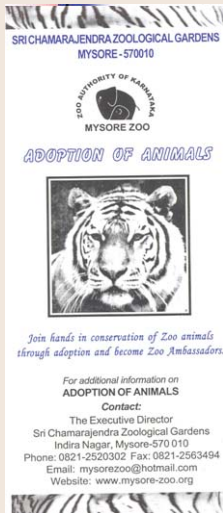


Joggers' path

Dove Tailing

- Dove tailing Mysore zoo with the Govt. policies.
- Linking the parking project with JNNURM.
- Understanding the requirement of the city and putting the ideas across - One stop tourist centre.

Animal Adoption



Year	Number of Animal adopted	Amount collected (Rs in lakh)
2001-02	07	0.38
2002-03	26	2.21
2003-04	65	3.09
2004-05	93	4.11
2005-06	99	2.69

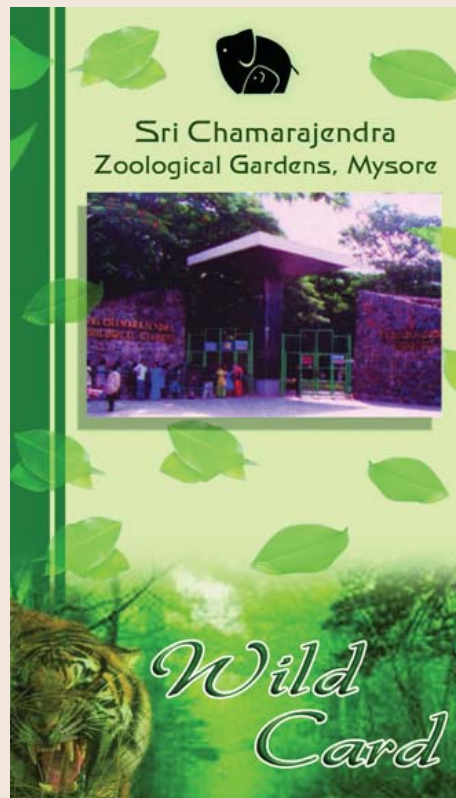
Wild Card

Charges

- Single person Rs 250.00
- Couple Rs 400.00
- Family members (2+2) Rs 500.00
- For every additional Child Rs. 50.00
- Adult Rs 100.00

Facilities

- Special entry at the gate.
- Free information brochure.
- Guide facility.
- Eco-friendly vehicle for zoo rounds.
- Library books for reference.
- Camera allowed for photography.
- 5 per cent discount at zoo shop.
- Free entry to Karanji Nature Park.



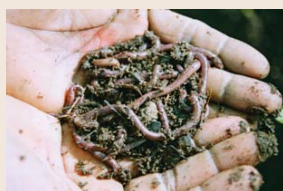
Tourism Passport Selling of ornamental plants

- One passport to important tourist destinations of Mysore – Hassle-free tourism.



Vermicomposting

Analytical Results



Sl. No.	Tests	Standard Criteria	Results
1.	Colour	Light Black, Dark Black	Light Black
2.	Moisture (%)	15-20	20
3.	P ^H	6.50-8.0	7.43
4.	EC	1m mhos/sec ²	0.94
5.	N (%)	0.8-1.20	1.51
6.	P (%)	0.30-0.60	0.16
7.	K (%)	0.25-0.80	0.45
8.	Water soluble Nutrients	Percentage should be very negligible	Negligible
9.	Volume for every 100 gm	160-175 ml	200
10.	Relative Density	0.54-0.62	0.50

Sources of Raw Material

- Dung of Elephants, Gaur, Mithun, Hippo.
- Garbage from all the herbivore enclosures.
- Garbage from the garden.
- Vegetable and kitchen waste.

Production and Pricing

- An average of 1 to 1.5 tons of vermicompost per day is expected (say around 500 tons per year).
- The existing price in the market is Rs 2800 to Rs 5000 per ton.
- The competitive pricing at Mysore zoo could be Rs 3000 per ton.
- The expected turnover per year is around Rs 14.00 lakhs.

Marketing

- Visitors, for the garden, in 5 kg and 10 kg packets.
- Bulk buyers, in 50 kg packets.
- Farmers.
- Govt. Departments like Forest, Agriculture, Horticulture, etc. in their schemes.

Sales

Last year the quantity of vermicompost sold is 140 tons and amount collected is Rs 4.20 lakhs.

Sponsorship

- Kiosks, Drinking water points, Toilets
- Education programmes such as adopting rural schools
- Working lunch for special category people, prizes, etc.
- Interpretation centre by MUDA



Zoo Education



Drawing Competition for Physically Challenged



Wildlife Photography Exhibition



Essay writing competition for school children

Branding of Zoo

- Mysore zoo as a centre for learning.
- Intensive Campaign.

**Wide SCOPE for
wild imagination**

There is virtually no limit to the points where Maasthi can help Mysore Zoo metamorphose into a premier educational centre. The points mentioned in this proposal are therefore only indicative. And beyond any business proposition, Maasthi deems MISSION: ZOO_MANTAR essentially as a professional challenge and as a wonderful opportunity to serve a cause that has not only universal significance but also immediate value for OUR CITY MYSORE.

Brand New Image for the knowledge age

Mysore Zoo is one of the foremost zoological gardens of India and is among the best-known centres for captive breeding and conservation of wild and endangered animals. It is a marvellous storehouse of knowledge, experience and expertise in management of captive wildlife and conservation of biodiversity. In order to share this treasure with the world at large and particularly to inspire the future generations to participate in the wildlife conservation efforts at all levels, the institution is now emerging as a centre of excellence in captive wildlife studies and zoo management.

A major effort of image makeover through print as well as electronic media has therefore become imperative for the Mysore Zoo. Maasthi, a well-known creative communications agency based in Mysore, is happy to present this proposal of total solutions to rebrand Mysore Zoo as a premier centre of education and conservation. Needless to say, the process of rebranding would also open up for the institution whole new revenue streams, never thought possible before.

Print Products

A. STATIONERY

Redesigning of all stationery products (visit card, letterhead, envelope, folder/binder) so that they reinforce the image/ message by uniform and repetitive appearance.

B. NEWSLETTER

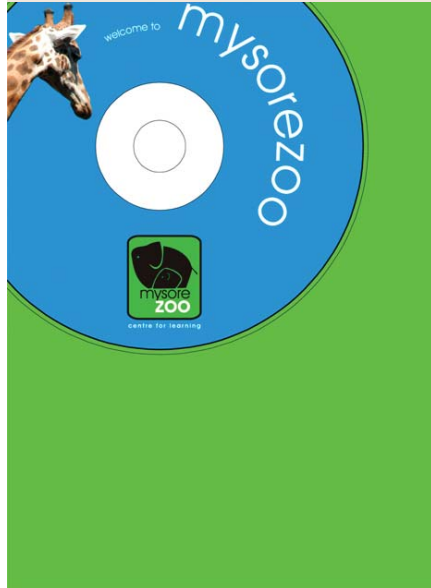
Creation of an exciting new format (masthead, columns, etc.) for the zoo's quarterly newsletter. For starters, this could be in single colour and cover topics of general interest to the zoo community. Later, it could be produced in full-colour and a Teachers' Edition or a Children's Edition could also be introduced. It could be priced and its space sold for ads.

C. MAILER

A mailer could be published every second Saturday for circulation at various educational and tourist points, with the latest news on the various developments in the zoo. Updates of the mailer could also be made available free on the website.



e-media solutions

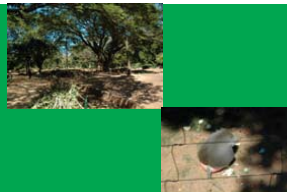


Multimedia Solutions

Production of a multimedia presentation featuring the various exhibits, events and facilities of the zoo, in CD/DVD formats. The presentation could be priced or given as a special gift on relevant occasions.

Internet Solutions

Designing and hosting of a portal for Mysore Zoo for promotion of the range of educational and conservation activities of the zoo across the world, audio and video clippings, interactive zoo map and virtual zoo tour on the website, scope for online shopping of zoo merchandise, link for online signing up for memberships, mailers and donations, formation of a Mysore Zoo Web Group with free emailing service, incorporation of blogging and podcasting for interest groups, starting of online educational programmes, including distance learning through videoconferencing, etc.



Educational Solutions

Maasthi can help design a variety of books, teacher resource guides, animal education kits, maps, charts and other educational resources to help increase the knowledge and appreciation of flora & fauna, and the conservation & rehabilitation of habitat for wild and captive animals, in people of all ages.

Miscellaneous Solutions

The restaurants inside the zoo, and their interiors and recipes could all be rebranded on animal themes. The shopping areas of the zoo could be redesigned on animal themes. The uniform for the staff could also be redesigned to suit the fresh image. Masked men could be placed to greet the visitors at the entrance.

Event Management Solution

Maasthi can manage various events related to education and conservation as indicated here:

Summer and winter camps for school children involving skits, story telling & story writing, poems & music, poster making, and quizzes.

Classes to teach animal art and animal-based presentations — Workshops for training children & teachers — Orientation courses for young students to become information partners of the zoo (to guide the visitors and answer their questions).

Recycling jamborees for school and college students (with badges and free tickets for highest collectors) — Children's night-out (wild-night sleepover) programmes with parents, sunrise strolls — Information fairs - Summer and winter adventure camps and photo caravans.

Earth Day, Environment Day, Independence Day, Children's Day, Wild Sunday, Butterfly Day. Special days like birthdays for the celebrity animals of the zoo.

Election of one wild animal as "President of the Zoo" (for a particular period) by school children.

Master Plan Workshop : Assignment Review, Progress And Participatory Discussion

FACILITATORS

Jon Coe
Bernard Harrison
Tina Lim

The participants who took part in interactive master planning exercises during visit to Nandankanan Zoological Park, participated actively in Master Plan exercise on 14th April, 2006. Jon Coe, Bernard Harrison and Tina Lim facilitated the entire exercise during the workshop. The summary of Master Plan Workshop (taking Nandankanan as indicative example) is produced here for reference.



Master Plan Workshop (Summary)

Constraints

- Lack of financial resources
- Lack of planning
- Untrained junior staff
- Senior staff rotation
- No visitor focus - long walk - Visitor programme
- No business plan
- Lack of infrastructure and human resource - skilled manpower
- Staff cooperation - PR Work
- Zoo tradition
- Climate - hot & humid
- Visiting hours, seasonal variation
- Zoo - animal centric, should also be visitor centric
- Interpretation

Opportunities

- 1.3 million people
- Large area
- Water body - Lake
- Tourism belt/ destination
- Availability of White tigers/tigers and other animals
- Availability of space
- Natural forest
- Close to city
- Political support

Signature features

- White tigers, Tigers
- Gharials, Pangolin
- Free ranging langurs
- S.K. Patnaik • Lake
- Cable car • Interpretation
- Create a journey through the habitats
- History of successful breeding

Big Ideas

- Specialize in carnivores
- Fresh water animal attraction
- Lake (lake fountains, aeration, lights), house boat, floating restaurants
- Aquatic animal exhibits (hippo, crocodiles, elephants, island primates)
- Public tram system
- Forest (nature trails, tree tops, night safari, rescue and rehabilitation centre)

Imperatives

- Animal performances
- F & B facilities, Retail outlets
- Animal exchange
- Zoo must inspire
- CZA guidelines/norms
- Cost effectiveness

- Elephant rides/elephant bath
- Fishing
- Camps for tourists & students, night walks
- Attract butterflies
- Bundling with tour operators
- Local biome
- Local wildlife sanctuary
- Cultural connection

- Controlled public feeding
- Mythological and Zoological connection, local cultural story
- Local infrastructure
- Water rides
- Seeing the zoo through the water body
- Underwater viewing
- Good public transport
- Drive through safari for herbivores
- Interpretation and orientation to visitors
- Developing visitor facilities
- Visitor-friendly services, visitor - interest facilities
- Rescue and Rehabilitation Centre at the zoo
- Conservation breeding centre for endemic threatened species with ultimate goal for releasing back to wild

- Cleaning of lake - pisciculture
- Facilitation in and around lake for visitors
- Veterinary facilities at zoo as referral centre for city
- Start with what we have now, utilize the large cats for future of the zoo, using the local, mythological, Socio-economic support
- Inter-phase between visitors and zoos - information about the animals, convenient places to relax, knowledge of behaviour, linkages, monuments value-relationship etc.
- Strengthen roads, parking, pedestrian way
- Disaster Management

Themed Zoo Night Safari

Bernard Harrison

Principal Partner
Bernard Harrison & Friends Ltd.
Singapore



A special lecture on “Night Safari” was delivered by Bernard Harrison in the evening of 14th April, 2006. It was one of the widely acclaimed and popular lectures attended by participant trainees, guest speakers, course faculty and others, including the officers of Forest Department, Govt. of Orissa, for proper appreciation of the facts on Night Safari (very popular in Singapore and other places). Mr. Harrison and his team designed 1st, 2nd, 3rd and also 4th Night Safaris of the world.

It was elaborated why a Night Safari is needed along with the location of Night Safaris (three operational and one in the pipeline). Further, various aspects – where to develop a Night Safari, site selection, planning considerations, operational considerations, exhibit design, theming, animal management etc. were explained in quite an interesting manner. The lecture was followed by a special video screening of a film on Night Safari.

Themed Zoo Night Safari

Why a Night Safari?

To display nocturnal
animal at night



When they are active

Where there are Night Safaris

- Singapore
- Guang Zhou, China
- Chiang Mai, Thailand
- Greater Noida...in the pipeline



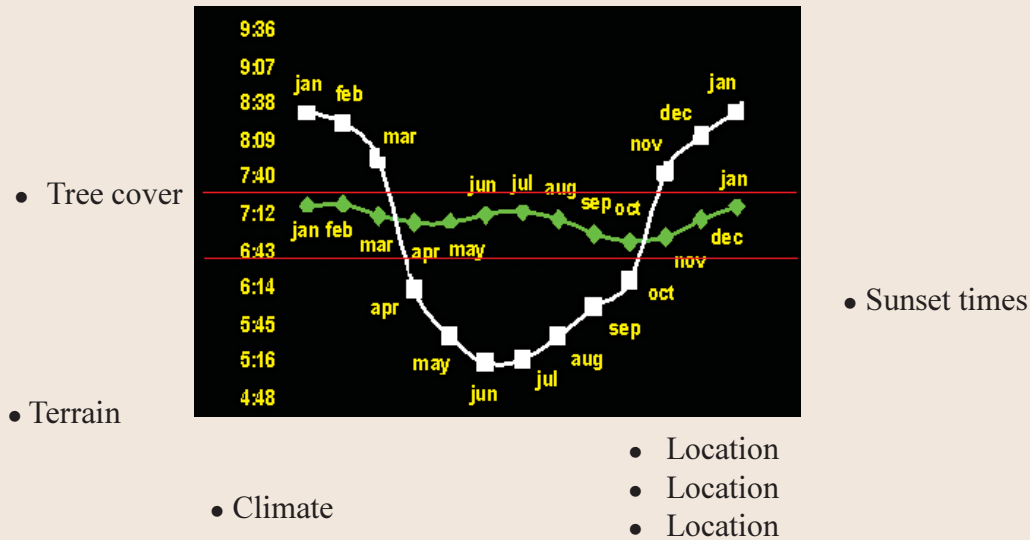
Why a Night Safari?

- Most tropical mammals, with the exception of primates, are nocturnal
- Unlike most birds, which are primarily diurnal
- Evenings are cool and it rains less
- Makes a lot of sense in a desert when people emerge at 5pm!
- Wholesome evening, family entertainment

Where to develop a Night Safari

- About 40 hectares of land fairly close to a major population centre
- Target market could be tourists or locals or both
- Should be within one hour's drive of the main target markets

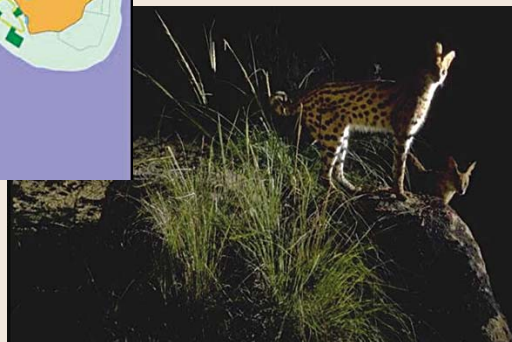
Site selection



Planning Considerations



- Foot trail/road traffic
- Service areas
- Animal / human zones



Operational considerations



- Opening hours
- Safety & security
- Visitor flow

Moonlight

Colour temperature

5000°K

Light Direction

Lighting Levels 0.3 lux
(daylight = 100,000)

Habitat lighting

- Theatrical focus
- Light cast downward
- Cool, bluish white light
- No fixed level but average of 30 lux
- Broad, wash lights + Narrow, spotlights
- Warm, orange fire or lamp light in shelters



Circulation

- Limited time = limited walking distances
= limited ride passenger-journeys
- Exploit darkness to pack circulation more closely
- Linear trails vs. complex path network



Exhibit design

Follow general zoo design principles, plus:

- Greater control over what is visible
- Exhibits as stage sets

Theming

Theme depends on intent: to be modelled on

- National parks • Zoos
- Greater illusion of habitat immersion
- Lighting, night sounds, 'atmosphere' as elements are unavailable to day zoos

Animal management

- Larger day areas
- Intensive behavioural enrichment
- Observation & visitor guiding at night
- Feeding mostly at night - food presented as in wild
- Exhibit maintenance by day
- Escape protocol



Technical Session



Crisis/Disaster Management Plan

SPEAKER

B.C.Choudhury

Head, Endangered Species Management
Wildlife Institute of India
Dehradun



Photo: Brij Kishor Gupta

The topic, being an essential component for any Master Plan/ Management Plan of the Zoo, was well explained by B.C.Choudhury in its true perspective. Zoos are targeted adversely at the time of crisis/disaster and lots of time, energy and resources are utilized such crisis/disaster takes place. It is desirable to have a Crisis/Disaster Management Plan in place, for effective handling of any adverse situation created due to such crisis/disaster. The various aspects – reasons, types, key requirements in handling such crisis etc. were discussed in detail.

