

# USING THE ZOO TO TEACH BIODIVERSITY

## LOW TECH METHODS OF COMMUNICATING HIGH LEVEL TOPICS

### WORKSHOPS WITH WHITEHEAD & WALKER

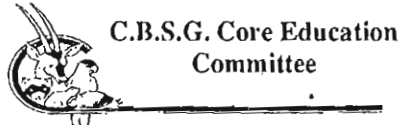


British Council  
Division



Last December-January M/s Malcolm Whitehead and David Lawson, (a.k.a. John the Lens) joined S. Walker and the Zoo Outreach Organisation team to put on a series of Capsule Zoo Education Workshops in three Southern states.

These Workshops were conceived by Walker and Whitehead at Jersey and Twycross Zoo to implement a mandate of the CBSG Core Education Committee (Co-chaired by Steve Hage of the Minnesota Zoo and Peggy Harvey of the San Diego Zoo) to conduct relevant educational activities in regions of high biodiversity. It was also the desire of the conceptors to experiment with short time-frames on a regional basis, an approach that seems to have much merit.



The Workshops were sponsored jointly by the British Council Division of the British High Commission, Southern Region, in Madras and the British Airways Assisting Nature Conservation Twycross Zoo Z.I.P. Squad and the Zoo Outreach Organisation/CBSG, India. The Zoo Outreach Organisation organised and coordinated the Workshops for the hosting institutions which were the Mysore Zoo and Zoo Authority of Karnataka, the Madras Zoo and Forest Department of Tamil Nadu, the Hyderabad Zoo and the Forest Department of Andhra Pradesh and the Coimbatore Zoo and Krishnamal College.



In addition, the Workshops had the full blessing of Sri Kamal Nath, Chairman, Central Zoo Authority.

The focus of the Workshops was biodiversity in all its manifestations and the name, in fact, was "Using the Zoo to Teach Biodiversity: Low tech methods for communicating High Level Topics." The idea was to demonstrate some of the simply teaching devices which have been developed over the years, mostly at Twycross Zoo by Mr. Whitehead, as well as to give

participants an overview of the subject of biodiversity and zoo conservation, including small population biology.

The most emphasis was placed on conveying material that could be reproduced cheaply and easily by the participants and on demonstrating the REAL purpose of the zoo, e.g., saving species and populations. Thus the work of the Captive Breeding Specialist Group was given special emphasis.

Briefing material was prepared and given to each participant, along with a packet of educational materials entitled ZOO SCHOOL, a variety of educational stickers, a t-shirt, etc.

The modus operandi was to get ourselves invited to hold the Workshop at different zoos, which would then invited whom-ever they pleased, e.g. their staff, teachers, n.g.o.'s, other foresters, etc., but limiting the number of participants to twenty. The holding several short workshops in different places was for several reasons but the major advantages are:

1. Zoo personnel and others may not find it difficult to spare three days, but could not manage 10 days or two weeks or more,
2. It allowed junior level zoo personnel to attend which may not have been possible if the venue had been one place for all southern states.
3. It allowed for adjusting the Workshop content for the particular zoo and its audience.

The Workshops were held at four different zoos in three South Indian states. Each Workshop was different, reflecting the diversity of participants in each:

Coimbatore: attendees consisted of a broad range of Coimbatore Zoo personnel and Trichur Zoo personnel and zoo volunteers. Mysore: attendees consisted of zoo personnel and n.g.o.'s as well as Natural History Museum staff. Madras: attendees consisted of zoo staff, including zoo biologists, with a large component of zookeepers for whom much of the Workshop was translated by their Director and Dy. Director. Hyderabad: attendees were forest officers of D.F.O. level from different wildlife divisions in the state.

Because the Workshops adjusted to different time scales and circumstances, it is meaningless to reprint the programme as such, but some of the topics which were covered are given here:

## USING THE ZOO TO TEACH BIODIVERSITY MAIN SUBJECT MATTER

### Day One -- Variety of Life Systems and Life Styles

- A. Overview of Biodiversity: What is it; its value; threats to it.  
B. Why zoological gardens are unique places to teach about Biodiversity and its preservation.  
C. Why People visit zoos  
D. Target audiences and approaches to zoo education:  
- 1) People as animals: demonstration of active learning techniques with ape shirt, -2) Classification is not boring - Using real animals and observation skills, -3) constructing keys for school children to learn about biodiversity, -4) Processes of biodiversity - lively ways to teach animal locomotion, -5) Animals in cross curricular school work - using vertebrates and Invertebrates.  
E. You will respect animals if you know them - Ideas for making people watch animals and behaviour in the zoo -1) school level (grooming study, gestures, mime), 2) school and visitor level (Top secret graphics and "chats", -3) Environmental enrichment.

### Day Two -- The Web of Life, Zoos and Habitats

- A. Ecology: all life is linked and interdependent - how to reflect this in the zoo. Solutions through zoo design. Evolution of zoos and zoo design. Problems of species vs habitat approaches. Webbing game.  
B. Using the zoo to teach about habitats and ecosystems. -1) Birdybag, -2) Colour coat, -3) Giraffe wall, -4) Peek-a-zoo, -5) Jungle swag bags, -6) Value of plants, -7) Invertebrate safaris, -8) Cross-curricular habitat, etc.  
C. Using biofacts in the zoo. Touch tables, art carts, rain forest trucks.

### Day Three -- Biodiversity Conservation and the Zoo

- A. Role of Zoological Gardens in Biodiversity Conservation  
B. Small populations  
C. Twelve points of communicating conservation in zoo  
D. Promoting the zoos role to different audiences: -1) Vulture days, Wildlife Weeks, -2) Role of zoo graphics, -3) Junior directors, -4) Zoo exhibitions, -5) Links to the wild - zoo classrooms like field stations or hides, -6) Guidebooks, -7) Friends of the zoo and volunteers, -8) Meet the keeper type events, -9) Mission statements, etc.  
E. The personal touch - everyone is an educator

Every day included practical "hands-on" exercises for participants to create an item, a concept, etc. and present it in front of the group or try it out in the zoo.

Many of the project work was excellent and we regret not having the time or facilities for reproducing it here.

In the following pages some of the material which was covered by Whitehead, Walker and photographer David Lawson and has not been covered before in ZOOS' PRINT is given, hopefully in a form that can be utilised by zoo educators.

## BACKGROUND AND BIOGRAPHY

### Malcolm Whitehead (a.k.a. Malki-alki-muthu)

is a zoologist employed as the Director of Education at Twycross Zoo, England. He is a widely published author of articles, papers and books; university lecturer, broadcaster and has worked and lectured in five continents, including as a Tutor for two years on the International Zoo Educator Course, Jersey. He is a member of many prestigious conservation organisations including C.B.S.G., I.Z.E., British Zoo Federation, and I.C.C.E. He is a Life Member of Zoo Outreach Organisation and is soon to start a U.K.-based charity for Z.O.O.

### David Lawson (a.k.a. John the Lens)

is a freelance photographer affiliated to the Education Department of Twycross Zoo. He works closely with many major British zoological collections and is an agency photographer for WWF-UK and ICCE. His photographs have been published in national newspapers and magazines and he is the winner of the 1992 Metz Meccablitz Flash of Brilliance photo competition.

### Sally Walker (a.k.a. the Cat Woman)

is Editor of this Journal, founder Secretary of Z.O.O., Convenor of CBSG, India; Member, CBSG & CBSG Core Education Committee; Member, Central Zoo Authority; Tutor, Intl. Zoo Educator Course, Jersey; Member, Wildlife Advisory Boards of Orissa and Tamil Nadu and several zoo advisory boards.

### Zoo Outreach Organisation and Twycross Zoo

Twycross Zoo has achieved a reputation for producing innovative, attractive and effective educational materials and exhibits. The Twycross Zoo is collaborating with Zoo Outreach Organisation, India on a number of educational projects, these workshops being one example

The Twycross Zoo sponsors an Animal Facepainting Project for children who visit to the zoo, charging a small fee and donating the proceeds to Zoo Outreach Organisation for their education and conservation projects.

Ms Molly Badham and Nathalie Evans, Directors, of Twycross Zoo have been most helpful in the implementation of the workshops, allowing Malcolm Whitehead long leave for conducting them. Ms Badham and West were the recipients of an Award for Outstanding Achievement this year from the Zoo Federation of Great Britain and Ireland.