Crisis/Disaster Management Plan

What is a crisis?

- “A time of great difficulty or danger or when an important decision must be made”
- Synonyms of crisis are disaster and calamity and all of them are events that cause suffering or unfortunate consequences that cause great damage or loss of life
- They are not necessarily natural or inevitable and therefore an analysis of such situations over a period of time, say several decades, will help develop a profile of the kinds of crisis one could expect. They can be compiled from newspaper archives; zoo records and through interviews with old timers.

Types of Crisis

- An acute crisis is a potentially damaging natural event and results in disruption of the functioning of the system causing widespread material losses (Both biotic and abiotic) that exceeds the systems ability to cope without external relief and often termed as disaster or calamity

- Chronic crisis - ones that are expected and management is somewhat prepared to deal with them.
- Large number of visitors in some seasons
- Vandalism by unruly visitors
- Sudden change in climate
- Strike by staff
- Failure in essential supplies - food, water, power etc.

Examples of acute crisis

Flood, earthquake, cyclone, landslide, war, epidemic disease, animal escape

Various kinds of chronic crisis encountered in zoos (related to visitors)

Vandalism, Injury to animals and visitors, Recreation related wildfires

Vindictive crisis

Planned vandalism by in house personnel, Outside visitors/community, Terrorism

Degree of susceptibilty

If they are located

- In and adjacent to earthquake prone areas
- Adjacent to the coast and other windstorm prone regions
- An unstable slope susceptible to landslides
- In flood plains
- Along wilderness areas susceptible to wildfires

The crisis management plan should have

- Crisis management protocol
- Crisis management plan/cell with personnel and budgetary allocation
- Crisis management infrastructure
- Mock drill plans
- Provisions of specialized training for facing such crisis by a special group
- Network with the national /state or other such contingency plans

Reducing losses in case of a crisis

- Strengthening building codes
- Design enclosures which are damage proof
- Establish standards of maintenance that detects vulnerability
- Establish relocation plan and facilities for livestock
- Build flood channels, firebreaks etc. to minimize impacts

Key elements of crisis management

- Identification, frequency, intensity and probability of such events
- Documentation of probable impacts, zones and areas and database of impacts and responses and their results for future reference
- Post crisis investigation to collect additional data for crisis and revise existing plan
- Expect and lookout for new potential crisis for which you may not have a response - terrorism, bird flu.

Key requirements in crisis/disaster management plan

- Prior assessment of risks
- Preventive measures planned and implemented
- Preparedness in terms of crisis
- Emergency responses
- Other resource mobilization plan

Planning for a Biological/Zoological Park

B.C.Choudhury

Head, Endangered Species Management
Wildlife Institute of India
Dehradun

Planning for a Biological/Zoological Park

What is a plan ?

- A range of activities to be conducted in an organised manner in a set timeframe to achieve a set of determined objectives.

Why a plan ?

- To avoid whimsical (often direction less) and adhoc achievements that do not follow any set of objectives.

Levels of planning

- Macro plan
- Long term for a country/state
- Abroad guideline generally governed by a policy statement
- A vision document for a longterm
- A master plan for an area to be implemented in a long time frame

- Micro plan
- A subset of the master plan to be implemented in a determined timeframe
- A percentage of activities to be implemented with available resources
- Completion of some or all planned activities in the timeframe with judicious use of resources
- (Eg- Management plan of a zoo that defines all activities in a time frame of five to six years)

Relevance & expectation of outputs from this training exercise

Our zoos fall into:

- Royalty zoos requiring new planning or renovation
- Post-independence zoos requiring modernization
- Old zoos shifting into new and larger space requiring proper master planning

What is expected out of this training exercise from the participants:

After an exposure to the norms and process of development methods of different levels of plan (master, layout and management) the participants will

- Review such practices and examples practised elsewhere.
- Review such attempts in India.
- Attempt in a participatory mode developing conceptual plans for their zoos.
- Take the conceptual plan to evolve, develop and refine with technical and financial support from the Central Zoo Authority.

Zoo Administration and its Role in Master Planning

SPEAKER

S.K. Patnaik

Former Addl. Pr. CCF (Wildlife)
& Chief Wildlife Warden, Orissa
and now Member Technical Committee,
Central Zoo Authority



Initiating the talk with the concept of Management Plan, various components were described in detail by Sri S.K. Patnaik. The conceptual and operational areas of importance for achieving the essential components of Management Plan were explained with the inputs from his vast experience.

Zoo Administration and its Role in Master Planning

- First and foremost it is the duty and responsibility of the zoo administration to stand the process of master planning of its zoo, to give it a direction and focus
- The process is not the work of an individual may be a consultant director or any other functionality. It is a collective work based on input and experience of many individuals connected directly or indirectly with the zoo

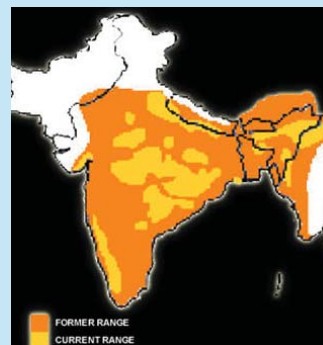
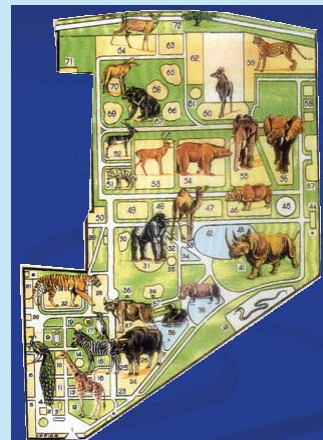


Having set the process of master planning of motion, It is the zoo administration as to what is best way of doing the same

- In lease preparation
- Have a master plan committee with both insiders / outsiders
- External consultant with support forms the administration

Whatever may be the option provide individual/committee

- Existing layout plan & phases of development
- Prepare topographical map of the area
- History of the park
- Detailed administrative set-up
- Functioning of different setup and their effectiveness
- Facilities available ■ Visitation ■ Short comings



Zoo administration should arrange consultation with

- Different staff members
- Former 300 officers
- Veterinaries
- NGOs
- Architects
- Local universities
- Landscape planners
- Visitor graphs
- Other stake holders
- Local community
- Police/Local administration



The zoo administration can provide to the planners inputs like

- Sources of finance & quantities of expenditure
- Availability of water
- Power source
- Disposal facilities for solid and liquid wastes
- Definite systems
- Absolute/ depended structures
- Force living wildlife & their conservation
- Local problems
- Epidemics/ minimal health problems prevalent in the locality
- Acquiring or otherwise of establishment
- It has to provide the planner all relevant information as and when required or procure information if not available in the zoo and arrange frequent consultation between the planers other who can contribute to the planning



Developing a good Zoo Administration model in the Master Plan

SPEAKER

Tina Lim

Principal Partner
Business and Operations,
Bernerd Harrison & Friends Ltd.
Singapore



Photo: Brij Kishor Gupta

A good Zoo Administration ensures an integrated organisation which has to perform effectively and efficiently. While dealing with the zoo administration we should focus on our vision and mission as to how to maximize our output. It is also important to visualize that CEO/Director of a Zoo must be more than an administrator. Operations (Zoology, Veterinary & Education,

Horticulture and Maintenance, visitor services, security etc.). Corporate structure, human resource management, positioning and branding, SWOT analysis, marketing potential, pricing, revenue streams etc. were well explained for ensuring good zoo administration. The talk was highly informative and provided appropriate dimension and orientation to the zoo administration.

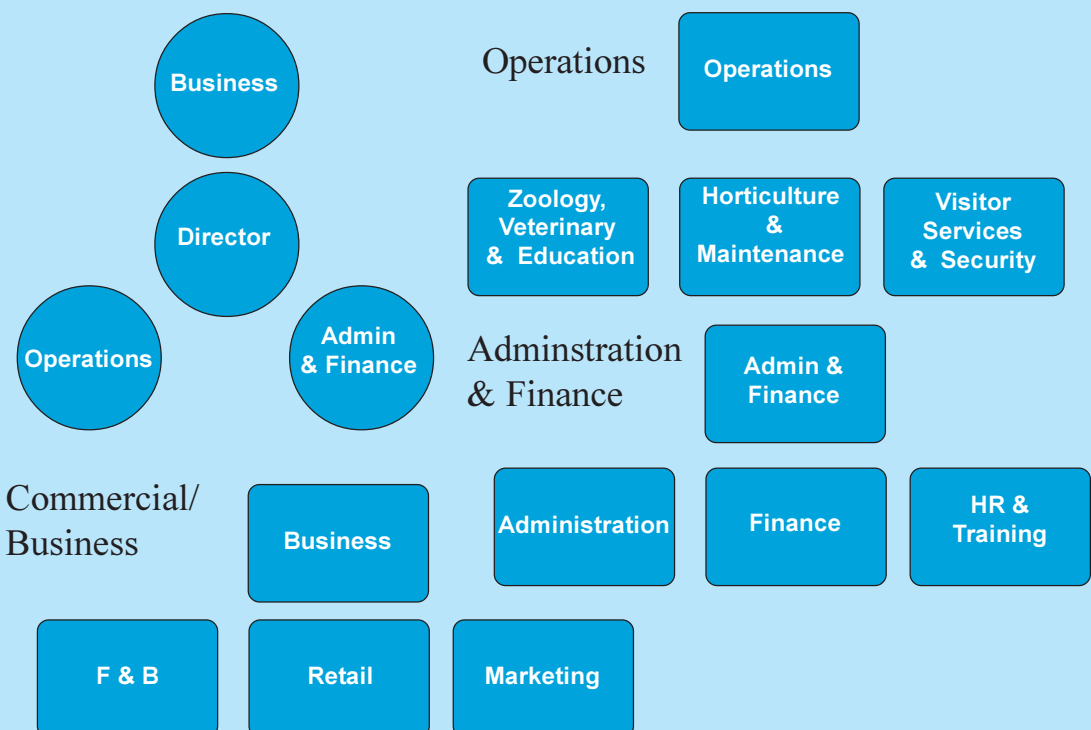
Developing a good Zoo Administration model in the Master Plan

Where do I start from?

How do I operate the new Zoo-Unzoo ?

- Set up - Business, Administration & Finance, Operations Units
- Everyone needs to understand the design story
- Set out the vision & mission clearly
- Translate it into the values, culture, style of management, the language etc – practical & emotional approach
- Develop the BIG picture in Management & Business, set out the guiding ethics
- Invest in people
- Think integration, think strategically

An Integrated Organization



Develop our Vision & Mission

- To develop a zoo which your citizens are proud of – creating stakeholdership
- It must achieve the following objectives:
 - ▶ Financial viability
 - ▶ Be a tourist attraction
 - ▶ Be a facility for Recreation & Entertainment
 - ▶ Be an institution for Educational & Conservational

To Achieve the Vision

- Create a workable Master Plan – Design, Business & Operations
- Need funding to implement the Master Plan and complete the process
- An appropriate corporate structure to support the proposed Master Plan in 3 areas – D+B+O
- Need good people who expect commercial market remuneration
- You need to believe & have the end in sight
- You need to lead, excite, empower & get buy in

Understand your Strategic Objectives

Maximize on your:

- Location, surrounding, settings, neighbors,
- Position in society
- Connections with Government & Corporations
- The changing attitudes about wildlife & your role in effecting that
- Increasing your market share & Share of Voice
- Making the system work for you – learn to dance

To become a TMP to Visit

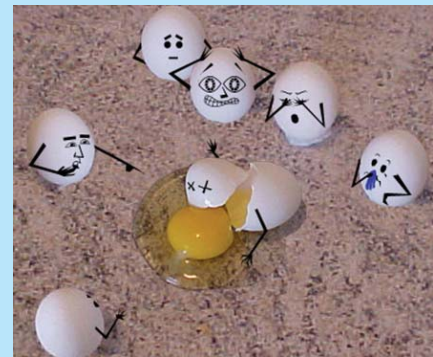
- You need to become a major recreational facility in your City/State, with a clear position – Top of Mind
- You need to develop your brand & strategically align yourself to business partners
- You need to review your target audience yet still retaining your civic duty
- You need to review operating hours to become efficient in resource management & budgets
- You need to think like a “business with soul”

The Corporate Structure

- One needs a change of management mindset & corporate model
- A need to “learn” to set up & operate towards achieving sound financial returns (as any corporation) - sustainable to commercial
- That allows for an efficient & effective allocation of resources
- That allows for quick turn around time
- That allows for growth & promotions
- The CEO/Director must be more than an administrator
- He/she should be business and operations comfortable
- Needs to be supported by a high caliber team - curators, marketing, operation, HR and finance directors
- Must stay the time
- Must have fangs that bite

Human Resource Management

- Includes Personnel, Resource Management & Training
- Staff are the most expensive asset so take care of them



- Invest in them - train & develop them
- Empower them, challenge & reward them
- Provide specialist courses – make customer service a way of life
- Choose them well & pay them well
- Have high expectations of them (realistic)
- Get rid of under performers

What's in a Name? my Brand, my Position

- The positioning & branding of the attraction - starts with the RIGHT name
- Do we need to call ourselves “Zoos”
- Can we be known as Wild Places?
- What else can we be known as?
- How unzoos can our name be?

Positioning & Branding

- Position my Zoo to attract the target market it desires - low, mid, high, premium attractions
- Can I position my zoo as a premium attraction for middle and upper income groups?
- How aspirational is my target market? (market mobility)
- Can my product be of an international standard for residents and domestic tourists?

- What is my Zoo's Unique Selling Proposition?
- How do you differentiate it from the other zoos in India and the world?
- What Brand is my Zoo creating?
- What does that Brand represent? - value, emotion, vocabulary, image, worth... eg. Ambassador, BMW, IBM, Coke, Pepsi, Air Indian, Singapore Zoo, Bernard Harrison
- Can my Brand excite & do people want it?

SWOT Analysis

- Do a SWOT to find out where you are & how do you go forward

Strengths

- What do we do exceptionally well?
- What advantages do we have?
- What valuable assets and resources do we have?
- What do visitors identify as our strengths?

Weaknesses

- What could we do better?
- What are we criticized for or receive complaints about?
- Where are we vulnerable?

Opportunities

- What opportunities do we know about, but have not been able to address?
- Are there emerging trends on which we can capitalize?

Threats

- Are any of our weaknesses likely to make us critically vulnerable?
- What external roadblocks exist that block our progress?
- Are our competitors or quasi-competitors doing anything different?
- Is there significant change coming in our sector/industry?
- Is technology dramatically changing the sector/industry and services to it?
- Are economic conditions affecting our financial viability?

Who is the competition, Competitors or Complementary?

- Museums
- Shopping centers
- Videos
- Can we bundle with them - study & understand them, work together
- Amusement parks
- Cinemas
- Outdoor activities
- The internet

Markets & Marketing, Potential & Target Market Size

- The Potential Market - "WHO can I get & how big is this market?"
- The Target Market - "WHO am I aiming for & how big is this market?"
- What is my Market Segmentation - How do I divide the target market?

Market Segmentation

- Families
- DINKYs - Double income no kids yet, mid-high income
- PMEBS - Professionals, Managerial staff, Executives and Business people
- MICE - Meetings, Incentives, Conferences and Exhibitions
- Corporate - corporate entertainment and functions
- Young single adults
- University & school students

What is Marketing?

- Sell more
- Build market share
- Get press and market voice
- Change mind sets
- Get tough & make waves
- Move stuff
- Show fangs
- Grow brands



For free Publicity, use Celebrities

Marketing

- Communicating a message that sells you - especially your USP – Marketing Communications (MarComs)
- MarComs Tools: corporate communications & PR, advertising & promotions, event management, direct selling, corporate sales
- Develop stakeholder relationships for sponsorship, cross selling, corporate affiliations
- Have a highly trained spokesperson that sells your brand

Some Possible Marketing Efforts

- Get tour operators to market your zoo to domestic & international tourists
- Set up a website & reserve your zoo name – links, use e-commerce to sell promotions & events
- Develop a logo and tag line
- Hire the services of a professional PR firm to do this or develop a strong marketing team
- Network with local airlines, hotel and tour associations
- Look at bundling with other attractions

How do I price the New Zoo?