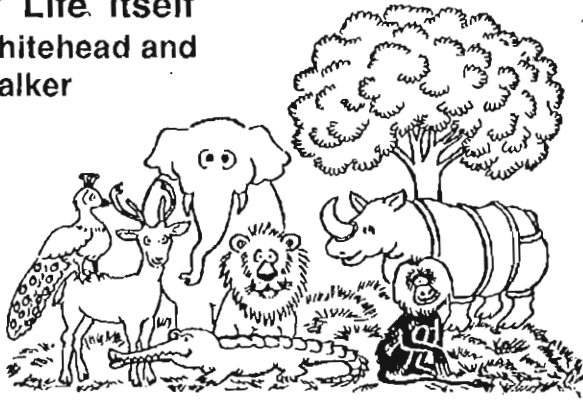


*Molly Badham, Director, Twycross Zoo*



# Biodiversity - Behind the Scenes of Life itself

Whitehead and Walker



## We homo sapiens share the planet

with millions of species of plants, animals and other organisms. This sheer variety of life and the myriad ways in which it interacts and interrelates, is known as **biodiversity**. Biodiversity is actually an abbreviation of the phrase, "biological diversity".

Scientists have described about 1.5 million species of living things. Each 'thing' or organism is classified within a widely accepted hierarchical system. The largest groups of 'things' are called Kingdoms and many scientists accept five of these namely

The Five Kingdoms of LIFE	Named and known "things" in it
1. Animals (Animalia)	1,060,000
2. Plants (Plantae).	268,000
3. Fungi (Mushrooms, moulds and lichens)	47,000
4. Protoctista (algae and protozoans)	58,000
5. Prokaryotae (bacteria and blue green algae).	5,000
<b>Total "things" =</b>	<b>&lt; 1,438,000</b>

There are reputable scientists, however, who think that there may be over forty kingdoms of life! Just imagine!

That is one of the greatest challenges of biodiversity research. We don't know even how many groups of species there are! Therefore, we are a long way indeed from discovering the total number of species that inhabit our planet.

Of these animals, some 97% are invertebrates -- the ones which are, unlike us and the more familiar mammals, birds, reptiles, fish and amphibians, without backbones. The British biologist J.B.S. Haldane (a man with considerable Indian connections) once said that, "God had an inordinate fondness for beetles." The beetles or *Coleoptera* represent over one fifth of all known species (23.8%).

Vertebrates, which are what all Indian zoos exhibit exclu-

sively, constitute a mere 2.7% of living species. Only a few zoos in the world exhibit invertebrates. We hardly give them any importance, considering how many they are! Why is that?

These days we hear a lot about endangered species. Three hundred species or subspecies of vertebrate alone have become extinct since the seventeenth century. Now the rate of extinction may be one a day rising to one an hour by the end of the decade, although no one knows for sure.

What we DO know for sure is that there are many more lifeforms yet to be discovered. Even today, new species turn up quite regularly and, although most are invertebrates, a number are quite large and spectacular vertebrates like the Golden Bamboo Lemur of Madagascar, the Chacoan Peccary of Paraguay. Other species, thought to be extinct or nearly so, reappear, such as the Manipur Brow-antlered deer (thought to be extinct; rediscovered in the mid 1950's), the Pink headed duck (sighted in 1990). Other animals turn up in places where they were not known before expected, such as the Hispid hare in Dudhwa National Park and the Rusty-spotted cat in Gir Forest. Such familiar creatures as Mountain Gorillas, Bonobos, Malayan Tapirs and Okapis were only described by scientists this century, although their existence was known by local people for a long time beforehand.

The possible number of species living on planet Earth will be in the millions or even tens of millions. Estimates vary from five to one hundred million.

This is high drama. When you think about it, it is more amazing than Madonna, more interesting than cricket, more complicated than politics. If people thought about it, they might get absolutely fascinated and do something for some of these known and unknown species. We need all the help we can get, so how do we get people to think about it?

The ZOO is a GREAT place to get people to think about it because the zoo has lots of species itself. Zoos are the BEST places to teach about the biodiversity of life. Probably the first thing people should learn when they come to the zoo is that

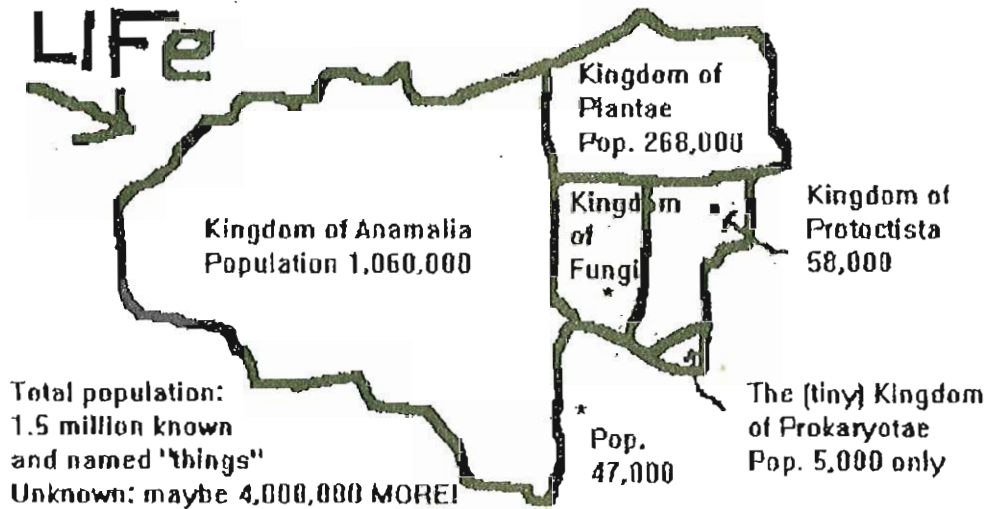
There are  
**1,060,000 known species of animals**  
**3% are like us, -- people**  
 and dogs and cats and fish and birds and snakes and frogs  
 e.g. -- things with backbones  
**97% are NOT like us**  
 at all, they are beetles, bugs, flies, butterflies, fleas etc  
 e.g. ...things without backbones

**WHAT IF THEY COULD VOTE!**

See the graphics on the opposite page also. As an exercise, make your own using just the information in this article. Design a board for the entrance to your zoo. Let your imagination run WILD for teaching about WILDLIFE!

The Continent of

# LIFE

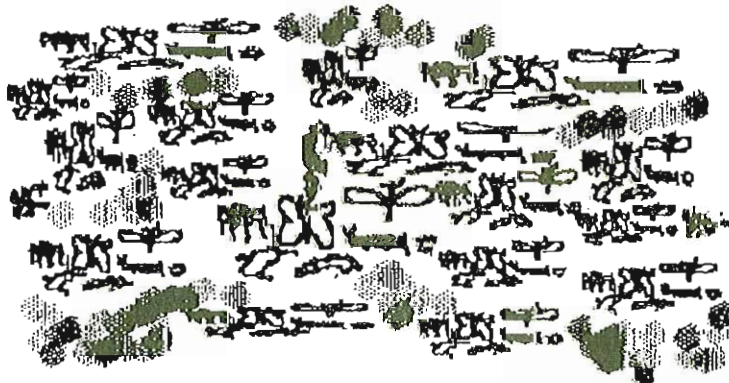


## vertebrates & invertebrates

In the Kingdom of Animalia, only 3% of them have backbones



and the other 97% of them do not!



## BIODIVERSITY

Of the 1,438,000 named and known species of animals on the Planet Earth, we have at least 139 of them right here only in this zoo itself.

# Biodiversity: -- Threatened

Kingdoms  
Whitehead  
and  
Walker



Disease, drought, pestilence, plague, flood, fire ... Occasionally these events threaten the variety of life and ecosystems, either locally or on a wider scale. Some of these are natural calamities which have been happening since forever. They are unpredictable and (probably) unpreventable "acts of God" so to speak. Scientists mostly can't bring themselves to talk about "acts of God" however so they call these natural calamities "random events" or "stochastic events".

Some of these calamities ARE preventable and we have -- with our human discipline and science -- learned to prevent much of disease, pestilence and plague.

In our efforts to do so, however, and in general to "tame nature" and exploit it for products that will improve the quality of our lives, we have created conditions that actually cause what were once only natural calamities, e.g. flood, drought, fire. Cutting down too many trees, for example, affects the weather so that some of the floods and droughts we have today actually are our own fault!

The impact of human beings on the planet is immense. It is also full of irony. We humans think ourselves very knowledgeable and smart. We are always trying to improve our lives ... to make daily life easier, more comfortable, more full of thrills and pleasures. The more man tries to make life better, the more he uses up some vital ingredient in his very survival kit!

There are over 5,000,000,000 (five billion) of us humans and everything that we do affects the Earth. Quite simply, humans are in danger of living beyond the capacity of the planet's finite resources to support us. We are living beyond our ecological means.

Teaching this in a country like India is problematical because it is not countries like India which are causing the trouble on a global scale. It is the rich, western countries that have over-consumed. It is fashionable now to refer to the "West" as the "economic north". There is no real geographic division however; it is just "rich" and "poor" -- in terms of hard currency and the power that purchases, not in other ways. The combined population in all rich western countries (or the "economic north") represent only a quarter of humanity. This "quarter" consumes two thirds of the world's resources. Half

of the Earth's population of people has trouble finding enough resources even to stay alive.

The 'living beyond our means' mentality and habits of many of these individuals, governments and multinational companies has resulted in problems which threaten everyone in the world, e.g. atmospheric, terrestrial and marine pollution; global warming; habitat degradation and fragmentation; population pressure; shifting cultivation and transmigration; poaching, wildlife trade, shrinking populations of endangered species and a decreased quality of life for one and all.

## Conservation of Biodiversity .

The future of life and humanity depends on us adopting strategies of sustainable development at local, regional, national and global levels. We must find ways of reducing consumption in the economic north, and ways of improving the quality of life in the economic south. Humanity must live harmoniously and equitably within nature, and local communities must be involved in the conservation of 'their' biodiversity. It is likely that many countries will adopt multiple land use policies, make better use of agricultural land to meet food production without adversely affecting the environment for future generations, pass legislation to control wildlife trade, adopt in-situ and ex-situ conservation policies (using zoos for the latter), and create networks of protected areas.

The details of this will be published in national conservation strategies that follow the guidelines and spirit of the second world conservation strategy, entitled 'Caring for the Earth' and launched in 1991 by the UNEP, IUCN and WWF. For the latest information on all such aspects of biodiversity, a good reference is 'Global Biodiversity' (IUCN/WCMC, 1992).

Again, you probably know all that, or at least have a feeling for the trends. How do you teach it to your visitors? And what do you teach? India has always had a tradition of conservation - it is in the history and culture of this country. It is only in recent times that other countries have become aware of the need to conserve natural resources.

It is probably not good politics to rail at the rich countries that are to blame. It is too easy then to sit back and count on them to try and repair the damage. This would be madness for a variety of reasons. It may also not work to say "don't make their mistakes" because nearly every normal person wants the luxurious things we associate with western life -- cars, videos, cameras, tape players, fashionable clothes.

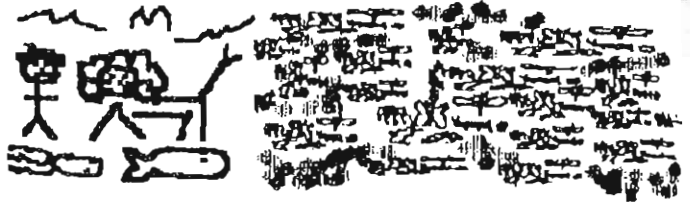
It is not ethical for us as westerners to say "Don't make our mistakes -- do without nice things!" Particularly while the West continues to overconsume. We have no face to suggest much of anything here. Probably the most sane and sensible position to take is simply to go on promoting and reinforcing sustainable development. "Put back what you take. Don't use things that can't be replaced, etc." Create awareness of the fact that the Earth's resources ARE limited.

1/4 of the people on Earth  
consume 2/3 of the Earth's resources



# Biodiversity -- many things; many DIFFERENT things

Whitehead and Walker



Biodiversity is not restricted to the number of species that inhabit Earth. It also means **variety**. This variety occurs on several levels of organisation from the genetic and microbial to the population, community and whole ecosystem.

## There are Many Reasons for Conserving Biodiversity

### Reasons of Interdependence

The Gaia hypothesis has it that the Earth is a self-regulating organism of ecological cycles and feedback systems. Conventional ecological theory shows how energy flows through trophic levels of producers, consumers and decomposers. The components of life are interdependent in some shape of form.

### Reasons of Ecology

Biodiversity, then, is a major part of ecological stability - the life support systems upon which our economic and biological lives depend. This is hard to value in standard economic language. Without biodiversity, ecological stability is threatened and so are we. Priceless seems a good value to me.

### Reasons of Economy

It is possible to put a price on various parts of biodiversity. Most people consume nature's products like firewood or game animals. Some things, like timber and fish, are commercially harvested. Thus there is a consumptive value of biodiversity.

There is also a nonconsumptive value. Activities like scientific research, birdwatching and wildlife tourism occupy millions of people every year, and provide employment for others.

### Reasons of Biology

In biological terms, it would be insanity and irresponsibility of the highest order NOT to conserve the genetic diversity of plants and animals, cultivated plants and domestic animals as well as their wild relatives. Many plants have real and potential value as sources of medicines, pesticides, foods, oils, industrial products and genes for strengthening existing crops. When we conserve biodiversity we "maintain our options" for the future.

### Moral and Ethical Reasons

Finally, there are good moral and ethical reasons for conserving biodiversity. Non human species have an intrinsic value, a right to survival and a sanctity of life that is recognised in many Indian religions, philosophies and cultures.

## NOW, HOW DO WE TEACH THAT ?

As a Zoo person, either official or associated, you probably know this. How do we best teach it to the common man (or woman, and children -- particularly children). Communicating the urgency of conserving the quality and diversity of our entire Continent of Life is probably the most important of our many tasks.

Probably the best way is to first make people realise how dependent they really are on products of biodiversity -- past, present and future. Maybe a graphic showing different areas in the home where we find what have become necessities of life that depend on plants and animal products. When you think about it, you feel rather foolish and humble because there is just nothing useful that doesn't come from some natural plant or animal at some stage of the manufacturing process.

The list is so long we can't include everything here. Also, in different areas, different products may be more meaningful. So here is a shell of an exhibit to get you started and a very few examples. You can fill in more and perhaps get an artist to paint nice illustrations of some of these products. If you have an exhibit set up that is protected from mischievous hands, you could mount some of the actual products instead of just naming them.

The San Diego Zoo does this with an attractive wayside exhibit called "Tropical Rainforest in your cupboard" where they show actual products such as medicines, cosmetic items, etc. in a mock cupboard.

**BIODIVERSITY =  
BIOLOGICAL DIVERSITY =  
MANY DIFFERENT LIVING THINGS**

**We are DEPENDENT on the variety of  
life  
for our quality of life**

**If we did not have Biodiversity in the Past, we would not have :** textiles, rubber, tea, coffee, sandal, cereals, pulses, .... (add your own examples)...

**If we did not have Biodiversity NOW, we would not have:** toothpaste, aspirin, medicines, soap-powder, ... (add your own examples) ...

**If we do not have Biodiversity in the Future, we will not have :** a cure for Cancer, a cure for AIDS, clean air, clean water, forests, ... (add your own examples)



# An Education Programme vis a vis an educational programme

## Considerations for Zoo Educators

Whitehead and Walker



An Education Programme can be truly effective only with careful, coordinated planning. Most zoos do education haphazardly, a board here, an activity there -- and that too for a very general audience. An Education Programme means a design, or blueprint for education for a longer period and for more groups. An educational programme -- spelled with small letters -- means one isolated activity. An Education Programme is made up of many education programmes and activities.

Just as we take time to plan out an enclosure design, thinking and planning what would work best, we need to take time to plan a design for education as well. It is good to plan a whole year's worth of educational activities or even longer, making sure different aspects of conservation and biology are covered and specific activities and materials are directed towards specific groups of people who have different needs.

If you do this, your chances of obtaining funding for your individual programmes are better as people have more confidence in a well-thought-out programme and also can include items in their yearly budget. Businesses might be more likely to sponsor a brochure, sticker or booklet -- or maybe several -- if they know in advance when it will come out and who will be reading it. The extra time will improve the quality of your material as well. Here are some suggestions to keep in mind while planning your Education Programme.

### A) THEME SELECTION

Select a subject as a theme and centre your interpretation around it. Some good, basic ideas are:

i) Global conservation issues relating to species, habitats, resource consumption, development, socio-economic and cultural factors. Interpretation of ideas expressed in 'Caring for the Earth'.

ii) Local (India and/or State-based) conservation issues and linking of the zoo to the local community.

iii) The Zoo itself as conservation institution. What we do, individually and collectively, in *ex-situ* and *in-situ* conservation.

iv) Animals' welfare issues including visitor behaviour (teasing/feeding bans etc.).

vi) Biological and non-biological stories about the animals. Not every "story" or educational message has to be strictly about zoology or conservation.