- Look at the Price Sensitivity of your Target Market
- How much can they spend & how will they spend it?
- How much of it can I take? Where can I take it?
- Understand the Market Place you are in

Benchmark for Pricing

- What is the disposable income of my market segments?
- How much do they spend on leisure?
- What is the cost of a cinema ticket, an amusement park ticket, other ticket costs?
- What do they spend on eating out? • What do they spend on retail?
- What is their thresh hold?

Pricing for Peak & Low Periods

- Week days vs. week ends
- School holidays
- Seasonal patterns – high & low periods
- International & domestic tourists arrival patterns
- Operating hours
- Consider dual pricing, seasonal pricing
- What can I charge for?
- How do I improve my low seasons?

Other Revenue Streams

- Food & Beverage (F&B)
- Retail
- Fund raising
- Adoptions & sponsorship
- Photography
- Rides
- Entry to extra areas - safari, children’s zoo
- Overnight stays
- FOZ scheme/s

Singapore Zoo Revenue Composition

Category	SS ‘m	% of Revenue
Admission	7.0	40
F&B Sales	6.0	34
Retail Rental	0.6	4
FOZ fees	1.7	10
Adoptions	0.8	5
Others	1.0	6
Total	17.1	100



Does Zoo Food have to be Lousy?



Make Use of Spectacular Settings



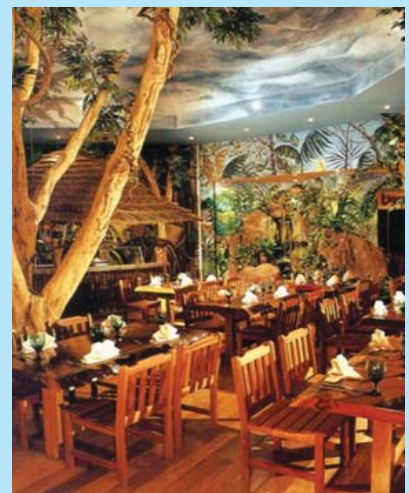
Experiential Dining



A Possibly Retail Setting
A Beautiful Asian Home

Food & Beverage

- Offer good quality food, create a setting, have interior theming, provide good service, make it an “experience”
- Research & understand the preferences & tastes of your target segments
- Create different outlets - a restaurant, fast food outlets, kiosks, ice-cream & drink stands
- Get professionals to operate the outlets - rent them out
- OR set up an F&B team



Do Fund Raising

- Sponsorships for capital donations
- Adoptions of exhibits - recurrent
- Friends of the Zoo or Society programmes
- Raise contributions to conservations funds
- Receive out right donations and wills
- Run fun raising events
- Have a dedicated Fund Raising team to do this

Business Plan - Bums on seats

- Do a Business Plan & be precise about your Revenue Streams
- Project your Revenue
- Develop Retail & F&B business units
- Bundle Admissions
- Put Bums on seats!!!



Other Things to Consider

- The use of Information Technology in your Zoo - financial management, stock control, ticketing systems, record keeping etc
- Logistics management - car park operations, toilets, park cleanliness, transportation systems, security surveillance
- Business Units & budgets
- Targets & responsibilities - KPIs
- Developing SOPs

Your Risk Management

- Avian flu, SARS and animal related diseases
- Terrorist attacks
- Power failure
- Animal rights issue
- Animal escapes
- Safety features, operational and maintenance procedures
- Sever climatic conditions
- Insurance coverage
- Damage control/disaster management

Conservation Breeding Policy, Guidelines and Current Programmes in India

Brij Kishor Gupta
Scientist
Central Zoo Authority
New Delhi

National Zoo Policy

To give proper direction and thrust to the management of zoos in the country, the National Zoo Policy was framed and adopted by the Government of India in the year 1998.

Objective

- 2.1 The main objective of the zoo shall be to complement and strengthen the national efforts in conservation of the rich biodiversity of the country, particularly the wild fauna. This objective can be achieved by-
 - 2.1.1 Supporting the conservation of endangered species by giving species, which have no chance of survival in wild, a last chance of survival through coordinated breeding under ex-situ condition and raise stocks for rehabilitating them in wild as and when it is appropriate and desirable.

Role of Conservation Breeding

1. To make all zoos self sufficient in their collection, so that no animal from wild is acquired for display. (As per recent amendment to the Wild life (Protection) Act, Section 11, animals from wild cannot be acquired by zoos)
2. To establish a genetically viable population of species for restocking/reintroduction in wild if required.

Guideline for Conservation Breeding

1. Before taking up breeding programmes of any species, zoos shall clearly identify the objectives/goals for which the breeding programme is being taken up. The targeted numbers for the programme should be decided keeping in view the identified objectives.

Goal-A

For common display species:- Establish a tractable easily managed population well adapted to the captive environment, Example: Leopard, deer/antelope species, Peafowl, Python etc.

Goal-B

Endangered species in captivity which require long-term conservation- Long term maintenance of viable population and preservation of genetic diversity

- Example: Lion-tailed macaque, Tiger, Asiatic lion, Swamp deer, Sangai, Nicobar pigeon, Hornbills etc.

Goal-C

- For rare species being bred for immediate release into natural habitats- Rapid reproduction in captive environment as similar as possible to the natural environment. Example: Pigmy hog

2. All zoos shall cooperate in successful implementation of identified breeding programmes by way of loaning, pooling or exchanging animals for the programme and help creation of socially, genetically and demographically viable groups even at the cost of reducing the number of animals or number of species displayed in individual zoos.
3. Breeding programme shall be taken up by zoos after collection of adequate data like biology, behaviour and other demo-graphic factors affecting the programme, including the minimum number of founder animals and the quantum of housing facilities available.
4. Zoos shall give priority in their breeding programmes to endangered species representing the zoo-geographic zones in which they are located.
5. For carrying out breeding programmes in a scientific and planned manner, the zoo shall mark every individual animals involved in the programme in an appropriate manner and maintain appropriate records.
6. Zoos shall take utmost precaution to prevent inbreeding. They shall avoid artificial selection of traits and make no explicit or implicit attempts to interbreed various genera, species and sub-species.
7. Special efforts shall be made to avoid human imprinting of the stocks raised for reintroduction purposes by providing off exhibit breeding facilities.

Constraints

One single zoo cannot take upon itself, task of planned breeding of a particular species

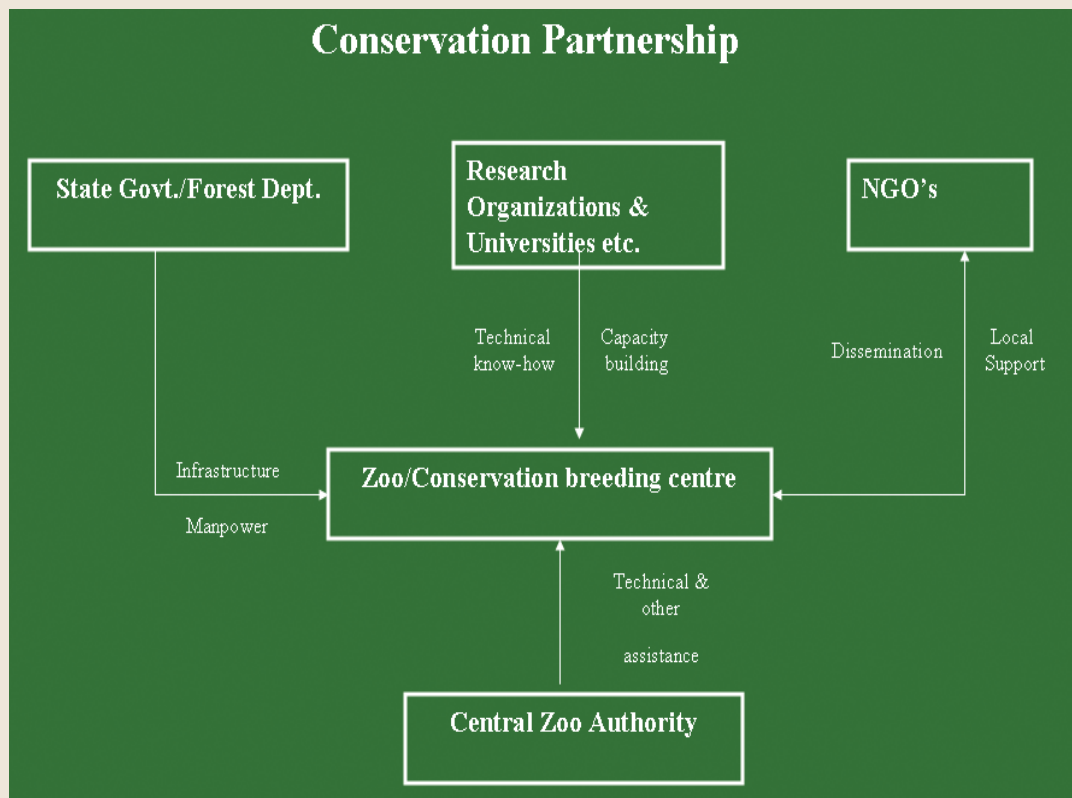
Reasons

- 1 Founder animals required and the minimum viable population required is quite high. Single zoo will not have space to accommodate all the animals. (founder animals required- 20 for a MVP of 250).
- 2 Problem in coordinated action among zoos.
3. Continuity in management and non-availability of technical support staff.

Not every zoo can afford to have a fully functional institution on its grounds to initiate conservation breeding; thus, the need for partnerships between zoos and universities / other scientific institutions.



Conservation Partnership



Initiatives taken by CZA

- A group of specialists were nominated by the Authority just after its creation in 1992 with a mandate to prepare a strategy for conservation breeding of endangered species in Indian Zoos.
- The group identified about 35 mammals, birds and reptiles for their probable captive breeding in identified Zoos. The Chief Wildlife Warden's of the States, which had the natural distribution of the species, were selected as coordinators for the programme
- Because of varied ownership patterns of the Zoos and divergent nature of animal collections, not much was achieved.

A Sub-Committee of experts with Mr. M. Kamal Naidu, Ex-Director, National Zoological Park, New Delhi and Nehru Zoological Park, Hyderabad, Dr. J.H. Desai, ex-Director, National Zoological Park, New Delhi, Dr. L.N. Acharjyo, Ex-Veterinary Officer, Nandankanan Zoological Park, Bhubaneswar, Dr. Gautam Narain, Project Officer, Pygmy Hog Conservation Programme and Dr. B.R. Sharma, Member Secretary, Central Zoo Authority as its Members was constituted with the approval of the Minister, Environment & Forests, Government of India and Chairman, Central Zoo Authority.

Decisions taken by the CZA

- It has been decided that the on-going Planned Conservation Breeding Programmes for Snow leopards, Red panda, Pygmy hog and Asiatic lion should continue as per the existing set up.
- The Planned Conservation Breeding Programme for other species in need should be taken up in consultation with the State Governments and as per the availability of founder population and proper ex-situ facilities as recommended by the Sub-Committee on Conservation Breeding.
- For maintenance of studbooks for the programme, the Wildlife Institute of India has agreed upon for maintenance of studbooks.
- In order to make the Conservation Breeding Programme a success, Central Zoo Authority will provide financial assistance on 100% basis for creation of appropriate infrastructure for the identified species of wild animals either in the off-site facility in Zoos or as a satellite facility.
- The maintenance cost of endangered species selected for conservation breeding should not be borne by the Central Zoo Authority.
- Take help from national, international associations/ individuals and experts who have the expertise in ex-situ breeding of wild animals and would like to collaborate with the Conservation Breeding Programme.

Past and Present Conservation Breeding Programmes undertaken by Zoos in India Crocodile Species (Gharial, Mugger & Estuarine crocodile)



- The first ever programme for conservation breeding of species in India was that of the crocodile species, whose population in the wild had nosedived to only few individuals. Dr. H.R. Bustard, a FAO expert on crocodiles, on the invitation by the Government of India, initiated the programme 1975 at Tikerpada in Satkoshia Gorge sanctuary (Orissa).
- The Project funded a gharial breeding complex in the Nandankanan Zoological Park in Orissa.
- The Zoo had three adult gharials, but the male suffered repeated penile prolapse, and it was decided to obtain a large male from Frankfurt Zoo in (then) West Germany rather than capture one from the wild in India. This male reached Nandankanan and despite never having seen another gharial since a baby, mated with the Oriyan females. Thus the world's first captive-breeding of the gharial took place.
- The Crocodile Conservation Project has seen the creation of first few wetland sanctuaries of the country under the provision of the Wildlife (Protection) Act, 1972.
- One of the most striking features of the Crocodile Conservation Project has been the building up of a base for wildlife research in the country.

Asiatic Lion



- Asiatic Lion (*Panthera leo persica*) is a critically endangered species (sub-species), whose estimated population in the wild is about 359 +/-10 (April 2005 estimate of the Gujarat Forest Department). This wild population survives in and around the Gir National Park and Sanctuary in the Southern Saurashtra region of the Gujarat State, India.
- Conservation Breeding for Asiatic lion was first discussed in a meeting in May, 1995 at Sasan (Gir PA), which was chaired by the Chief Wild Life Warden of the State of Gujarat.
- The salient features of the meeting were – for planned breeding of Asiatic lion in Indian Zoos a minimum 20 founders i.e. 10 male and 10 females will be required. The breeding of the species will be done in such a way that all the founders contribute equally to the population
- It was estimated that the genetically viable population of 100-150 would be achieved in three generational breeding.

- Chennai Zoo, Ahmedabad Zoo, Kanpur Zoo and Van Vihar National Park, Bhopal were identified for coverage under the planned breeding of the Asiatic lion.
- Between May, 1995 to October, 2003, there were 186 births (84 males and 90 females and 12 identified cubs) in nine Indian Zoos with majority (143) in Sakkarbag Zoo, Junagarh.
- The Central Zoo Authority has decided to fund the creation of a new off-display facility at Sakkarbag Zoo for the Conservation Breeding of Asiatic Lion in Gujarat.
- Scientific/ technical personnel inputs in form of engaging a skilled person in project mode will also be placed at the disposal of Sakkarbag Zoo, Junagarh to assist in the Breeding Programme.
- Chief Wild Life Warden of Madhya Pradesh where Kuno Wildlife Sanctuary is being prepared for re-introduction of Asiatic Lions has also requested by the Central Zoo Authority to identify a suitable Zoo/ site for creation of off-display conservation breeding facility in Madhya Pradesh for conservation breeding of Asiatic lions.

Bengal Tiger

- Conservation breeding of Tiger (*Panthera tigris*) was on the agenda of the Central Zoo Authority since its inception in 1992. The main objective behind the programme was to have a genetically viable population of Bengal tigers in our zoos.
- 29 Tigers of wild origin being exhibited in the zoos were identified as founder for the breeding programme. Nine Zoos were selected under this programme.
- Shri S.K.Patnaik, then Director Nandankanan Zoological Park, Bhubaneswar was selected as the National Coordinator for the programme.
- It was observed that many of the zoos were reluctant to part with their animals due to sentimental feelings attached with the animals.
- The programme lost steam due to the fact that it could not be monitored at regular intervals by the National Coordinator due to preoccupation in the duties assigned to him by the State Govt. of Orissa.
- Some of the identified tigers also died in the zoos.
- The programme for breeding of tigers was again discussed in the meeting of the sub-committee on conservation breeding during May, 2005 and it has been decided to not to go ahead with the programme for the time being.



Snow Leopard



- The Padmaja Naidu Himalayan Zoological Park, Darjeeling (West Bengal), India started work of conservation breeding of this rare species in the year 1983. It was selected as an ideal site for this breeding programme. This was the first instance of an Asian zoo participating in the Snow Leopard (*Panthera uncia*) Master Plan which was conceptualized by Ms. Helen Freman, President of International Snow Leopard Trust and was also Species Coordinator of “Species Survival Plan for Snow Leopard”.

- A pair of unrelated snow leopards was flown to Darjeeling from Zurich Zoo in March, 1986. Another pair came to Darjeeling from US Zoos in January, 1989 which gave birth to two female cubs in May, 1989. This was the first successful breeding of Snow Leopards in Darjeeling Zoo.
- One male and two females were later added to induce new blood and continue planned breeding programme at Darjeeling.
- Two wild/ rescued females from Jammu & Kashmir were also airlifted to Darjeeling in 2000 to continue the breeding programme.
- In the last twenty years, there are in total 40 births of snow leopards in captivity in the Padmaja Naidu Himalayan Zoological Park, Darjeeling.
- Padmaja Naidu Himalayan Zoological Park today has 18 snow leopards, one of the largest captive population in a single zoo in the world.
- one pair each has been shifted to High Altitude zoos at Shimla, Nainital and Gangtok in the Himalayan States.
- Intention is to have 4-5 stable captive population of 50-60 snow leopards in Indian zoo, so that next step can be contemplated.
- A suitable site is also being finalized for initiation of conservation breeding programme for snow leopard in Kashmir.