It is not possible to tell everything in one visit. Better to go for quality, rather than quantity. Quality (e.g. interesting) material will make visitors want to come back again and get more.

**B) KNOW YOUR AUDIENCE** -- Who are your target groups? Are you preaching to people who are already converted? Are you offering appropriate material? For example telling four year olds about small population biology or university students about big animals and little animals is inappropriate. Your zoo should be able to interpret at several levels to reach different target groups.

**C) CREATE AN EDUCATION STAFF & RESOURCE CABINET.** Gather sufficient staff and resources to do the job. Everybody in the zoo is a potential educator; particularly keepers who are often the only zoo staff that the public comes into contact with. NGOs and other volunteers also, if they are the cooperative and constructive sort make good educators -- as guides or information desk minders in the zoo as outreach representatives.

**D) METHODS AND MATERIALS.** Decide what materials and techniques you will be using. Will your messages be presented in passive, active and/or interactive ways? People remember and understand more if they are actively involved and doing something. Will you use graphics, literature, high-tech or low-tech gadgetry? Will your materials be multilingual or visually oriented for non readers?

**E) MASTERPLANNING FOR EDUCATION.** Develop an education/interpretation master plan. Education Master Plans can be done for different sections of the community and cover all the events and opportunities throughout the year. Set targets, goals and priorities according to your particular circumstances, staff, resources and budget.

**F) ABC - ALWAYS BE CREATIVE.** The unique aspect of the zoo is the living animals and what they are doing. That is what the visitors will be seeing/hearing/smelling. Interpretation should use the immediacy of the animals in front of us. It should answer the questions that occur to visitors as they watch the animals. It should provoke further questions. Before planning your signboards, spend several days observing the animals. What are they likely to be doing most of the day?

The lions are likely to be resting so you can use that in your signboard in a clever manner. It is a waste of resources to put up a big expensive board about Felid evolution when people are already frustrated looking at a sleeping lion. They don't want to wait for it to evolve -- they want a thrill -- NOW. Or at least an explanation.

If people are not stimulated, they will not want to know more. They won't buy a leaflet or read a book. They won't join an organisation. Unrelated graphics which don't link to the exhibit may be boring. People won't remember.

Use endangered species to tell conservation stories. It is much more effective to look at macaques as animals with arboreal adaptations and then show how forest destruction and degradation leaves small populations of them in fragmented and isolated bits of forest. This is more interesting than straight biological information: "Here's a Lion tailed macaque. There are only 5,000 left. They are threatened by habitat loss, etc.

Animals teach by existing. In the best zoo exhibits, husbandry, interpretation and the visitor experience go together. Such exhibits often have on-site interpretive stations rather than just one or two boards. For example, recent development at New York's Bronx Zoo (Jungle World, Baboon Reserve) have classroom laboratories immersed into the design.

In India perhaps you could construct a simple "hide" that visitors could enter and look out onto a naturalistic habitat display. Informal graphics telling how researchers construct these so as not to alarm wild animals while they observe them. You could tell how such hides used to be constructed for hunters to stalk their prey which also played a big part in declaiming our wild life. Even if a new one had to be constructed every week, it is not so difficult and your keepers could do it in a short time.

**G. DON'T BE BORRRRING, DARLING.** All education and interpretation should be exciting, lively and fun. Nothing turns off people more than boring, pedantic, pseudo-scientific, wordy labels or talks.

**H. INTERPRETATION IS NOT JUST INFORMATION.** One definition of interpretation is that it is 'revelation based on information'. Communicating conservation (and other things) to zoo visitors requires a blend of interpretation and information -- like light and shade. Knowing when and where to interpret is both an art and a science. It is crucial to effective zoo education and awareness campaigns.

**I) WE WANT FACTS.** Give people a database to make critical judgements and decisions about conservation issues. Use propagaganda sparingly and with impact.

**J) ITS HAPPENING RIGHT NOW!** Be topical. If you want to get a story into the news media, remember the 'so what' factor. Is it relevant and is it relevant now? The same holds true for some zoo interpretation situations.

**K) FAMILIARITY BREEDS COMPREHENSION.** Use familiar analogies. Start where the visitors are at. Not where you are. Otherwise you'll never get the message across and raise consciousness. Use familiar examples that people might come across in their daily life.

**L) WHAT CAN I DO?** Tell people what they can do as consumers, businessman, thinkers, communicators and participants. Is there a nature club or volunteer scheme that they can join? Tell people where they can link up with other environmental organisations and initiatives.

**M) LEAD BY EXAMPLE.** If your zoo is developing along conservation lines, you will present a good example to the public. Bad zoo practice carries many negative images, both explicit and subliminal, to your visitors. The atmosphere of progressive zoos radiates conservation and projects zoo and/or zoological society as a nerve centre of local and global conservation action -- a true conservation centre of excellence.

**N) REMEMBER YOUR FIRST...** Don't forget what made you excited about wildlife and nature in the first place. It is your best educational tool. Don't be shy to use your personal experience -- it is the most genuine and will be the most effective teaching device. As a zoo educator you are trying to make the public "excited about wildlife". This would make a good yardstick by which to measure each exhibit -- "if I was not a wildlifer, would this make me want to be one?"

**O) ANYTIME IS RIGHT TO EDUCATE** -- But some times are better than others. All of the animal, environmental and wildlife events are good times to educate. For one thing you can exploit the free publicity generated by global and national events, e.g. World Environment Day, World Forestry Day, Animal Welfare Fortnightly (national), Wildlife Week (national), National Environment Month, Zoo Week, etc.

If you planned activities around the environmental and related events alone, you would be involved in some programme almost all the time. Every event needs build up and wind down. You could build up to any of these events for 2 or 3 weeks with announcements (press, radio, billboards), have the event with activities (painting and essay competitions, dramas, films, lectures, etc.), and spend a week winding with prize awards. Six events means something is going on in your zoo for half the year. Your regular zoo news -- births, conservation projects, etc. will take you through the rest.

With a bit of effort you can turn your educational programmes into a dynamic and exciting Education Programme.

In a good zoo, something is -- or should be -- going on

## ALL THE TIME



# Attitudes of Visitors to Zoo Animals

Whitehead  
& Walker



## Visitors' Studies can be useful

Stephen Kellert, an American Social ecologist, identified **ten basic attitudes** towards wildlife and the natural world during a three-year study of Americans.

The attitudes, which may occur singly and in different combinations in the same and different people are tabulated below. In general these attitudes can be found in every country. Which are you? How would you characterise most of your zoo visitors? Your colleagues? Your friends?

### KELLERTS' 10 BASIC ATTITUDES TOWARDS ANIMALS

Attitude	Characterised by or concerned with ...
1. Naturalistic	Wildlife and outdoors.
2. Ecologicistic	Environment, ecosystems and ecological interrelationships.
3. Humanistic	Individual animals as pets and / or surrogate people.
4. Moralistic	Animal rights and cruelty/exploitation.
5. Scientific	Biological systems and functions
6. Aesthetic	Artistic and symbolic characters.
7. Utilitarian	Consumptive value of biodiversity. Concern for practical/material use of animals.
8. Dominionistic	Master/servant relationship over animals.
9. Negativistic	Avoidance of animals due to fear, dislike or indifference.
10. Neutral	The person passively avoids animals.

Acknowledgment and consideration of such attitudes is important for zoo educators. As zoo professionals, we wish to teach the naturalistic and ecologicistic subjects, e.g. those which emphasize breeding, small populations and species / habitat conservation to zoo visitors when most visitors would rather hear about what and how much the animal had for lunch!

Most zoo visitors have humanistic feelings towards the animals they see. Somebody who looks into a primate enclosure is probably seeing a man in an animal skin. He may think the animal is "unhappy" because he is "not free." In other words, the visitor has attributed human feelings to the macaque or langur he is seeing. The animal may or may not be "unhappy". If it IS "unhappy", it is probably NOT because it is "not free", but because of some other reason which we simply can't imagine. We humans -- with all our science -- don't have the capacity to know exactly what goes on in any animal's head (including the human animal, even in our own family!)

It is a natural human quality to **anthropomorphise**, or attribute human qualities to non-human animals, however and practically unavoidable. Even biologists do it in unguarded moments.

Together with anthropomorphism in the zoo context, the zoo visitor is likely to have a **moralistic** attitude about the animals he or she sees -- is it 'right' to keep animals in captivity? In the past zoos were maintained for many of the wrong reasons and the moralistic attitudes were fully justified. Some of our zoos still do not keep animals very well and are not practising conservation so the "moralists" have a point but it is not the whole story.