Red Panda *Ailurus fulgens fulgens*

- Project started in 1990 as part of Global Red Panda Management Programme.
- 6 panda received from foreign zoo and five existing wild red panda in zoos.
- Project was conceived by MOEF/CZA/Intl. Stud Book Keeper-Dr. Angela Glaston.
- Padmaja Naidu Himalayan Zoological Park, Darjeeling (West Bengal)- focussing on high altitude fauna.

Breeding in captivity

- A total of 37 red pandas were born in zoo.
- Two females (mini and sweety) selected for release into the Singalila National Park, -high density of red pandas has been recorded from the area.



Red Panda Release

- Soft release: (15th August, 2003)
- both the females were kept in the soft release facility, under observation and for acclimatization.
- No feed provided while in soft release.
- Weight and Health - monitored.

Releasing into the wild

- 14th November, 2003.
- Gairibans, Singhalila National Park, West Bengal.
- Before release *mini* weighed 5 kgs, and *sweety* weighed 4 kgs.
- Before release both animals were radio collared for subsequent monitoring.



Monitoring methods

- Non-triangulation location technique - Homing-in on the animals method
- Direct observation/monitoring - time intensive methods.
- Both the animals monitored on alternate days.
- GPS reading of the location was also taken.

Interaction with wild pandas- positive sign of adjustment

- Mini was seen interacting with the wild pandas.
- Entered into the Nepal forest in January 2004
- Mini found dead in March 2004, sign of predation.
- Her skull, portion of her tail and paw along with attached collar was found on the 15th March, 2004.



Behavioural observation

- *Sweety* found very mobile.
- Seen together with a wild panda on 17th Feb., 26th Feb., 11th March, 1st April and 3rd April.
- *Sweety* gave birth to a cub in a tree hollow on 7th July, 2004.
- A success story.



Coordinated planned breeding programme of Lion-tailed Macaque

- Lion-tailed Macaque is one of the most endangered species inhabiting the evergreen forests of Indian Peninsula.
- The habitat of this species is threatened due to biotic pressures of various kinds.
- A programme of planned breeding of this species has been initiated with financial assistance from Central Zoo Authority.

- Presently three zoos namely – Arignar Anna Zoological Park, Vandalur (State of Tamil Nadu), Sri Chamarajendra Zoological Gardens, Mysore (State of Karnataka), Thiruvananthapuram Zoo, Thiruvananthapuram (State of Kerala) are actively participating in the programme.
- The existing population of this species has been studied and exchanges of individuals have been effected among zoos with a view to form social groups.
- A social group from San Diego Zoo is also being received to provide requisite stability to the existing zoo population.
- The aim of the programme is to establish a viable population of LTM in captivity and restocking of the wild.
- It is hoped that restocking of the species would focus attention on the need to protect the habitat for conserving the rich biodiversity occurring in the unique ecosystem of the evergreen forests found in the peninsular India.

Ecology and behaviour of LTM in wilderness & captivity

- Lives in groups of 8 to 40 animals (Average 18 animals)
- Groups comprise of – one adult – one sub-adult male – five to seven adult females remaining juveniles and infants
- Birth – throughout the year – peak December and February

- Female matures at an age of 6 years – 4.8 years in captivity
- Inter birth intervals is about 2.5 years – 1.3 years in captivity
- Oestrous cycle every month
- Gestation period – 6 months
- Average birth rate is 0.31 infants/female/ per year
- Mortality rate of all classes 0.045/year
- Population growth rate slow because of low birth rate and delayed age at first birth
- Feeds on seeds, fruits, flowers, nectar, invertebrates, small birds and mammals



Population of LTM in wild

LTM population in the wild -
current population fragmented
5 Large population and 6 isolated
population

State	No. of Animals
Tamil Nadu	1000
Kerala	2000
Karnataka	1000

Natural habitat of LTM



Coffee plantations



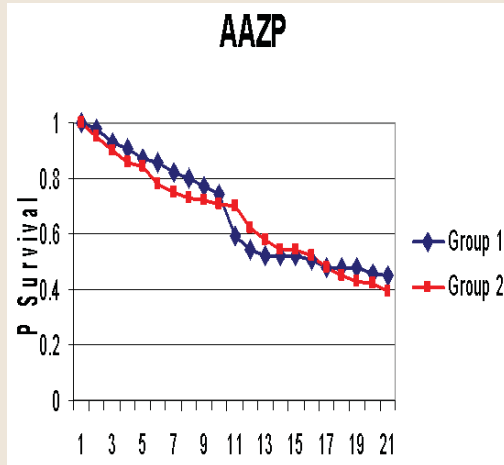
Status of LTM in Indian zoos

- LTMs in 15 zoos in India 32:19 (51) – CCBP stock – 20:16 (36)
- Number of females declining sex ratio 1:0.6
- Population declining with mortality and natality rates of 3.75 & 1.75 respectively
- Only 3 breeding females for the entire Indian population being from AAZP
- Females from Bhilai, Patna and Jaipur are proven breeders identified for acquisitions

Captive breeding programme population

Name of the Zoo	Male	Female	Total
Arigmar Amma Zoological Park	9	6	15
Thiruvananthapuram Zoo	8	7	15
Mysore Zoo	3	3	6
Total	20	16	36

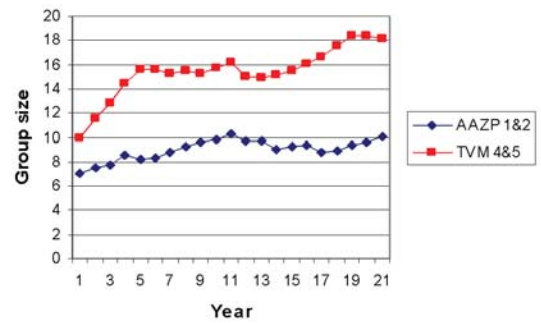
Viability Analysis of the Captive Group of LTM



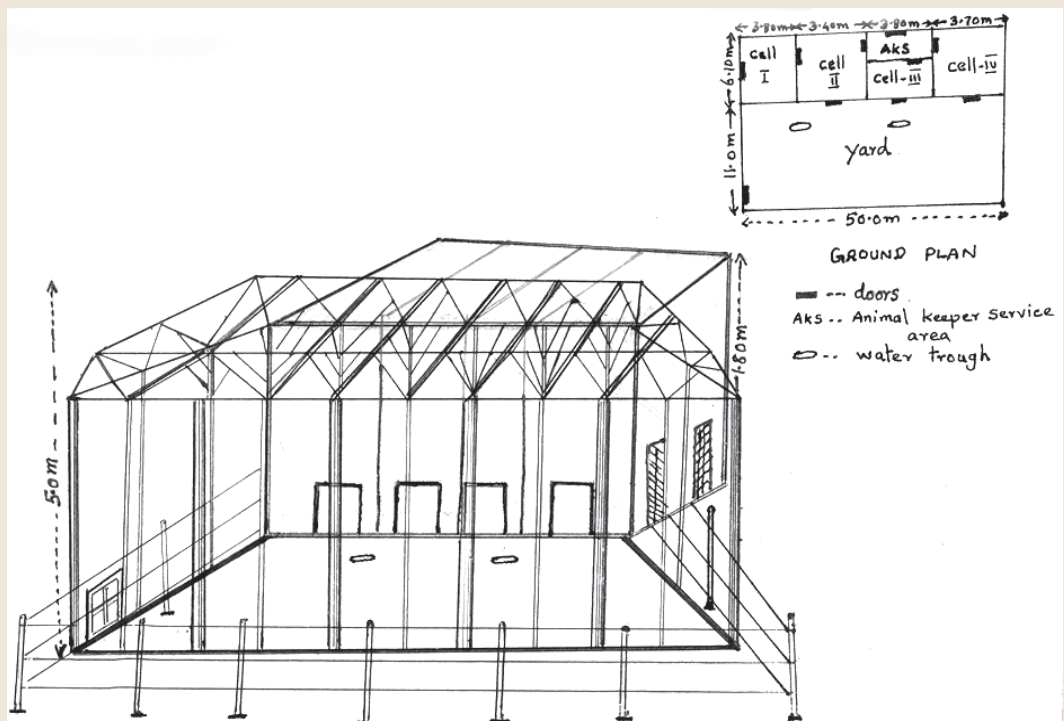
Group 1: M(8),
Bhama (15), Veni (6), Mala (3)

Group 2: M (8),
Rani (6), Apsara (3)

Two groups pooled: Group size



Lion-tailed Macaque's enclosure





LTM in Island moated enclosure in AAZP



Reading ID number



Tranquilized LTM for fixing transponder

Planned Breeding Programme

- There should be some purpose or objective for keeping each and every individual animal in a zoo.
- Get the right founders of the targeted animal species. Have and maintain the history cards, pedigree charts and stud books for each individual and targeted animal species.
- For that each and every animal of the species must be identifiable : by the keepers - by popular name; by the management using ear tags, rings or transponders.
- The zoo library should have sufficient reference material on the targeted animal species.
- Proper housing facilities, veterinary facilities including pathological laboratory facility should be available in the park.
- Next important step is to select the proper breeding pairs, considering pedigree, compatibility, age structure, social behavior etc.
- Health Precautions: before mating – like deworming, vaccination, health supplements etc.-during pregnancy and after pregnancy are also required to be taken.
- Facilities like nursery for hand rearing, trained manpower etc should be handy.
- And if we properly succeed in-situ by improving the habitat and *ex-situ* by planned breeding – the two can meet.

Conservation Breeding of Vultures

- White-backed vultures
(*Gyps bengalensis*)
- Slender billed vultures
(*Gyps tenuirostris*)
- Long-billed vultures
(*Gyps indicus*)



Suggested Action Plan for Conservation of Vultures

- It was felt that for the reversal of the decline of vulture population, ex-situ conservation (captive breeding) programmes in the region required immediately. The Central Zoo Authority announced to provide financial assistance on 100% 'basis' for the establishment of vulture conservation breeding centres in the off-exhibit areas of four zoos of the country (Van Vihar Zoo at Bhopal; Sakkaubagh Zoo, Junagadh; Nadankanan Biological Park, Bhubaneswar and Nehru Zoological Park, Hyderabad).
- The Vulture Breeding Centre being established at Pinjore, Haryana shall be collecting and raising nestlings of vultures.

Laboratory for Conservation of Endangered Species

(LaCONES) established at Hyderabad in collaboration with the Centre for Cellular & Molecular Biology, Hyderabad; Central Zoo Authority; Department of Forests, Government of Andhra Pradesh; Department of Bio-technology, Government of India and Council of Scientific & Industrial Research.



- Germ Plasm of Gyps species is being cryo-preserved at the facility being established by Central Zoo Authority in association of Centre for Cellular and Molecular Biology at Hyderabad - (LaCONES)

Assisted Reproduction in Birds

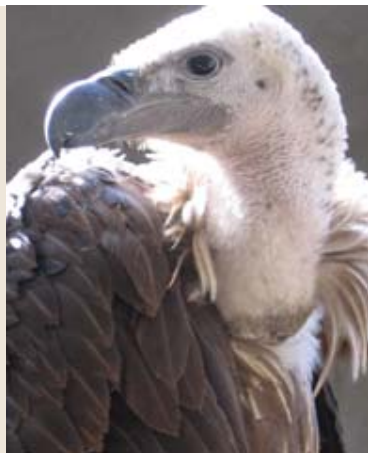
White-backed vulture
(*Gyps bengalensis*)

Semen collection, semen profile
Artificial insemination
Sexing by molecular techniques

Pigeon as a model
(*Nicobar pigeon*, *Nilgiri wood pigeon*)



Vulture
breeding
centre
at Pinjore,
Haryana



Planned breeding
programme
of selected
Pheasants

Western Tragopan

- Western Tragopan (*Tragopan melanocephalus*) also known as the Black-headed Tragopan or Western Horned Pheasant, has its distribution in the Western Himalayas in Northern Pakistan and Northwestern India.
- They disappeared from collections in the 1930s and currently, it is understood that there are no Western Tragopan in captivity outside India
- Western Tragopan is kept in captivity at Sarahan Pheasantry in Himachal Pradesh. The Pheasantry is situated at just under 8,000 ft. In 1993, the pheasantry managed to hatch and raise one chick under a broody hen, the only bird raised in captivity during the whole 20th Century.
- Dr. John Corder, Vice president, World Pheasant Association had taken a keen interest in the programme and according to his direction a conservation breeding programme was initiated at Sarahan
- The Central Zoo Authority is providing financial assistance to creation of a separate facility for the pheasants at Sarahan
- Two of the officers from Sarahan, B.L.Negi & Alam Singh, spent a couple of weeks training at Downlands pheasantry in the UK in Jan/Feb 2003 and the knowledge and skills they acquired have paid immense dividends

- The enclosures have been re-modeled according to the needs of the pheasants; they have also developed a diet from locally available resources which replicates very closely that are used by wild birds
- The first breeding efforts from a young pair were attempted in 2004
- Success was achieved during June 2005, when 4 chicks were born. Two are surviving
- Field research is already under way to better understand the bird and its habitat requirements.



Western Tragopan at Sarahan Pheasantry, Himachal Pradesh

Red Jungle Fowl

- Recent publications have expressed fears that wild red jungle fowl populations may be genetically contaminated leading to an inference that there may be no pure Red jungle fowl (*Gallus gallus*) in the wild.
- A proposal to carryout a study of the red jungle fowl in captivity was initiated in the year 2001 by the World Pheasant Association-South Asia Chapter, to identify pure red jungle fowl in Indian zoos and segregate them for initiating a planned breeding programme.
- The Central Zoo Authority had supported the study.
- As a result of the study, it was found that the specimens kept in the Indian zoos phenotypically resembled the pure variety of Red Jungle fowl.
- All these fowls were marked with closed ring and the zoos were advised to keep the birds segregated from other fowls.
- The National Zoological Park, Delhi was instructed to initiate a breeding programme for the species in association with the WPA.

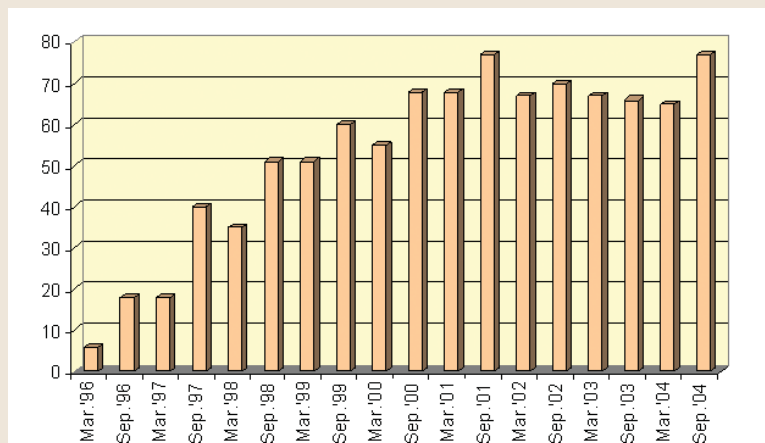
- The Central Zoo Authority provided financial assistance for construction of an appropriate enclosure for the fowls in off display area of the zoo. The programme initially started with 5 birds.
- At present their population is 25.
- Similar success has also been achieved at Morni in Haryana, where soft release of the fowls in the nearby sanctuary areas have also been carried out, by the Haryana Forest Department.



Pigmy hog Conservation Breeding Centre, Assam



Population trend of Pigmy hogs at Basistha, Guwahati



“Out of 145 reintroduction projects worldwide, only 16 (11%) have made any contribution to maintaining a self sustaining wild population”.

“The world is undergoing rapid change and survival of zoos as modern cultural institutions will depend upon the strength of their commitment to conservation of endangered species”.

Criteria for developing and integrating *in-situ* and *ex-situ* conservation strategy

B.C. Choudhary
Head, Endangered Species Management
Wildlife Institute of India
Dehradun

Premise

- The best conservation effort is *in-situ* conservation
- *Ex-situ* conservation is a supplement not a substitute to *in-situ* conservation
- *Ex-situ* efforts not at the cost of *in-situ* efforts

Needs to be governed by

- A national policy and action plan complimented by a state policy and/or action plan
- National obligations to international conventions
- Feasibility and practicality
- A long term planned commitment

What is the national policy support?

- The national pa network planning based on biogeographic representative areas himachal pradesh has pa's with 16.04 % of area under *in-situ* conservation (8930.03 km²)
- Gaps have been identified for biogeographic provinces rather than zones
- Charter 5 of 1983 national wildlife action plan and charter 3 of new wildlife action plan 2002 – 2016 encourages states to develop long term proper planned *ex-situ* conservation programmes

Why does Himachal Pradesh require a supplementary *ex-situ* conservation strategy & action plan?