As educators we want to change attitudes which we feel are outdated, incomplete, inappropriate or destructive and to enhance constructive but uninformed attitudes. We want to make conservationists out of consumers. We aim to change indifference or hostility towards animals to affection for them. For that matter, we want to change the image people hold in their minds about zoos from that of a menagerie to one of a Conservation Centre.

Zoo educators can respond to misguided or incomplete attitudes by exploiting them in our programmes. The anthropomorphic attitude can be addressed by using individual animals as models for the species -- Rama the lion is a character in his own right. You can tell people about the animal as an individual first (including what he ate for lunch) and slowly bring in messages about lion conservation. You will have taken the people from where they started (humanistic



attitude) to where you want them to be (naturalistic and ecologicistic attitudes).

The "moralistic" attitude can be addressed by telling how some species and -- to make it more real -- some small groups (small populations) of animals are being squeezed out of existence by pressure on the habitat. Taking Rama the lion as a model again you can describe the human animal conflict which formerly existed at Gir Forest, the last remaining habitat for lions, in which people were coming in and appropriating the lions' "kills" for their own consumption. Some of the lions were starving before "protection". Now there is a different problem -- overpopulation -- and the need for an alternative habitat. Lions are occasionally being forced out of their protected area in territorial disputes with other lions. Now it is the lions which appropriate the humans source of food, e.g. livestock, or sometimes even humans themselves. Wildlife managers are searching another area of the wild which would be suitable habitat for lions so that pressure on Gir can be reduced.

Zoos - and the sciences and skills being developed therein - are crucial to conservation programmes involving the reaction and maintenance of small populations of wild animals. In the meantime, zoos provide a refuge for animals that have got into trouble, e.g. cattlelifting, maneating and would otherwise have to be destroyed.

It is no longer a question of whether or not it is "right" to keep animals in captivity. It has become NECESSARY if we are to maintain every species for preserving or representing the biodiversity of the planet.

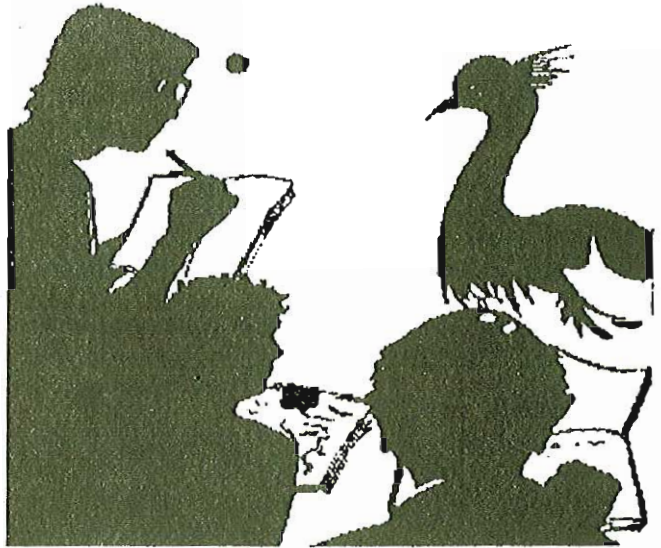
**Exercise:** Think of examples of each of the 10 "attitudes" listed above. Think of ways you can use the animals in your

zoo to change negative or misguided attitudes and to enhance positive attitudes. Think of ways you can actually exploit misguided attitudes of visitors to get their attention and feed them a conservation message.

#### References

Kellert S.R. (1980) Activities of the American Public Relating to Animals : Phase II (Washington DC. Fish and Wildlife Service).

Turner W.R. (1987) Observations conservation and the zoo visitor. IZE Journal 17:29-32 (N.Z.P., Washington)



## Question: When is a Zoo NOT a Zoo?

## Answer: When it is a Modern Zoo !

Zoo education is conservation and environmental education, not a peripheral subdivision of it. Using wildlife as the starting point, nearly all environmental issues can be addressed. Much of what is taught in zoos is transferable to educational efforts in parks, sanctuaries, villages, towns and schools.

Very progressive zoos are evolving into environmental resource centres. The New York zoos all adopted a name change recently -- all are called "conservation centres" now to reflect their evolving presence in active, dynamic biodiversity conservation.



---

## ZOOS' IMAGE --

# Change "boooooooooooooos" to "Oooooooooooooooooohs" by using the zoo to teach biodiversity conservation

Walker and Whitehead

---

Many wildlife professionals, environmental activists, animal welfare /rights enthusiasts and even normal people do not like zoos. Zoos are low on the list of conservation priorities because they are seen as having little relevance to REAL conservation. Some of the myths and complaints which commonly circulate about zoos are:

- \* Zoos are old fashioned and have no place in modern conservation
- \* Zoos are consumers and plunderers of wildlife from the wild,
- \* Zoos are trying to save species in cages, ignoring the importance of the wild,
- \* Zoos are, even if well-meaning, ineffectual distractions that divert funds and attention from the real issue - i.e. the wild.
- \* Zoos keep animals in small cages which cause a breakdown of natural behaviour
- \* Zoos are kept as cheaply as possible solely for human pleasure.
- \* Zoo animals do not get enough to eat because the management skips on their diet and zookeepers steal much of what is provided.
- \* (Indian) zoos do not have "enough" animals -- they don't have giraffes, zebras, etc.....

This list goes on and on ... Add the myths and complaints you have had to answer

### **Actually,**

many of these myths were true at one time. People remember zoos as they used to be and do not realise that they have changed.

### **Moreover,**

some zoos have NOT changed and they give all zoos a bad name.

### **In point of fact,**

a great deal of the value of zoos lies in their potential, rather than their actual track record. Some of the conservation programmes for which zoos are crucial, are just getting off the ground technically.

### **Finally,**

even good zoos are very bad at promoting the good things they do and answering critics. This is particularly true of smaller or poorer zoos where so much of that kind of responsibility is in the hands of one over-worked individual, e.g. the Director. Some of the big, rich zoos have whole Departments simply to look after Public Relations and Marketing, in addition to an Education Department.

In India, the person responsible for Education probably will be the one both to promote and protect the zoo. Thus, our mandate as educator is clear. We need to tell people the truth about the zoo potential. The potential is unlimited insurance for the conservation of biodiversity.

Zoo Directors, zoo educators ... actually anyone who deals with the public and press should be able to answer any reasonable criticism. We have listed some of the objections people have to zoos. Now we are going to answer some of them. As an exercise, try to improve on what we have done and fashion it more appropriately for your zoo. List the instances of criticism that we did not list or answer and write out answers. Knowing what to expect -- and being prepared -- is important. Send your ideas to us to publish in a later issue. It might give other zoos ideas to cope with their problems.


**MYTH: Zoos are trying to save species in cages, ignoring the importance of the wild, and c) Zoos are, even if well-meaning, ineffectual distractions that divert funds and attention from the real issue - i.e. the wild.**

Habitat conservation is the number one priority. No self-respecting zoo person thinks otherwise. Species recovery programmes, breeding in zoos; reintroductions, artificial reproduction and other zoo-related activities and sciences are for one purpose and one purpose only -- to conserve animals in the wild. No modern zoo manager today wants to be merely a museum curator of living specimens. Today's zoo personnel -- and this is true in India more than anywhere -- are forest and wildlife officers in disguise!

Zoos offer expertise and resources for interdisciplinary conservation activities -- much of the high tech that field conservation is becoming increasingly dependent upon has been developed in zoo research departments

The modern zoo -- with a modern education programme not only does not divert attention from the wild -- it focuses attention on the wild, zeroing in on the crucial issues. Or it SHOULD do -- that's where the zoo education comes in. If you are not using your zoo to educate people about problems in the wild, you have no one to blame but yourself if you get this criticism!

Every animal comes from some wild area. A message about that area and its importance can be included in the graphic and other printed information you distribute to the public. When giving a press release about a birth, always have up to date information about the habitat of the animal. Many Indian zoos already do this.



**ZOO NUTRITION TEAM**

**OUR ANIMALS GET GREAT STUFF TO EAT**

Each animal gets his own measure of ...

Tigers -- meat -- 6 kg. per day

Bears -- Chapatis (2 thick) ; ground nuts (1/4 kg.); honey (2 spoons); Curd (1 cup); glr (1 chunk)

Parrots -- Til seeds (100 gms); palak (250 gms); ground nuts (200 gms.), etc.

## Sangai born in Tigerpuram Zoo

By Alley Stalker, Correspondent

Three female Sangai in the Tigerpuram Zoo gave birth to fawns this month. The Sangai is one of the most highly endangered mammals in the world and perhaps the most endangered deer. Sangai is a subspecies of the Brow-antlered deer which occurs -- in as a different subspecies -- in Thailand and Burma.



The Sangai has become a "flagship" species, symbolising much of what is happening in the environment today. Originally the Sangai inhabited several sloping hill areas of Manipur but was forced out by an increasing human population and developmental pressure. Today Sangai exists in one small area of 14 sq.km. only, a floating island of impacted vegetation in the Kelbul Lamjao

National Park. The deer is said to have "adapted" a different shape to their hooves to subsist in the mucky swamp area which is their forced habitat. Today many wild areas -- and their wildlife -- are under pressure. Although mankind is to blame for the activities which cause the pressure to these areas -- and their wildlife, both faunal and floral -- man will well be the greatest sufferer in the future from the reduced quality of life that loss of biodiversity inevitably brings about.

**MYTH : Zoo animals do not get enough to eat. The management skimps on their diet and zookeepers steal food.**

Zoo diets are strictly controlled in good zoos where the zoo vet has to keep a close watch to see that animals even don't become *overweight!* This is potentially more dangerous to their health than going a bit hungry. In the wild, there is hardly an opportunity to become overweight as everything an animal eats is "hard earned". In the zoo, food is delivered "on a plate" so to speak -- because animals do not have to forage for food, they may eat more, with less expense of energy.

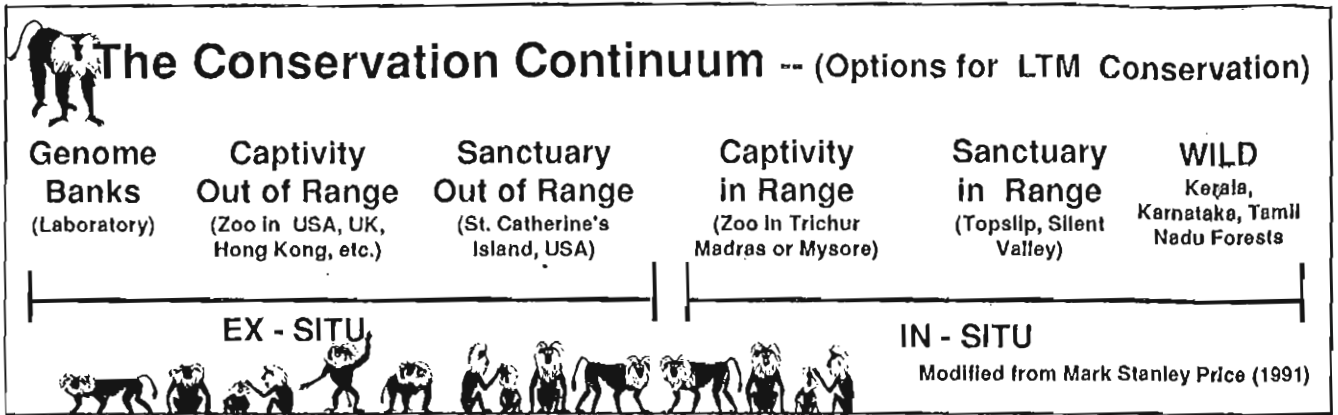
A way to educate about zoo food and pre-empt or answer the critics is to have educational displays and graphics about what the animals eat in the zoo, how it is obtained and prepared. Visitors are normally quite interested in this. You could have a somewhat elaborate signboard in some "dead" area of the zoo where nothing else is going on, or a small one on each enclosure saying something like "These animals eat ..... In the wild. We can't feed them ..... In the zoo, so we feed them .....", or whatever is appropriate.



**MYTH : Zoos are old fashioned and have no place in modern conservation**

**REALITY :** The modern zoo is part of a continuum that moves from genome bank through the wild. Every point on this continuum is necessary for some species, depending on its degree of endangerment, the condition of its habitat and the politics and economics surrounding it. The more the animal and its habitat are under pressure, the more zoos (and zoo-correlaries) are necessary. Without zoos, we will lose many vertebrate species (see SW, this vol) and their habitats.

Zoos cannot be considered in isolation or out of context. According to two early zoo conservation biologists, Tom Foose and John Ballou, "Zoos are a Support not a Substitute for the Wild." Any modern conservation policy would invent the zoo if it didn't already exist. Colin Tudge, a popular science writer for the British press said it better: "If zoos did not exist, then any sensible conservation policy would lead inevitably to their creation."



**MYTH : (Indian) zoos do not have "enough" animals -- they don't have giraffes, zebras, etc.....**

This is a common complaint from the public and press. Fortunately it is one of the easiest to answer. There are many answers for this. Here are some.

\* In the IUCN Policy on captive breeding, it is recommended that zoos concentrate on animals in their own range and climatic zone.

\* The modern zoo does not have individual choice over what it exhibits. Zoos get together and form Associations which "agree" to keep and breed -- or NOT keep and breed -- certain animals on the basis of their need for captive support. In India, the policy of the Ministry of Environment, Government of India for more than a decade has been to focus on indigenous species. In meetings of the Zoo Wing of the Indian Board for Wildlife more than 30 years ago, the importance of highlighting animals which are native to India was discussed.

\* It is expensive and time consuming to obtain exotic species. Zoos have to husband their resources as well as their animals-- the same amount of money spent on airfare for bringing a pair of giraffes to India could be used to set up a breeding programme or improve an enclosure for some highly endangered Indian species.

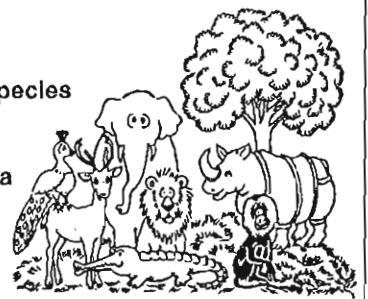
One way of addressing this issue in terms of biodiversity is to define the terms "indigenous" and "endemic" and tell how it is more important for zoos to give priority to those species than to exotics. It is "good conservation". Or, you might address the issue directly like this

**WHERE ARE THE GIRAFFES?**

YES, we have NO giraffe, NO zebra, NO chimpanzee . . . they are exotic species

but we DO have

- Lion-tailed macaques -- unique macaque found only in South India
- Sangal -- world's most endangered deer found only in Manipur
- Asiatic lion -- down to 300 in Gir Forest only
- ... all natives of India -- and (as subspecies) found in India only



**MYTH: a) Zoos are consumers and plunderers of wildlife from the wild,**

**REALITY:** Zoos are, in the main, producing more than they are consuming with regard to wildlife. Zoos don't get their animals from the wild, by and large; they get them from other zoos, or breed them themselves. Most of the animals of wild origin in Indian zoos today are there because they got into trouble with human beings. If zoos did not exist these animals would end up in the shabby animal camps which are attached to sanctuaries and National Parks, or in the ground.

People are impressed by facts. Why don't you do a little study of the animals in your zoo. Make a list of the animals which came from animal dealers, those which came from other zoos, those which were born in captivity, those which were confiscated or captured or rescued -- orphaned, injured or in trouble. Our good zoos in India will want to make an educational board showing this information.

**IF YOUR ZOO CAN'T MAKE A STATEMENT THEY CAN BE PROUD OF, SUCH AS WE HAVE DRAWN BELOW, THEN MAYBE YOU HAD BETTER EXAMINE YOUR ANIMAL ACQUISITION POLICY!**

**WHERE DID ALL THESE ANIMALS COME FROM?**

FROM ANIMAL DEALERS (WILD)	2 %
FROM OTHER ZOOS	40 %
FROM OUR OWN ANIMAL BIRTHS	30%
FROM WILDLIFE RESCUE SQUAD	27%
FROM THE PUBLIC	1%

**TOTAL = 100%**

**IN OUR ZOO, ONLY 30 % OF OUR ANIMALS COME DIRECTLY FROM THE WILD. OF THOSE, 20 % WERE RESCUED FROM LIFE-THREATENING SITUATIONS AND OTHERS WERE CONFISCATED FROM PEOPLE SELLING THEM OR KEEPING THEM AS PET. VERY FEW WERE PURCHASED FROM DEALERS MANY YEARS AGO. WE DON'T ACQUIRE ANIMALS FROM THE WILD FOR EXHIBITION.**



**WE ARE CONSERVING,  
NOT CONSUMING WILDLIFE.**



## **MYTH Zoos keep animals in small cages which cause a breakdown of natural behaviour**

That used to be true of menageries. It is still true of some old zoos which have not been able to remodel or replace their enclosures and even of newer zoos whose management has not kept up with modern zoo management.