- Himachal harbours a significant percentage of western himalayan flora & fauna. Several of them are endemic, rare & endangered
- It's network of protected areas following three decades of protection are ready for species restoration (assessment of habitat improvement required)
- It's *ex-situ* conservation efforts would not only benefit the state but other himalayan range state as well
- Set-up *ex-situ* conservation centres for future gene bank (global climate change & glacier loss)

Criteria for prioritizing species for *ex-situ* support

- IUCN red data book listed species
- Schedule I species with Himalayan distribution
- Himalayan range species – endemic or localised in Himachal Pradesh
- CZA prioritized species (himalayan)
- Species assessed in camp & short listed
- IUCN –specialist group recommended species
- Recent status survey reports
- Field managers requirements

Objectives for *ex-situ* conservation

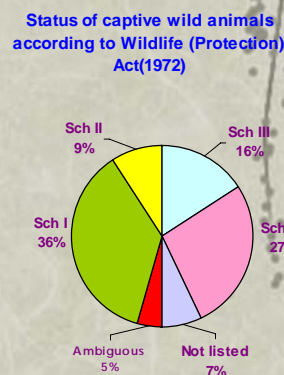
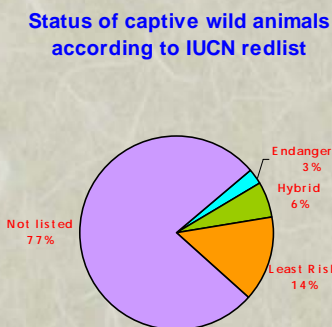
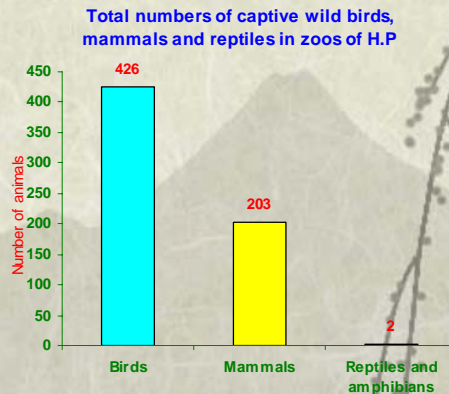
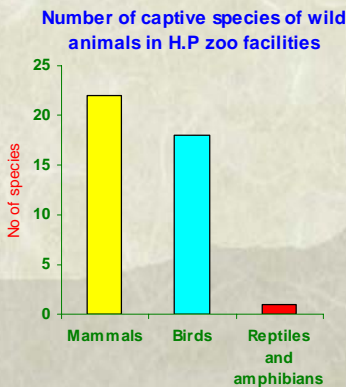
- Insurance against extinction
- Conservation breeding for species restoration
- Creation of surplus stock for gene pool supplementation and co-ordinated breeding
- Non-consumptive use (education – awareness tourism)
- Livelihood options using some restored species (Mahaseer)
- Derivatives for commercial use?

What is required?

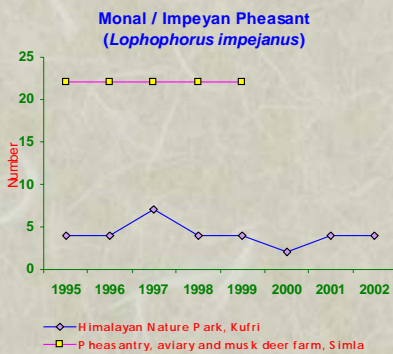
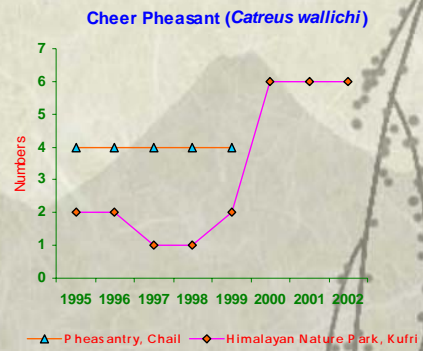
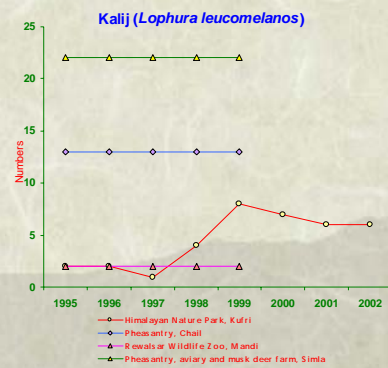
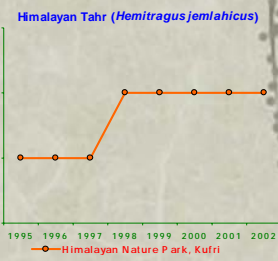
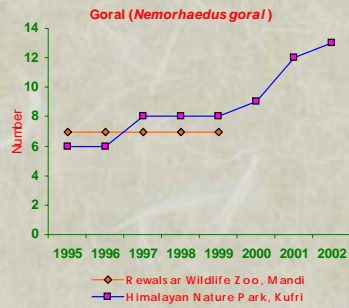
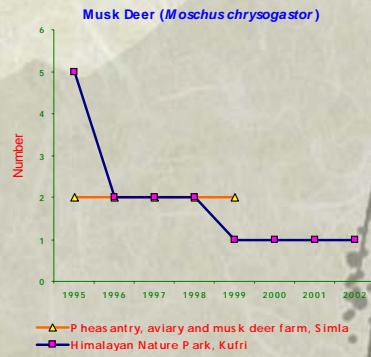
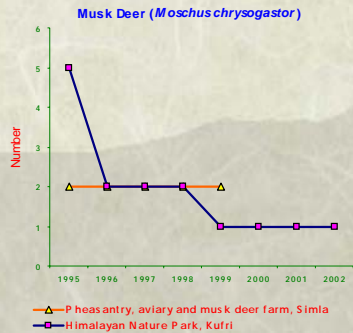
- Assessment of existing infra-structures and their contribution and suitability
- competency of human resource and skill development
- Networking with specialised agencies
- Linkages with *in-situ* sites
- Development of species specific integrated plans

Overview of captive facilities for wild animals in Himachal Pradesh

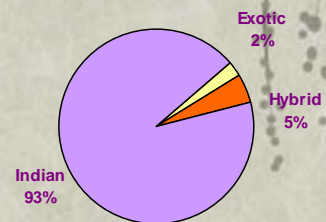
Sl. No.	Name of the Zoo	Status
1.	Dhauladhar Nature Par, Chamba	Existing, recognized by CZA
2.	Himalayan Nature Park, Kufri	Existing, recognized by CZA
3.	Pheasantry, Aviary and Musk Deer Farm, Sarahan Bushahr	Existing, recognized by CZA
4.	Pheasantry, Chail	Existing, recognized by CZA
5.	Renuke Wildlife Zoo, Mandi	Existing, Issued show cause notice by CZA
6.	Rewalsar Wildlife Zoo, Mandi	Existing, Issued show cause notice by CZA
7.	Tutikandi Zoo, Simla	Issued show cause notice by CZA Final status to be confirmed
8.	Jawahar Park Zoo, Solan	Closed, animals relocated
9.	Nehru Pheasantry, Manali	Closed, animals to be relocated
10.	Mini Zoo, Kalapaul	Rescue Centre, recognition not required



Population trends of some select Wild Captive Himalayan Fauna in Himachal Pradesh Zoo facilities



Indigenous and Exotic captive wild animals in H.P.



Visit to Nandankanan Zoological Park for interactive master planning exercise and discussion on conservation breeding prospect and new developments

FACILITATORS

B.C. Choudhary
Bernard Harrison
S.K.Sinha

The visit to Nanankanan was again organized on 15th April, 2006 for master planning exercise and discussion on conservation breeding prospect and new developments with reference to site specific situation and core strength. Mr.B.C.Choudhary, Mr. Bernard Harrison and Mr.S.K.Sinha facilitated this interactive exercise at Nandankanan Zoological Park.



Photo: Brij Kishor Gupta

Special screening of film “Cherub of the Mist”



The special screening of a film “Cherub of the Mist” (a film on conservation breeding and reintroduction of Red Panda – a success story) was organized in the evening of 15th April, 2006. The film has been produced by Bedi Film Productions, E-19, Rajouri Garden, New Delhi–110027. This is an excellent film attempted to explain conservation breeding and reintroduction of Red Panda – a project undertaken to save Red Panda (*Ailurus fulgens*) in the wild by Padmaja Naidu Himalayan Zoological Park, Darjeeling, West Bengal. This film widely acclaimed/appreciated by the participants and guests, has received recently the Best Conservation and Environmental Film Award at 29th IWFF (International Wildlife Film Festival), 2006, held at Montana, USA.



Leopard (*Panthera pardus*)

Technical Session

VI



Indian Pied Hornbill (*Anthracoceros malabaricus*)

Presentation of Individual groups and participants and panel discussion on outcome of exercise on master planning of ZOOS

B.C. Choudhary
Head, Endangered Species Management
Wildlife Institute of India
Dehradun

Participants from various zoos presented salient features of conceptual master plan developed for their respective zoos and various issues including the outcome of exercise on master planning of zoos were discussed on 16th April, 2006.



Photo: Brij Kishor Gupta

Visit to Balukhand – Konark Sanctuary area and nearby places

The field visit was organized with a purpose to appreciate the prospect for linkage of *in-situ* and *ex-situ* conservation. It is more important in view of the fact that the ultimate goal of conservation breeding in the zoo and release/reintroduction programme of endangered species to its natural habitat, is to support and ensure survival of the species in the wild. Balukhand—Konark Wildlife Sanctuary, stretching between Puri and Konark along the sea coast of Orissa is a place worth exploring. Participants enjoyed the visit and explored natural habitats. They were briefed about the significant aspects of the visited area.

Valedictory

The valedictory function was organized on the concluding day after the completion of the training programme as per schedule. Sri S.C.Mohanty, Principal Chief Conservator of Forest (Wildlife) and Chief Wildlife Warden, Orissa, graced the occasion as chief guest and handed over the participation certificates and memento to the participants. He delivered valedictory speech on the occasion.

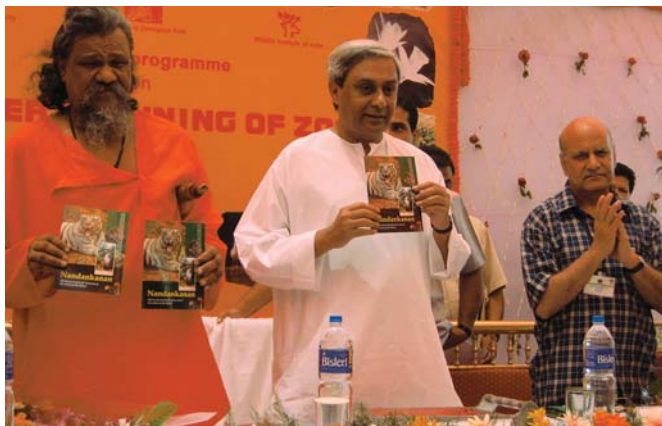
Sri S.K.Sinha, Director, Nandankanan, elaborated the outcome of this training exercise and expected advantages there in and thanked all of them who contributed in organizing this event. Mr. B.C. Choudhary, Mr. Bernard Harrison and Mr.B.K.Gupta spoke on the occasion and expressed their feelings.

Mr. D.N.Singh, Director, National Zoological Park, New Delhi, delivered vote of thanks on behalf of participants and expressed his heartfelt gratitude.



Images and Moments

Arrival of Chief Guest, Naveen Patnaik, Chief Minister, Orissa (2nd from right) at the inaugural function of training programme at Nandankanan. S.P. Nanda, Principal Secretary, Forest Environment Deptt., Orissa (4th from right), Prasanna Kumar Patsani, M.P. (1st from right) and S.K. Sinha, Director, Nandankanan (3rd from right) accompany the Chief Guest.



Release of Information Brochure on Nandankanan Zoological Park by Chief Guest, Naveen Patnaik, Chief Minister of Orissa) (Photo Brij Kishor Gupta)



Naveen Patnaik, Chief Minister, Orissa briefing Media on Training Programme (Master Planning of Zoo) and development of Nandankanan



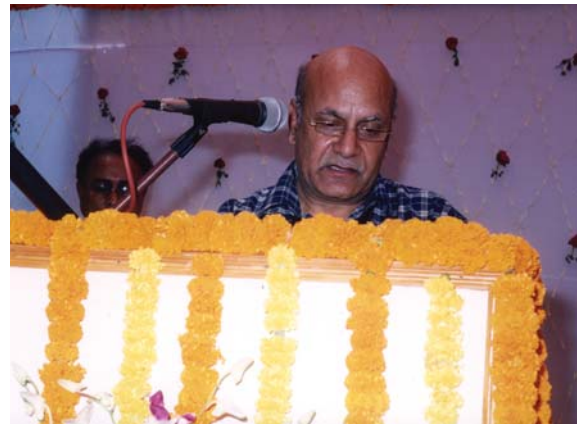
Photo: Brij Kishor Gupta



*B.R Sharma, Member Secretary,
Central Zoo Authority , explaining some
points on master planning during
technical session*



*Bernard Harrison with some of the
participants during an exercise on
Master Planning of Zoo.*



*R.P.S. Katwal, Addl. D.G. of Forest (wildlife),
MOEF, Govt. of India addressing at
inaugural function of Training Programme*

*Bernard Harisson, Tina Lim,
B.K. Gupta, S.K. Sinha and Jon Coe
(from left to right) after a technical
session at Mayfair Lagoon*





TRAINING PROGRAMME ON "MASTER PLANNING OF ZOOS" 11TH TO 16TH APRIL, 2006, BHUBANESWAR

Sitting from left : Tina Lim, A.K. Mahar, Dr. Kuldip Kumar, B.C. Choudhury, P.C. Tyagi, D.N. Singh, R.K. Sahu, Brij Kishor Gupta
A.K. Jha, Bernard Harrison, S.K. Sinha, Jon C. Coe, M.L. Sonal, P. Bhaskar Reddy, R. Hemanth Kumar, A.C. Dinakar

Standing from left: Dipak Mitra, Dr. K.D. Batwe, Dr. S.K. Chaudhuri, H.J. Bhandary, R.K. Dixit, Sh. A.L. Paranjpe, B.S. Bhadoria,
Liankima Lailung, Rakesh Kumar, Anupam Srivastav, N. Mahanta, S.K. Thomas, B. Vijay Kumar, K. Sadasivan Pillai,
R. Rajarathinam, Manoj Kumar, B Sundar

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ZOO MASTER PLANNING

DEFINITIONS AND PROCESS

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Biographies

Jon Coe is a Fellow of the American Society of Landscape Architects presently living and practicing in Australia. Mr. Coe has been a leading innovator of zoo planning and design for over forty years and has contributed to planning for 57 zoos, botanic gardens and nature parks in North America, Africa, Middle East, Asia and Australia.

Brij Kishor Gupta, a post graduate in Environmental Zoology, has submitted his doctoral thesis on behavioural and environmental enrichment of sloth bears in Agra, India. He has specialized training and fifteen years of experience working with zoos and a rescue centre in wildlife conservation, ex situ breeding, zoo planning, design and management. He received training from and was later a Grantee and Fellow of the Durrell Wildlife Preservation Trust. Mr. Gupta has contributed fifty-nine scientific papers to various national and international journals. Mr. Gupta is presently with the Central Zoo Authority (Ministry of Environment and Forests, Government of India) and is fully involved in the implementation of their programs to improve zoos throughout India.

Abstract

Master planning zoological parks and other multi-functional campuses and working with multi-disciplinary client and consultant teams can be difficult and confusing. This paper explains and defines important, but frequently misused planning terms, presents a step-by-step comprehensive planning process and identifies common causes of master

planning problems. An extensive template for preparing zoo master plans is also included.

Introduction

This article provides an introduction to master planning for zoological parks. While some material applies specifically to zoos, much of the information is broadly applicable to planning other complex multidisciplinary facilities and campuses.

Definitions

There are many important terms used interchangeably and indiscriminately in planning which has led to considerable confusion among students, planners and their clients. We hope the following definitions will encourage better communication in this field.

A **master plan** foresees the coordinated physical and management development of the many separate facilities and functions of a zoo in order to guide growth and control the final outcome. The term **master plan** simply means the plan which governs all other plans within an organization. However this term is commonly used to describe planning work ranging from very brief vision statements and conceptual plans taking a few days or weeks to prepare (we refer to these as **concept plans**) to lengthy and detailed comprehensive plans requiring many months to complete.

The term master planning also is used in relation to several different planning subjects or focuses. These include **physical planning** of tangible assets like exhibits, pathways, support buildings, infrastructure

and plantings; and **business planning** which guides human resource, financial and operational management. Unfortunately, most zoo master plans are only physical development plans. However, it is in the owner's interest to coordinate physical, operational and business planning, since all are needed for successful development. The term **comprehensive planning** is sometimes used to describe such integrated programs. This integrated, comprehensive model is followed in this article, although we will continue to use the more popular term "**master plan**". Zoos may also have "collection plans", "educational plans" and "conservation plans", for example. However, all these should be integrated under the master plan.

The terms **long-range planning** and **strategic planning** are sometimes used to mean master planning although the term "strategic" is associated with business planning. The "long-range plan" describes a desired future and the means to achieve it¹, encouraging long-term thinking. The term "strategic" implies the organization "...will creatively attempt to conceive its role in a different, more effective way."¹ This strategic approach applies to both long-term and short-term activities. For the purpose of this paper, the terms "master plan" and "long-range plan" will be considered synonymous.