Well run zoos of today try to provide their animals with naturalistic enclosures with space and stimuli for exercising normal behaviours, normal social groupings -- flexible, dynamic areas that fulfill as much as possible behavioural and physical requirements. Modern zoo managers today are conscious of the need to keep animals in such a way that will retain as much of their wild character as possible. Preserving biodiversity means that these animals -- or their reproductive material -- may go back to the wild someday and they need to be still real deer or tigers not cows or pussycats.

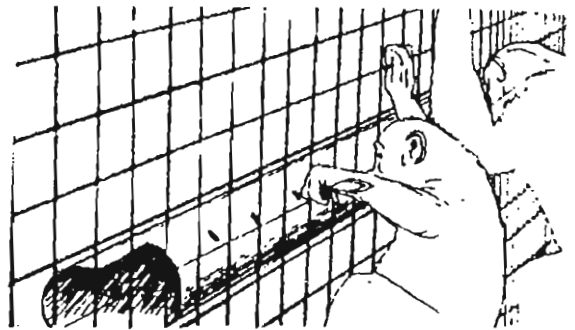
Besides, not all "small cages" cause a breakdown in natural behaviour. It is not so much the size of the enclosure that is important but its shape and what is in it -- and how that relates to the species' behavioural characteristics.

In your educational graphics, you can list some of the things you have done in the enclosure to make it more interesting for the animals. People will find this interesting ... and it may improve their OWN behaviour.

## **ENVIRONMENTAL ENRICHMENT**

**Different animals have different needs.**

Primates need mental stimulation so some zoos arrange their food so that they have to work for it ... or find it, such as these chimps. They are using a "puzzle feeder designed for captive apes to provide some of the stimulation they need. The animals manipulate fruit along the tube by using stick tools. It has been observed that chimps use stick tools in the wild also -- to get ants out of an anthill for instance.



Other animals just need a place to relax. Lions sleep 20 hours a day. In this enclosure bushes and small caves have been 'specially included so that they can get out of the sun and away from disturbance.

These are Asiatic lions which form part of a scientific breeding programme to support the small population of only 300 wild lions in the Gir Forest. One day in the future, these self-same animals or their relatives may go back to the wild, either live or as sperm or eggs. Therefore, they need to be as much like the REAL THING as possible.

**HELP US KEEP THEM THAT WAY**



# Saying it with species and habitats -

Malcolm Whitehead

Day one of the 'Using the Zoo to teach Biodiversity' workshops concentrated on a species based approach to zoo education. Subsequent days dealt with habitat -based approaches and how to interpret the zoo function. It is likely that most zoo education departments will use varying mixtures of the different approaches. The species - based approach was used to introduce a range of zoo education practice for different target audiences. We started with species because :

a) Zoos have large collections of vertebrate species.

b) Species are readily recognisable components of biodiversity.

c) A knowledge of the variety of life is an important prerequisite to learning about species interactions in food chains, food webs and whole ecosystem.

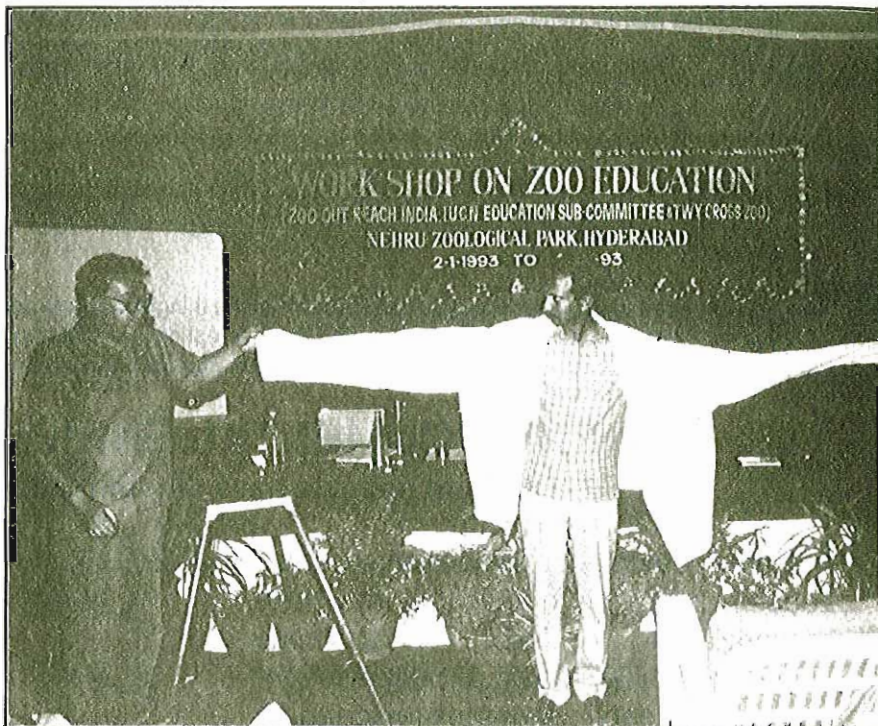
d) Zoos are primarily concerned with species conservation as one facet of integrated zoo/field management strategies.

e) Subjects relating to the diversity of life (e.g. animal classification) and processes of life (e.g. locomotion, feeding, behaviour etc.) feature in Indian school syllabuses at different levels.

f) Species - related studies that include a zoo component can encourage attitudinal, values and skills- based learning in science and cross curricular subjects.

## A RECIPE BOOK

In the next few pages, we offer ideas for teaching about biodiversity at the species and habitat level in the zoo. The simple, low-tech and cheap ideas are not to be used in isolation, but incorporated into appropriate formal and informal teaching sessions for different target audiences. The only limits are your creativity and imagination.



*Shaker Reddy of Nehru Zoo models the Gorilla shirt*

### Recipe 1

#### The Gorilla (or elephant or gibbon) Shirt

The Gorilla Shirt is a shirt made to the measurements of an adult male silverback Gorilla. At Twycroos Zoo we use the shirt at infant and junior school level (ages 5-11) to teach young people that we, too, are animals and part of biodiversity. Obviously we don't use words like 'biodiversity' in front of very young children. We have also used the shirt in informal sessions for the general visitor that are conducted by our Gorilla enclosure, and for light relief during university lectures on primate biology.

Normally, a young volunteer is selected from the audience to wear the shirt. The size of the Gorilla becomes immediately clear, and the long arms (which are an ape characteristic) are apparent. Performed in front of ape enclosures, this can lead to an observation session about anthropoid locomotion. One word of warning: you will probably have to tell very young children that real Gorillas don't wear shirts!

In India, Gorillas are only kept at Mysore Zoo. However, other collections maintain groups of chimpanzees, Orang-utans, or gibbons. The shirt could be adapted accordingly to become a scaled - up human-sized Hoolock Gibbon shirt to compare the proportions of ourselves to India's other ape species.

The shirt caused great merriment (and understanding) when used as a prop during a talk on Indian Primates that was delivered to a secondary school audience in Coimbatore.



## Recipe 2

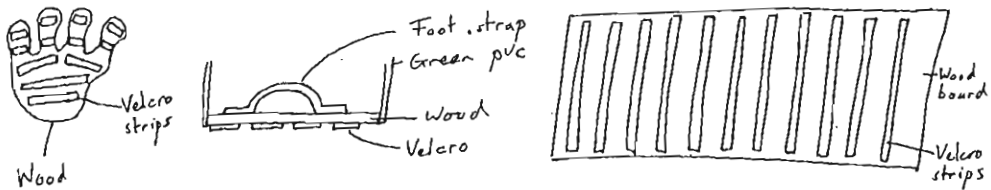
### Looking at locomotion - False feet.

Many processes of life can be taught in the zoo from behaviour to feeding and thermonregulation to reproduction. It is right and proper that education about biodiversity at the species level also deals with systems and how animals function.

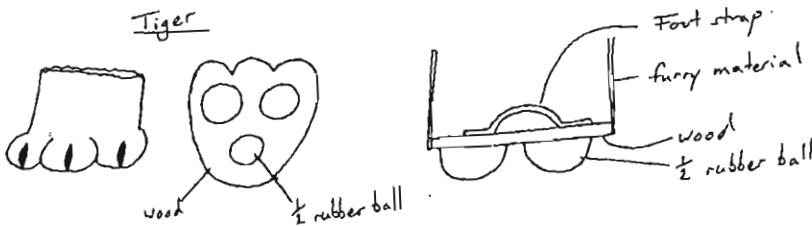
There was not enough time on a three-day course to 'do justice' to more than one process of life. We used locomotion as an example of a life process. Locomotion (as opposed to movement) distinguishes animals from plants, and can be readily observed at the zoo.