There is often confusion of the terms "vision", "mission", "purpose", "goal", and "objective". Simply stated, there are two general ways to use these terms to establish a hierarchy of intentions and actions. The first is a "results-based hierarchy" (Cook 1987). **Purpose**, the senior item, means: "the ultimate result your organization hopes to achieve" (Cook 1987). This is followed by **goal**: "a broadly stated subsidiary result"(Cook 1987), which may or may not be fully obtainable and **objective**: "a precise, measurable, time-phased result"(Cook 1987).

The second method to establish a hierarchy of intentions is to use a methods-based approach¹. This approach seems to be more in vogue today. The term **mission** identifies: "the main focus of the organization (what business are we in?)" (Cook 1987). This is

followed by **strategy**, the primary method of advancing the mission. Below strategy comes **program**: "a set of activities designed to achieve or contribute to" (Cook 1987)... strategies and mission. Programs in turn are supported by defined **activities**.

Either the result-based or the method-based terms may be used, but these terms should not be confused or used interchangeably. We will use the mission/strategy/program method for this paper.

Another term much used today is **vision**. We define **vision** as how an organization wishes to see itself or be seen by the public after the implementation of the master plan. A related term that deserves more use is **message** (Coe in press) which describes the emotions, memories, attitudes and facts the zoo wishes visitors to retain from their visit.

Zoos are educational institutions and zoo master plans usually organize the zoo campus into didactic **themed** (Coe in press) areas, such as taxonomic, geographic, or bioclimatic zones as well as other public and off-exhibit precincts. The design of each themed area and each exhibit or exhibit complex within each zone is guided by specific scenarios and storylines. A **scenario** (Coe in press) is an outline of the proposed natural or cultural scene or setting of the display. A **storyline** (Coe in press) is the narrative or pictorial sequence of events or visitor experiences envisioned in the themed exhibit area.

The Planning Process

As typically presented, the master planning process is a sequential investigation that proceeds in well defined steps.

Pre-Planning

Before planning begins it is often useful to hold an informal, interactive vision workshop with a small influential group of organization leaders. The purpose is to define the zoo's "mission," "vision" and "message". This can be a prelude to both physical planning and business planning.

Planning

The first step is **inventory**: the systematic gathering of background information about such subjects as natural systems (climate, geology, hydrology, soils, vegetation); infrastructure (utilities, roads, structures); cultural systems (historic features and surrounding uses, cultural values), market studies, operation audits, and precedence and trends (development models and trends in zoos and related industries such as theme parks, museums, aquariums, botanic gardens and wildlife sanctuaries).

Second: **Analyse** the data inventoried in the preceding step. This is then presented, both graphically and verbally. Often the analysis data is discussed in terms of opportunities, constraints, risks and rewards.

Third: Draft a **development brief**. This confirms the organization's mission, vision and message. The development brief also identifies and prioritizes the needs of the organization which the master plan is intended to address. It may list "project imperatives": actions or facilities essential to success. The owner usually prepares the development brief before the planning consultant team is selected. However inexperienced zoos should obtain the help of professional planners to assist them in preparing this important document. In this way the brief can be prepared concurrently with the inventory and analysis work and respond to opportunities and needs identified during the analysis phase.

Fourth: The previous steps are then synthesized into a **concept plan** by individuals or small groups with strong interdisciplinary, planning and design skills. The concept plan includes concept-level cost and schedule projections as well as a prioritized development or action plan. The concept plan represents the optimal relationship among all major master plan components, a happy marriage between needs, opportunities, constraints, risks and rewards supporting an exciting vision for the future. Often several alternative concepts are developed, compared and evaluated before a final concept is selected.

Preparation of the concept plan may represent only 30-40% of the effort needed to produce a full master plan, but it includes most of the important decisions and commitments needed to proceed.

It is recommended the concept plan together with summaries of other studies listed above be submitted to internal and external governing authorities for interim approval before proceeding to develop the master plan.

Lastly, after a concept plan has been approved, it is further elaborated with additional levels of detail appropriate to institutional needs and developed as the **master plan** or **comprehensive plan**. This is then given final approval and published.

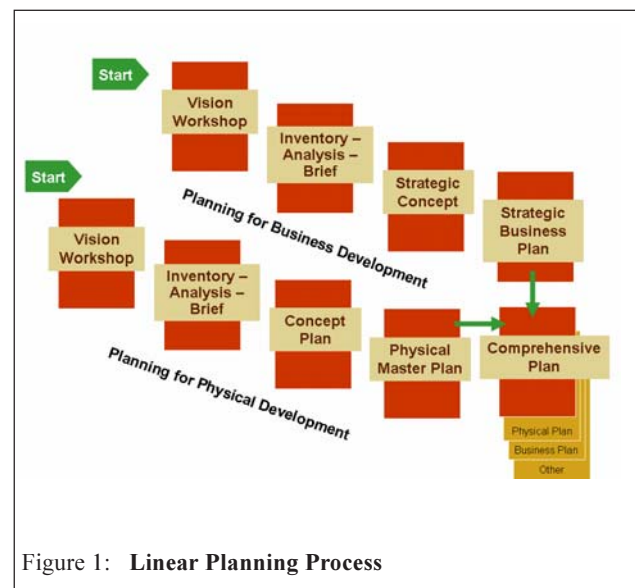


Figure 1: Linear Planning Process

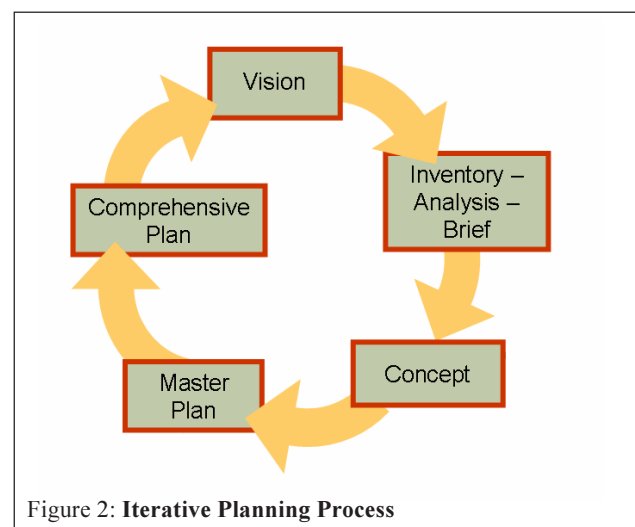


Figure 2: Iterative Planning Process

Planning as an Interactive Process

While the main steps in master planning are thought of as linear and taken sequentially, experience has shown it is beneficial to cycle through the steps of inventory, analysis, development brief, and concept plan several times with increasing depth being investigated each time.

For example, if one were to fully analyse all site or business data without any means of evaluating the data's relevance, one would soon be overwhelmed with data and expend unnecessary amounts of time. It would be better to begin with an extensive (but not intensive) search for relevant data. That is, do a broad search of all categories (such as natural and cultural systems, etc.) but don't go too deeply into each category until you establish its relevance. Analyse these preliminary data and use them to formulate your first planning concept alternatives. These preliminary concepts may raise questions which suggest the need to inventory and analyse additional material or look in greater depth at previously generated data. Thus an iterative approach to master planning encourages a more efficient use of time and other resources.

What Level and Frequency of Planning is Needed?

Owners developing new zoos or upgrading institutions without master plans should consider preparing complete comprehensive plans. However, preparation of such thorough studies requires considerable time and effort to develop recommendations, some of which will not be needed for many years and may become obsolete during the interim. Some owners prefer to carry planning only to the approved concept plan stage, delaying more detailed plans to be completed during development phase. For example, the concept plan may include development guidelines scheduling projects for short, medium and long term development. Detailed planning work is prioritized accordingly. Following this model some owners are able to accelerate design and implementation of high priority projects and programs while planning studies continue in areas of less urgency.

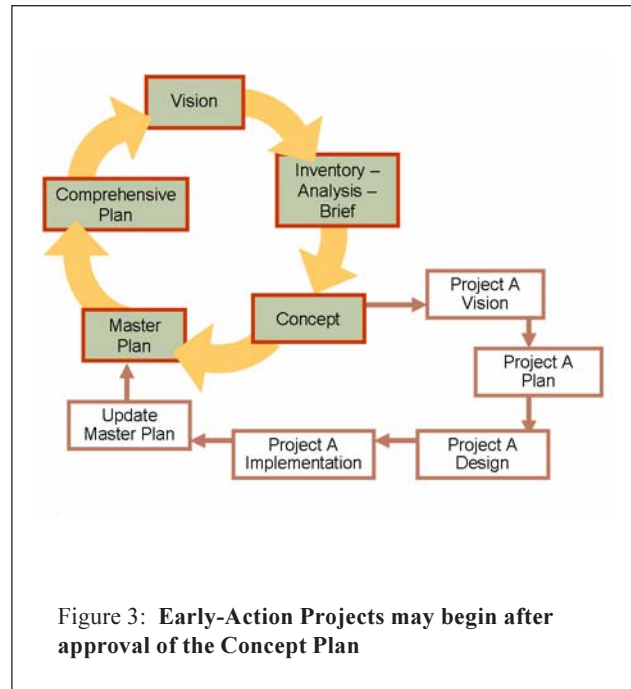


Figure 3: Early-Action Projects may begin after approval of the Concept Plan

Some highly successful zoos choose to review and update their master plans on an annual or five-year schedule. This allows them to adapt to changing design, market and business trends and evolving mission priorities while adhering to the main frame of their original plan.

The Planning Team

The master plan is often developed through the collaboration of two teams. A **consultant team** of experienced professionals, landscape architects, architects, engineers and business advisors prepare the plan. There is no substitute for the special training and experience of consultants specializing in zoo planning and design. The owner's **in-house planning team** participates in, reviews and approves the work. It is essential that members of both the consultant team and the owner's planning team be multidisciplinary.

The owner's planning team should represent a balance of stakeholders representing all major areas of the zoo's operation including executive, veterinary, animal care, and education. More advanced zoos also include representatives of fields such as horticulture, research/conservation, marketing, guest services and even volunteers.

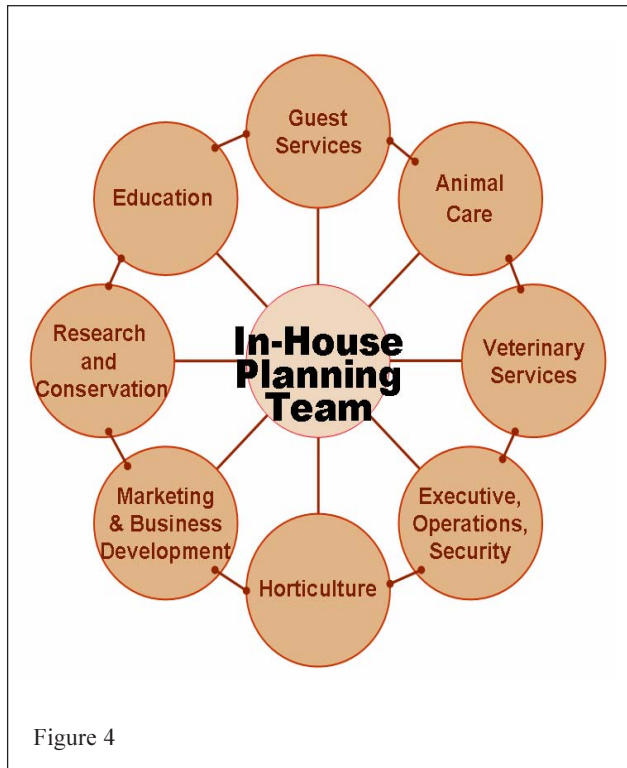


Figure 4

In order to keep the in-house team a manageable size, representatives are often divided into two groups, a **planning team** or core group and an **advisory team**. Each team member is expected both to contribute directly to the planning effort and also to communicate the ongoing planning work to constituents in their field within the organization.

A few large zoos do all planning and design in-house, sometimes providing positions for staff trained in this field.

Planning as an Interactive Process

The planning process should be interactive. Team members not only contribute good ideas and valuable experience, they also help insure the developing plan achieves an overall balance. And they will be largely responsible for delivering the final outcome. For these reasons it is vitally important planning meetings encourage free thinking, open exchange of ideas and shared sense of ownership and responsibility for the final plan. Planning meetings are best managed as interactive “workshops”, run by experienced facilitators, rather than as simple “take-it-or-leave-it” presentations.

Planning Problems

It is important to keep the purpose of the planning effort in view and not get lost in details. Remember the master plan is a means to an end (sustained self-improvement) and not an end in itself. Sometimes “planning paralysis” occurs when leaders are unable to make timely decisions or teams focus excessively on details.

Lack of vision is another common problem. A plan may be very complete yet totally uninspired or unoriginal, suggesting the future will be simply a continuation of the present. However, an overly impractical or unsustainable plan may also fail.

A fourth common cause of ineffective master plans is failure by leadership to build a constituency among staff at all levels to support the plan. This is often the result when leaders develop the plan themselves without broad and open staff involvement and support. When a strong leader imposes a plan and then leaves the institution it is usually time for a new plan.

Planning as Advocacy

From an academic perspective planners are seen as impartial advisors. In practical terms we are advocates for improvement and innovation. Master plans must not only function as road maps for institutional advancement, they often are used as promotional documents. Descriptions of proposed changes or new facilities are expected to be both truthful and compelling. Report graphics and organization are designed to appeal to a predefined reader, be it a governing board, government agency or corporate underwriter.

Conclusions

Planning complex multidisciplinary, multifaceted institutions such as zoological parks can be a daunting task. While we hope this presentation will become a useful guide, following it too slavishly could result in an uninspired “fill-in-the-blank” master plan. Thoughtful planners must frequently step back and seek to reorient themselves to the “big picture”, asking, for example: “Is this the best way to achieve the

owner's desired ends? Are we using the planning process to solve problems, or is the process becoming a problem in itself?" Responsible planning consultants insure their zoo clients understand both what they are doing and why they are doing it. Responsible owners use the planning process to develop a constituency which will advocate for the master plan's implementation and the realization of their shared vision and dreams.

Appendix: Zoo Master Plan or Comprehensive Plan Format

The following format is suggested both to help guide the planning process and to serve as a report outline for a relatively complete zoo master plan. It could be abbreviated for less complete concept plans.

Each client and site is unique and the outline must be tailored to fit the owner's needs. For example, many business-oriented institutions prefer a more streamlined approach for the master plan document itself, beginning with a brief executive summary followed with a presentation of the plan and key recommendations. Support material such as inventory, analysis, and concept plans are placed as appendices or even bound as separate documents.

Suggested Master Plan Outline

1) Introduction

- a) Summary of recommendations (executive summary)
- b) Brief history of the institution and previous master plans
- c) Justification of present planning; purpose and uses of the new master plan

2) Inventory

- a) Natural factors
 - Topography and hydrology
 - Geology and soil
 - Flora
 - Fauna

- Climate: rainfall, temperature and season, prevailing winds
- Sources of pollution

b) Social factors

- Attendance data: annual, seasonal, peak day, design day (ideal) and historic trends
- Visitor surveys: characteristics of visitors' age, income and education
- Demography of the market area
- Cultural factors affecting design, operation and attendance

c) Legal status of the land and expansion opportunities

d) Arrangement of existing zoo

e) Business and market study

- Market potential (latent demand)
- Market penetration
- Regional competition
- External factors: economic climate, demography
- Internal factors: attractions, current business practices, income, expenses, profitability, marketing effort

f) Visitor experience

- Arrival, transit, car park
- Wayfinding
- Circulation
- Amenities
 - Toilets
 - Shade, shelter and rest areas
 - Drinking fountains
- Accessibility
- Views and vistas
- Visitor services: food, beverage, gift sales

g) Service circulation

- Convenience and efficiency
- Accessibility

- h) Buildings and infrastructure
 - Buildings and exhibits
 - Water
 - Electric power
 - Gas
 - Telecommunications
 - Sewerage
 - Solid waste
 - Recycling
 - Record drawings available
 - Approvals
 - Opportunities
 - i) Administration and operations department
 - Organization chart
 - Janitorial
 - Repair and craft
 - Security
 - Marketing, development and public relations
 - Volunteer organization
 - Food, beverage and gift
 - Opportunities
 - j) Animal care department
 - Collection plan
 - Present collection
 - General health and status
 - Collection philosophy and goals
 - Opportunities
 - Conservation/breeding
 - Animal care staff
 - Staff
 - Education
 - Training
 - Animal exhibit and support facilities (may be covered under building evaluations)
 - Conditions
 - Adequacy
 - k) Veterinary department
 - Staff
 - Facilities
 - Programs
 - Opportunities
 - l) Horticulture department
 - Plant collection plan and inventory
 - Staff
 - Facilities
 - Programs
 - Opportunities
 - m) Education department
 - Staff
 - Facilities
 - Programs
 - Opportunities
 - n) Research department
 - Staff
 - Facilities
 - Programs
 - Opportunities
 - o) Zoo safety audit
 - Public safety
 - Animal safety
 - Workplace safety
- 3) Analysis**
- a) All areas of inventory study are evaluated and prioritized according to
 - Opportunities
 - Constraints
 - Risks
 - Rewards
 - National and international standards, best practice and trends
 - b) Integrate findings of physical, operation and business studies
- 4) Development Brief**
- a) Identify institutional
 - Mission
 - Vision
 - Message

- b) Identify strategies, programs and activities necessary to fulfil the mission and achieve the vision within a stated time frame
- c) Identify key action areas and key outcomes as mile posts along the way
- d) List and prioritize institutional needs according to development schedule
 - Develop a short list of “project imperatives”
 - List of desired animal species and their requirements
 - Detailed program of projects and their requirements
 - Prioritized list of early action and “clean-up, paint-up, fix-up” projects
- e) Development Schedule, a multi-year calendar of actions and development
 - Early action projects (first year)
 - Short-term projects (1-5 years)
 - Mid-term projects (5-10 years)
 - Long-term projects (10+ years)

5) Concept Plan

- a) Develop alternative concept plans based upon the opportunities, constraints and risks study and meeting requirements of the development brief, then select most promising plan or combination of plans
- b) The concept plan
 - Should cover all areas of the master plan at a general level to insure integration of the zoo’s assets and needs
 - A balance should be sought so no area receives too much attention while others are ignored
- c) Illustrative concept map (usually at a scale of 1:500 or 1:1000 with contour interval between 0.5 metre to 1.0 metre, depending on the topography)

- Existing natural features: topography, water bodies, significant trees, etc.
- Arrival, car park, and entry
- Visitor circulation
- Exhibit, demonstration and show areas
- Amenities: toilets, shade, shelter and rest areas, drinking fountains
- Visitor service areas: food, beverage, gifts
- General zoo service areas and circulation
- Administrative facilities
- Education facilities
- Support, off-exhibit and quarantine facilities

- d) Descriptive text
- e) Concept development guidelines: prioritizes actions into phases such as early action, short-term, mid-term and long term with proposed development costs and schedule
- f) Depending on local conditions, other items may also be added or deleted.

6) Master Plan

- a) Illustrative map (usually at a scale of 1:500 or 1:1000 with contour interval between 0.5 metre to 1.0 metre, depending on the topography)
 - Existing natural features: topography, water bodies, significant trees, etc.
 - Arrival, car park, and entry
 - Visitor circulation
 - Exhibit, demonstration and show areas
 - Amenities: toilets, shade, shelter and rest areas, drinking fountains
 - Visitor service areas: food, beverage, gifts
 - General zoo service areas and circulation
 - Administrative facilities
 - Education facilities
 - Support, off-exhibit and quarantine facilities

- b) Descriptive maps (often overlays to illustrative map) with descriptive text
- Overall concept diagram showing key features: theme areas, visitor circulation and experience, service access, principle attractions, unique features, etc.
 - Thematic concept: zoo organization concept (taxonomic or bio-regional, etc.), theme areas, storyline concept, landscape concept
 - Circulation concept: public circulation, service and emergency vehicle circulation
 - Infrastructure concept: water, power, gas, sewerage, surface drainage and storage, storm water harvesting and management concept
- c) Animal collection guidelines summary including population size and justification of keeping all endangered species
- d) Guidelines for animal exhibition and management
- Humane philosophy
 - Display philosophy: naturalistic, immersive, functional, etc.
 - Activity-based concepts such as “rotation”
 - Reward-based animal training
 - Environmental enrichment
- e) Guidelines for architecture and landscape architecture
- Theme areas
 - Public precincts
 - Off-exhibit and service areas
 - Buffer areas
 - Natural areas
- f) Exhibit storylines or scenarios
- Description of theme, storyline, setting, animal and plant species and key features,
- at least for short to mid-term exhibit development areas
- g) Guidelines for signage
- Entry
 - Wayfinding
 - Visitor services
 - Interpretation
- h) Education plan summary and recommendations
- i) Administrative and support area recommendations
- j) Development guidelines
- Details of the phased sequence of activities for master plan implementation (work usually is prioritized in phases of five to ten years with more detail presented for early projects than for works in the more distant future)
 - Plan should include projected costs (construction and operation) compared of projected income for the same period.
 - Revenue sources (this may be covered in a separate business plan)
 - Construction phasing schedule: a graph organized by month or quarter year showing date and duration of major projects including phases for design, tendering, construction, commissioning and opening. A parallel graph would show cash flow and project attendance in relation to construction.
- k) Sustainability guidelines
- Solid waste, composting, etc.
 - Energy conservation, methane production, etc.
 - Potable water
 - Irrigation
 - Storm water harvesting and management

- Grey water system
- l) Disaster management and contingency guidelines
- Animal rescued from wild
 - Escape of animals from enclosures
 - Monkey, dog, other feral or native animal menace
 - Arrangement for animal feed in case of strike (non supply by contractor) or natural disaster
 - Snake bite
 - Visitor injuries: visitors falling into water features or inside enclosures
 - Natural calamities and fire
 - Law and order breakdown or terrorist threat
- m) Staff development guidelines
- Manpower projections related to development guidelines
 - Guidelines for upgrading animal training and other professional skills
 - Guidelines for upgrading staff interaction with other zoos and regional cooperation
- n) Business guidelines related to development schedule
- Projected operating income: operating grants from government or other sources,

admission, food and gift sales, sponsorships, compost sales, etc.

- Projected operating costs: pay roll, animal food, other supplies, utilities, rentals, insurance, etc.
- Projected development income: capital projects, development grants from government or private sources, sponsorships, fund raising, loans, etc.
- Projected development costs: planning, design and other consultant fees, additional staff or support for in-house planning team, planning-related travel, construction costs, commissioning costs, marketing, costs, debt service for loans, etc.

o) Depending on local conditions, other items may also be added or deleted.

7) **Annexure to the Master Plan:** Detailed studies undertaken in the Inventory, Analysis and Concept Phases (items 2-5 in this outline) and other supporting data may be included in an appendix to make the main body of the master plan more readable.

References

- Cook, Jonathan. 1987. The Language of Planning. In: The Support Centers of America; Reprinted from The Non-Profit Times, November 1987 and March 1988.
- Coe, Jon. In press. New and Sustainable Directions in Zoo Exhibit Design. In: Wild Mammals in Captivity, edited by Kleiman, D., University of Chicago Press (In press).

CENTRAL ZOO AUTHORITY

(Ministry of Environment and Forests)

FORMAT FOR PREPARATION OF MASTER PLAN FOR ZOOS*

* Approved in the 44th meeting of the Technical Committee of the Central Zoo Authority held on 19.07.2005

Introduction:

Master plan foresees the coordinated physical development of the many separate facilities and functions of a Zoo, in order to guide growth and control the final outcome. Related activities include “strategic planning”, development of financial resources and operational strategies and business planning, which analyses human resources and operational opportunities. The term ‘comprehensive planning’ is sometimes used to describe a fully integrated planning process that combines physical, financial and operations planning. Collection planning guides the management of living collections of animals and plants. Zoos may also have an Educational plan or a Conservation Master Plan. However, all these may also be integrated in the overall planning process.

As typically presented, the Zoo planning process involves a sequential investigation that proceeds in well defined steps.

First the process entails inventory – the systematic gathering of background information about all concerns as “natural systems” (climate, geology, hydrology, soils, existing vegetation); infrastructure (utilities, structures); cultural systems (historic and surrounding uses, cultural values) and “precedence and trend” (development models and economic trends in Zoos and related industries).

Second, planners and designers conduct analysis – that is, they evaluate data, which is often synthesized and presented, both graphically and verbally in terms of site opportunities and development constraints.

Next the planners and designers draft a development program, which usually addresses the systematic evaluation and organization of physical needs, involves important but less tangible elements, such as the identification of the institutions “vision” and mission, as well as the cataloguing of those emotions,

memories, attitudes and facts that the zoo wishes visitors to retain from their visit.

Fourth, the previous steps are then synthesized into a conceptual plan, including concept level cost and schedule projections, that represents an optimal relationship among all of the major components; often several alternative concepts are developed, compared and evaluated by individuals or small groups with strong interdisciplinary and synthetic skills.

Lastly, after a conceptual plan has been approved, it is further developed as a final plan, with additional levels of detail appropriate to institutional needs. The final version of the Master Plan is then documented, usually in illustrated report form, given final approval and published.

The format

Part – I Chapters

1. Introduction – (includes history, objectives, physical features like the topography of the area, geology, rock & soil, flora and fauna, climate, rainfall, season, approach, demography of the surrounding area, legal status of the land, sources of pollution, if any etc.)
2. Appraisal of the present arrangement and constraints.
 - a) Animal section, veterinary section, store and feed supply section, sanitation section, maintenance section, security section, water supply section, disposal of solid waste & liquid waste – sewerage, visitors amenities, lawns and gardens- landscape section)
 - b) Collection plan.
 - c) General zoo administration section.

- d) Research.
- e) Conservation breeding.
- f) Education and awareness.

Part – II Chapters

1. Future objective
2. Future action plan
 - a) Proposed animal collection plan including population size and justification of keeping all the endangered species.
 - b) Description of the layout plan on the zoo – (Annexure – layout map on scale:

Layout map should be drawn on a scale 1:2000 or 1:2000; contour interval to be between 1mtr to 5mtr, depending on the topography; existing features like water bodies, precipices, forest patches, historical ruins, natural drainage, water channel rock outcrops etc. should be depicted; North / south direction, visitor circulation and amenities, site for disposal of carcass, water and electricity supply lines, solid and liquid waste disposal, approach road to the Zoo and paths, parking arrangement, gates and barriers, administrative buildings – [Zoo office, ticket counter, Veterinary hospital], housing colony, industries in the surrounding areas, rail roads if any sources of pollution)

For an existing Zoo, the layout map other than the above features should also show existing animal enclosures (black colour) and the enclosures that need to be redone after demolishing the old structure (red colour).
 - c) Proposal to address the inadequacies and shortcoming identified in the appraisal report [as appraised in Part – 1,2 a)]
 - d) Depending on the local condition of the Zoo, other items may also be added – peculiar problems of the Zoo – like rescue center, or items not relevant can be deleted.

3. Disaster management.

Plan to address during the Natural calamities (Fire control, flood – cyclone situations, law and order break down).

4. Contingency Plan.

- (1) Animal rescued from wild.
- (2) Escape of animals from enclosures.

- (3) Monkey and dog menace.
- (4) Arrangement of food in case of strike (non supply by contractor)
- (5) Snake bite.
- (6) Visitors getting injured / visitors falling inside enclosure.

5. Capacity building

Plan to upgrade skills of Zoo Staff interaction with other Zoos – regional cooperation.

6. E-governance.

7. Broad budget analysis for implementing the plan.

- (a) Construction and development.
- (b) Day to day maintenance.

8. Annexures to the Master Plan.

(I) Existing Zoos requiring modernization:-

Layout plan depicting the present set up (animal enclosures, administrative building, visitor amenities, roads etc.)

Existing animal collection plan.

Free living species occurring in the Zoo campus – flora and fauna.

Present staffing pattern and position.

List of buildings other than animals enclosures.

Notifications – Creation of Zoo, Society, acquisition of land etc., constitution of committees.

(II) For new Zoos – Site map, legal status of the land, proposed collection plan for animals (list of species)

Proposed staffing pattern.

MANAGEMENT PLAN

The management plan shall be a document which will detail out the activities to be taken up in the line indicated in the Master Plan of the Zoo for a particular time frame (1 year to 5 years), prioritizing of the works to be taken up in phases and financial year wise and provide realistic estimates of the proposed works indicating the sources of funding.

Strategy to be adopted for achieving the goals defined in the Master Plan (Part – II)

Originally prepared 2005 ARAZPA/SEAZA Joint Conference

The Unzoo Alternative

Jon Coe, Jon Coe Design gn P/L
Ray Mendez, Work as Play
5 April 2005

Foreword

“Stop showing the world’s inhabitants behind bars and wire. I don’t care how good the cage is, it is still a cage is, it is still a cage. We are the masters; they who live out their lives behind bars, the possessed. Create a place where the residents share the land. Create a place where the viewer is not the owner but a humble guest. Remind people that we are all connected and that wild places have spiritual and emotional wealth beyond dollar value. Make that your mission!” Ray Mendez, 1999

Two zoo design consultants and a project manager were having dinner together. Ray Mendez (Work as Play), Tony Kotevski (Zoos Victoria) and (Jon Coe Design) began discussing the future of native animal parks. Ray mentioned his long connection to the Asa Wright Nature Centre in Trinidad (see post script) and his 1999 recommendation that fauna parks should stop trying to become zoos and instead should develop innovative and effective ways to bring guests closer to free-ranging animals in nature. We decided they should move from being zoos with pens, grottos and exhibits to something new, or old, or different... They should become “unzoos”. But what would an unzoo be like and how could it be accomplished? After a lengthy and lively discussion, Ray and I agreed to outline the unzoo alternative.

The Vision

“We need another and a wiser and perhaps a more mystical concept of animals. Remote from

universal nature, and living by complicated artifice, man in civilization surveys the creature through the glass of his knowledge and sees there by a feather magnified and the whole image in distortion. ... They are not brethren, they are not underlings; they are other nations, caught with ourselves in the net of the life and time, fellow prisoners of the splendour and travail of earth.”²

Henry Beston, 1928

Definitions

Zoo: A park displaying live animals ...from different parts of the world ...kept in cages or enclosures for people to come and see, and where they are bred and studied by scientists.³

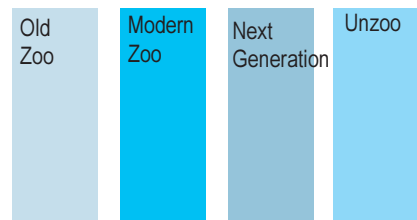
Unzoo: A place where the public learns about wild animals, plants and ecosystems through interaction with and immersion in original or recreated natural habitats.

Is the “unzoo” a possible alternative to current

zoos? Many have dreamed of the “cageless zoo”, yet how can we keep fragile and rare animals safe, secure and visible without close confinement? Advances in the philosophy and technology of zoo design and management are in fact evolving toward the unzoo paradigm. Old cages have been replaced with open “barless” grottos, which in turn are being replaced by “immersion” exhibits with hidden barriers. Isolated enclosures are being linked to form networks of “rotation” displays. Animal shows are moving into the bush, evolving

into “habitat theatre”. Advanced animal training techniques make display, husbandry and transport far safer, less stressful and more humane. Radio telemetry, night vision and other high-tech ways of seeing are being linked to computer network to study, record and present animals in the wild. What if these separate evolutionary trends were to coverage through design? Could we, through test and time, advance the evolution of zoos to unzoo, greatly reducing reliance on physical barriers along the way?

Think Differently!



Zoo

- With "cages"
- Physical barriers for animals
- Display based upon coercion or limitation
- Managed captive animals
- Animals forced to human schedule
- Large animal shows
- Capital intensive

Unzoo

- Without "cages"
- Physical barriers for people
- Display based upon attraction, motivation
- Managed free-ranging rehabilitated and wild animals
- People adapt to animal's schedule with animals trained to broaden schedule
- Large and small naturalistic shows and demonstrations
- Staff intensive

While elements of the unzoo hypothesis may benefit all types of zoos, this paper will focus on planning and operation of facilities specializing in native wildlife and ecosystems.

History

There has been along co-evolution among zoos, sanctuaries and natural history museums.⁴ Nature parks began putting wildlife in pens for the public to see and urban zoos developed more naturalistic

animal displays modelled after the dramatic dioramas of natural history museums.

Healesville Sanctuary in Victoria, which opened in 1934, is an early and excellent example. Other Australian examples include the David Fleay Wildlife Park (Fleay had done important work at Healesville) and Currumbin Sanctuary, both in Queensland, and Warrawong Earth Sanctuary in South Australia. More recent examples include the Desert Wildlife Park and Territory Wildlife Park, both in the Northern Territories. In the United States, the American Museum of Natural History opened Bear Mountain Trailside Museum in the 1930s. William Carr, who helped develop Bear Mountain, opened the Arizona Sonora Desert Museum near Tucson, Arizona, in 1952. Living Desert, in New Mexico, Northwest Trek, in Washington, High Desert Museum in Oregon and California Living Museum are more recent examples.

Most American and Australian native animal zoos adhere to the “biopark”⁵ model. The focus is on local and regional natural systems: geology, soils, plants and animals as well as indigenous and early settlement cultures. Many proudly proclaim themselves to be “living museums, not zoos”. However, over the years they have relied upon the technology of zoos for their displays. A plethora of pens, pits, cages, moats and animal houses were added to natural forest, bush, swamp and desert landscapes becoming constant and contrary reminders of human domination over nature, and thereby undercutting the professed message: reverence for and service to nature, its protection and conservation.

Tools of Change

While old zoo and museum attitudes and technology may have distracted native wildlife

parks from their purpose, recent zoo thinking can help them get back on target. Several recent trends can be thought of as tools to advance the evolution from zoo to unzoo.

Immersion Design Theory

“One can judge the effectiveness of an exhibit by the pulse rate of the zoo-goer.”⁶ Jon Coe 1987

“Landscape immersion” theory and design was pioneered at Woodland Park Zoo in the U.S. in 1976.⁷ From an educational perspective, immersion design theory contends learning is initiated by emotional responses such as awe, love, fear, surprise, and delight, for example. These may then lead to cognitive outcomes such as acquisition of information. High levels of emotional connection lead to high motivation to learn about the subject and to take action to protect and advance the subject’s interests. Furthermore immersion theory holds that humans in a subordinate position to animals rather than to learn from them.⁸

The best exhibits are those where the intended message is imbedded in the landscape or activity and can be interpreted through multiple means, including guides, graphics, games and so forth. Good immersion exhibits are good at telling stories; hence many are designed along carefully choreographed storylines.

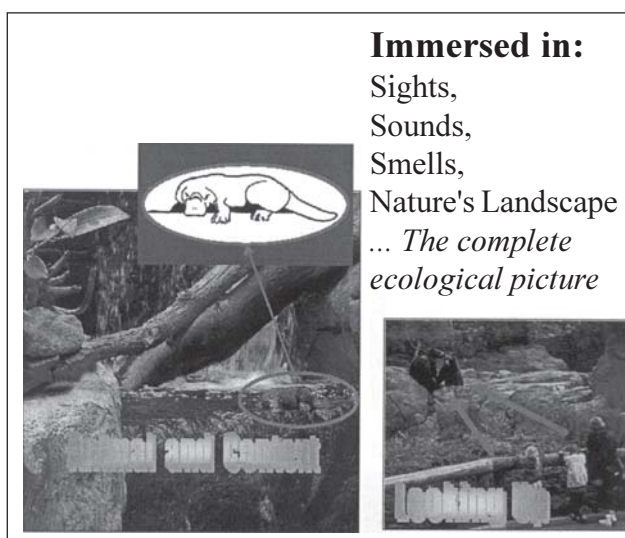
From an animal welfare perspective immersion design believes that the more closely we recreate the environment in which a species evolved, the more apt we are to meet its needs, including needs we may not even recognize.

Immersion design is based upon the following foundations:

- Nature is the model: copy nature, not other zoos,

- If we would teach respect for nature, we must present nature respectfully.
- Demonstrate landscape as appropriate habitat and ecosystem.
- Immerse visitors in the simulated or restored natural landscape dominated by animals, without distracting views of large crowds, barriers, support structure or inappropriate objects.

Immersion



All good immersion exhibits fit seamlessly with the site and utilize important site features and more distant “borrowed landscape” backdrops

The Walk-Through Exhibits should be the ultimate immersion experience:

Looking down between your feet, through metal decking, you see the forest floor far below. The elevated walkway sways slightly, and you grab the handrail. A possum ambles along a branch over you, heading for a cavity in the top of a lightning damaged tree. This, you realize, is the world of

possums, gliders, birds and bats, and you are in it with them.

Multi-species walk-through kangaroo yards and aviaries have become cliches, yet they represent an idea with untapped potential. By containing many species within a single perimeter, they put people inside the fence. In some cases simple barriers like handrails keep the public in prescribed areas without impeding animal movement. Large drive-through open-range safari parks operate on the same principal; people are more confined than animals. Elevated walkways, floating marsh walks and boardwalks above coastal dunes operate in this way. In a subtler example, tour guides on bush walks provide the same regulatory function. When the enclosed area is large enough and resources are sufficient, smaller species, including creatures from outside the facility may be encouraged to establish home ranges within the perimeter.

Animal Training

“We have been training animals for thousands of years, and we almost never ask them to do this! To bring their own abilities to the table. To think.”⁹

Humane training techniques developed with marine mammals by Pryor¹⁰ and others as well as falconry training methods have been combined under the psychological term “operant conditioning.” This approach has been popularized as “clicker training”.¹¹ These formal reward-based training methods are revolutionizing zoos with more active displays and safer, more humane husbandry procedures. Both animals and caregivers clearly enjoy the training periods and find them enriching.¹²

Animal Training



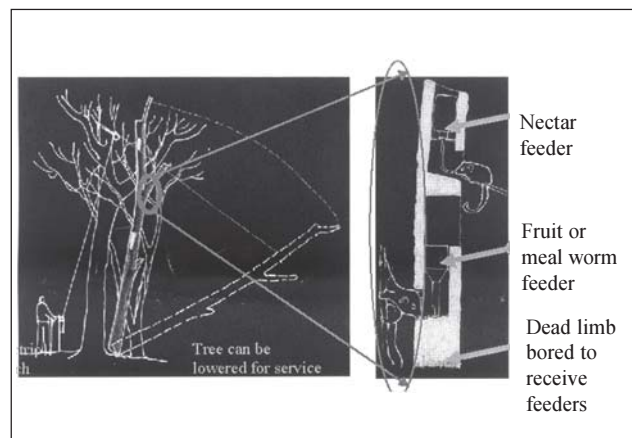
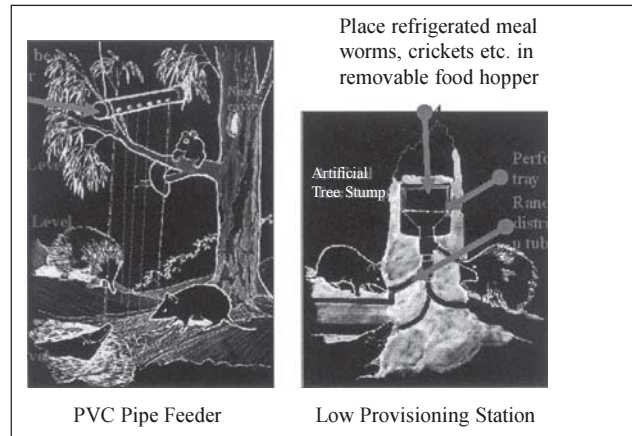
Training wild and free-ranging animals is also enhanced by using new techniques. While people have tamed wild animals since prehistoric times, clicker technology allows us to “capture” wild behaviours without capturing wild animals. For example, Ray Mendez used clicker training to teach wild bats to use artificial nectar feeders he had designed. The training only took a few hours and the bats remained entirely wild. The same techniques could be used for animals ranging from ants to antechinus.

You’re sitting on the terrace of the Mole Creek Tavern in Tasmania, enjoying a pint with other zoo professional attending a local conference. Movement in Mole Creek catches your eye. “Look, a wild platypus ... in broad daylight.”

“Yes”, the innkeeper confirms. “We see them most days at this time ... just got used to people, I guess.”¹³ Peter Stroud, 2005

Nature lore abounds with stories of opportunistic wild creatures that lost their fear of humans or were tamed by patient people. Wildlife rescuers frequently find animals become quite tame, at least to them, during recovery.

Attracting Animals



Managed wildlife feeding programs can also provide spectacular results. The facilitation of public feeding of wild rainbow lorikeets at Currumbin Sanctuary has led to a rush in construction of popular lorikeet feeding displays in the U.S. Properly managed feeding programs can lead to higher sustainable wildlife densities and visibility while avoiding common behavioural and disease problems.

The important idea here is that wildlife “flight distance” and “reaction distance” to use Hediger’s terms,¹⁴ can be greatly reduced without otherwise affecting natural behaviour. When interactions between people and wildlife are properly managed, as they have been at Warrawong Earth Sanctuary

and at the Mole Creek Tavern, wildlife goes about its business literally right under your nose. Of course, this is especially true for many insect species. The result can be a maximum of memorable close-ups and a minimum of fencing - the unzoo model.

Animal Close Encounters



Rotation exhibits¹⁵ utilize the same training that makes animal husbandry safer and more humane. Rotation allows animals to time-share each other’s space gaining exercise and stimulation in the process. Another advantage of rotation is that it allows habitat areas to recover from heavy use.

Shows & Habitat Theatre



Animal shows and demonstrations can be large or intimate, traditionally staged or a seemingly natural event.

“I would suggest you look at your landscape as a stage and the animals and staff as actors”¹⁶ Ray Mendez, 1999

Respectful bird-of-prey demonstrations are replacing demeaning “orang-utan tea parties”, but there is still room for growth and diversification. Shows can be formatted to inform us about animals of many types with emphasis on ecology and behaviour rather than on clever presenters. As one example, why not have a show based upon “Encounters at a Billabong” featuring multiple species of birds, fish, amphibians, reptiles and mammals from this habitat? Popular large capacity venues can take some of the traffic that might overwhelm the more intimate pathways, while maintaining high overall attendance levels and profitability.

Expanding the Senses

Walk in the bush surrounded by the free-ranging animals, without a cage, grotto or aviary in sight. Triangulate on that hidden bird: up comes its species, history and activity. Key in a remote camera to zoom in for a close-up as it feeds its chick.

Wildlife scientists have developed a wonderful array of tools to expand their observational and research capabilities. Some of these truly could become tools for change in zoos and sanctuaries. Traditional tools like local guides or binoculars are still important but they could be supplemented by night vision, radio telemetry, embedded

transponders and global positioning satellites. On Barra Colorado Island in Panama, a network radio towers allows scientists in comfortable offices to simultaneously triangulate, identify, track and record dozens of animals of several species. These same tiny embedded transponders could allow remote sensors to recognize specific animals, perhaps opening gates for some (but not others) or releasing food items on a random or predetermined schedule.

Expand the Senses



Extended Day Programme

The campfire wildlife talk was good but this adventure in the woods at night was a bit scary -at least until we put our night vision goggles. I never knew there were so many critters here! We'll spend tonight in a safari cabin and plan an early morning bird walk followed by a big breakfast. I never dreamed we could have a family safari so near our home.

The thrills of seeing active animals in the evening and night and walking to the early sounds of nature can form lifelong memories. Overnight and extended day programs have been available at open-range zoos like Werrabee in Victoria and Fossil Rim in Texas for some time and are an important component of the Earth Sanctuary System in Australia.

Night Events



After hours uses can also benefit larger, higher attendance unzoos. The Singapore Night Safari demonstrates some of this potential.

- Night time immersion displays are easy to develop because desirable areas are subtly spotlighted while areas to be hidden (barriers, service areas) are simply left in the dark.
- Many animals, including diurnal species are more active during cooler evening hours.
- Nocturnal species can be shown in natural settings without need for expensive and distracting nocturnal houses.
- Night programs can be built around popular animal demonstrations and dinner venues for which people are willing to pay higher fees. Greater earned revenue from admissions, food, accommodations and typically higher per capita spending supports higher quality facilities, operations and guest experience.

Ethnic, Indigenous and Anthropological Integration

Murrundini, a Wurundjeri Elder, is relaxed, even humorous as he shows our kids how to properly throw a boomerang at Healesville Sanctuary. Later

he will lead our group on a special tour of the Sanctuary's Corranderk Bushland Reserve. Corranderk has very special meaning to Murrundini, for it was his people's home as an Aboriginal Reserve for generations and, of course, was part of their traditional land for millennia. Where else could we have an experience like this?

Ethnic Connections

One of the pleasures of taking in Tanzania of a river tour on the Mekong in Cambodia is meeting local and indigenous people and beginning to see the world through their eyes. Of course we can do the same thing at home. Several zoos and opportunity could be even further integrated into the overall experience of the unzoo.

Recipe for Change

"Do not create any more exhibits. Create feeding grounds, blinds, lookouts and nest cavities with cameras. Use all the techniques that are available to enable the visitor to see native wildlife. ...Tear down all your cages."17 Ray Mendez, 1999

When zoos and wildlife sanctuaries seek to diminish the physical and perceptual barriers between their guest and nature, they must return to their wilderness roots.

- Recall direct experiences of nature in its many forms.
- Design exhibits as interconnected experiences, not as objects.
- Stimulate human emotions and embed meanings.
- Provide memorable, personal encounters with other species without unnecessary sentiment or artifice.

Recipe for Change

The Tools ...

- Immersion Design
- Positive Training
- Shows and Habitat Theatre
- Control People - Attract
- Provide Close Encounters
- Expand the Senses
- Night Encounters
- Ethnic Connections
- Invest in People, Not Facilities
- Evolve!

New tools can help. Clicker training and habituation allow animals to closely approach visitors without fear and greatly facilitates animal husbandry and well-being. Large multiple species walk-through areas, some many acres in extent can include integrated habitat theatre and subtly-managed trailside encounters. Other large venue animal presentations, formatted respectfully, can still serve large audiences cost effectively.

Remote sensing and field research technology can help us see and appreciate wildlife as never before. Immersion design techniques can blend remaining enclosures, if needed, into surrounding natural habitats. These can become interconnected for rotation and environmental enrichment.

All but the best existing exhibits can be phased out over time beginning with those which most isolate animals from surrounding nature. Pits and other depressed exhibits where animals pace below visitors should be phased out in favour of

respectful presentations. Systematics Victorian era collections, such as those in reptile houses or small mammal houses can be replaced with the biopark ideal of multilayered ecosystems.

As the shift from traditional zoo to unzoo evolves there will be a parallel shift from investment in capital assets to investment in staff, training and program development. This will allow great operational flexibility and future change. It will also require institutions to rethink their entire business strategies.

Reconnecting to the Vision

“My proposal is to uninvent zoos as we know them and to create a new type of institution, one that praises wild things, that engenders respect for all animals, and what interprets a holistic view of nature.”¹⁸ David Hancocks, 2001

About 78 years ago Henry Beston received a sublime vision of nature while walking an isolated beach on Cape Cod, Massachusetts. A few years later William Carr hiked along the Appalachian Trail above the Hudson River in New York and wondered how he could help city children to see nature as he saw it -whole and interconnected. At about the same time John Fleay may have had similar thoughts as he observed platypus in Badger Creek at Corranderk in the Yarra Ranges of Victoria. These visions and that of other insightful men and women have led to our present international legacy of native wildlife reserves, sanctuaries and zoos. But along the way a lot of old ideas and artefacts from museums and zoos got between the dream and the reality, obscuring Beston’s view of wildlife as “other nation”.

Today, with new tools, we can hasten the evolution from exhibit to experience, from objects to ecosystems, from teaching to experiential learning, from 9-5 human time to 24 hour natural time and from capital intensive to human intensive assets. Following this path, our institutions may evolve

from zoo to unzoo and, arriving there, we may find the unzoo is what we dreamed of all along.

Post Script

Ray Mendez offers this description of an unzoo, but of course, many other variations are possible in the Unzoo Alternative. Let this example inspire you, but don’t let it limit your dream; adapt the unzoo to your site, existing facilities, location, attendance and Institutional focus. Ray also sent along the valuable words of advice that conclude this case study.

“I have served on the Board of the Asa Wright Nature Centre, Trinidad (<http://www.asawright.com>) for 20 years and during that time we have taken a cocoa/coffee farm in the northern mountain range and turned it into a premier birding destination and nature preserve. We have also more than doubled the size of our holding while supporting a staff of over 50 people. This includes armed guards, cooks, field hands, guides, room service folks, managers and two environmental educators. All are hired full time at the same or above government salary rates. Benefits for our staff include pension, sick time and requirement funds. We do this, instead of laying off during the slow periods, a standard in the hotel trade, because we believe that you can preserve the environment and generate meaningful work for local populations.

Over the years we have a protected local species from hunting including such diverse groups as deer, oil birds (we have a colony living in a cave on the property), tree ferns and land crabs. We have started reintroduction programs on our property and on the Island. We have sponsored scientists, books, scholarships, lecturers, school programs, teacher programs and sea turtle programs. We maintain Simla, a research facility originally

founded by the Bronx Zoo via William Beebe, at low cost to visitors and do this staying in the black-most years. We do this with NO live animal collection. In a week you can see over 200 species of birds, 20-30 species of herps, hundreds of species of insects and a handful of mammals ... all this with no cages surrounding them.

We can do this because we have set goals and struggled to achieve them. Sometimes our simplest goals seem to take forever to achieve but we slug on. We lead by example, even when the locals think we are nuts. Five, ten or fifteen years later our crazy ideas actually make sense. Tourism is our cash cow and being non-profit allows us to keep our money. We are fiscally very conservative and have a board that has great continuity and represents not only Trinidad (13 members) but foreign (12 members) concerns. Just because not only Trinidad (13 members) but foreign (12 members) concerns. Just because some/many outfits fail in these ventures does not mean be crawling around on hands and knees.

In conclusion, I wish to remind us all that we work in a wonderful industry. It serves the role of helping to breed animals and plants which have no other home; it provides the visitor with a healthy, safe, entertaining, educational environment; and it can further serve society as places dedicated to holding the moral line in regards to the use or abuse of our world's fellow travellers. I believe we need to be part of the because they have intrinsic and spiritual worth. If we do not do this, our wild places will become nothing more than undeveloped shopping centres and the justification for their existence relegated to a simple dollar value. Our exhibits need to gently push the visitor so that love of wild places makes destructive behaviour both unimaginable and unacceptable." Raymond A Mendez, 2005

Photos:

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Kanja Lake



Kanja Lake