For young children, at Twycross zoo we prepared a series of false feet that they could wear in front of the relevant animals enclosures. This provided a catalyst to observing animal locomotion and talking about it. By comparing themselves to other species, children learned that different animals moved in different ways that helped them to survive in different places at various times. At a concepts of adaptation, adaptive radiation and ecological niches were introduced. Such concepts are central to biodiversity. If animals lose their niches through habitat loss or degradation, they may be unable to adapt to new circumstances. We were thus able to link the process of locomotion with conservation of biodiversity. The false feet are detailed in the following diagrams:

**The Gecko Foot Experience** : to create the Gecko foot experience you need strips of velcro attached to the bottoms of the feet and a wooden board with velcro strips passed down. Pupils could discuss how gecko feet help the lizards to walk up walls etc. On the top side of the feet, you need straps for the child to insert their foot so they will stay on.

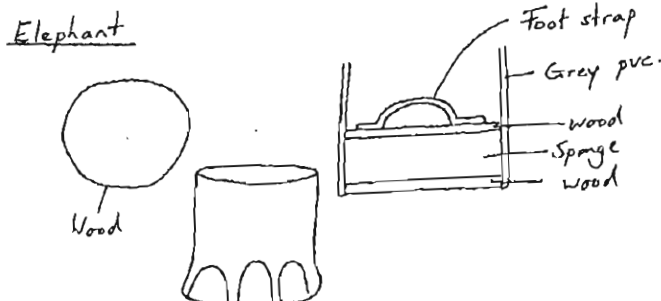


**Padding about on Tiger Paws** -- to make Tiger feet, cut hard rubber balls into half and stick them to the bottom of the wooden base. This simulates the foot pads of a tiger and produces an effect similar to walking on tiptoe (as in the tigers digitigrade locomotion). Add a foot strap for keeping them on the feet and some furry material like a tiger.



### Elephant Walk

Here, two wooden bases sandwich a foam filling and create a spongy effect which alters a child's centre of gravity when he or she puts on the foot. Kids love the feeling of walking like elephants.



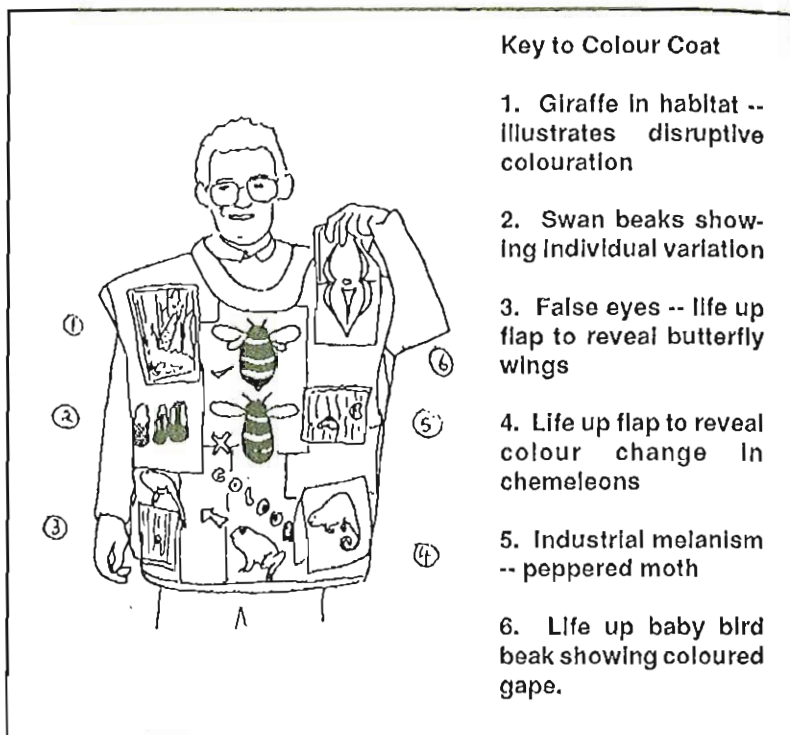
### Recipe 3 The colour coat

The colour coat is quite simply a coat of many colours that children wear. All over the coat are lots of pictures of animals in their own habitats and lift-up flaps. One lift up flap has a picture of a green chameleon on the outside. When you lift the flap, a brown chameleon is revealed. Another flap has two big eyes staring out of it. Lift the flap and the eyes are revealed as patterns on a butterfly's wings - the perfect foil to startle would be predators.

By using the colour coat, children are introduced to the variety of colours and patterns in the animal kingdom. They learn that colour is not only about camouflage but also about warning, disguise, advertisement and mimicry.

We tried out the colour coat in an informal setting at the Mysore Zoo. Very soon, a crowd gathered and started asking questions. The exercise was performed in front of the Giraffe enclosure and we were able to lead visitors from the Giraffe picture on the coat to the living animals which is the ultimate aim of props like colour coats. Such gimmicks are not an end in themselves but a mechanism to vary the visitor's day, slow them down, and make them start asking questions about the real creatures in front of them.

Why not create an Indian Forest coat? Or a grassland one? Or one about another habitat or even another biodiversity theme all together?



Stork

**Stalking Stork feet** -- The stilt like legs of storks can be approximated with a pair of wooden poles and tin cans. Kids love this one because they can look around from "up high."





---

## Recipe 4 Animal Olympics

**Tongue Twisters** -- A giraffe can reach every part of its body with its tongue. Can you touch your nose with your tongue? How many times can you flick your tongue in and out of your mouth? An anteater can do it 100 times. Why?

**Who Is Stronger?** -- Who is stronger? You or an elephant? (Divide children into pairs of equal weight. Get them to lift each other.) We can lift our own weight. An elephant can only lift 20% of its weight. Lest you feel too proud, remember that an ant can lift seven times its own weight.

### **Flamingo Feed**

Try standing on one leg. Can you rest the palm of your hand flat on the ground five times in a row.

### **Bird flap**

How many time can you 'flap' your arms in a minute? A medium-sized duck can do it 700 times. A hummingbird can do it 5,000 times. A condor does it once while soaring.

## Recipe 5 The Birdy bag

The beaks and feet of different bird species are adapted to different foods, feeding mechanisms and ways of life. Using the fundamental interpretive tool (pun intended) of analogy. I went on a shopping trip to Coimbatore with the Z.O.O. Crew, and purchased a number of household implements that performed similar tasks to particular birds' beaks.

The familiar objects were placed in a 'birdy bag' and taken along to the Zoo education workshops. Delegates were invited to match the tools to the beaks of various birds in 'their' zoos. All agreed that it would be a useful way of introducing the concepts of adaptation and adaptive radiation through analogy.

The contents of a birdy bag will vary according to your bird collection. However, they could include: nutcrackers (parrot), meat hook (bird of prey), drinking straw (sun bird), tea strainer (Flamingo), tweezers (any small insectivorous bird and chopsticks (ibis), etc. Can you think of more?



The Webbing Game (Krishnamal College stage -- Coimbatore)



# ... NO BODY CAN (OR SHOULD) OBJECT TO ZOOS

Sally Walker \*



Wildlife protection and wildlife conservation is different today from before. Previously there were large numbers of nearly all species of wild animals in a variety of habitats, habitats which often covered thousands of sq. kilometres with little in between. Under those conditions, what was required was — for the most part — protection only.

Today, the situation of wildlife populations and habitats is quite different. Populations of a growing number of species are NOT large -- quite the contrary — some populations of wild animals in the wild are hardly enough to make up a good captive breeding group, much less survive in the harsh conditions of the wild. Habitat also is quite different. Instead of thousands of sq. kilometres of contiguous — or at least relatively unbroken — forest, the protected areas have shrunk to a few hundred, or sometimes a few dozen (or even less) kilometres -- and that too in fragmented, isolated patches.

Fragmentation of habitat is as serious for species and populations as outright destruction because of animals' territorial and biological needs as well as genetic and demographic requirements. Probability theory, stochasticity, chaos theory are all statements of one inescapable fact of our existence, that is

## Life is unmanageable.

We can't predict what is going to happen or prevent it from happening in some areas of Life, Nature being one. When you apply the unmanageability principle to the fact of a small population of wild animals, what you get is a big gamble. Leaving a small population of wild animals in the wild to survive under the protection that traditional wildlife management normally provides, is irresponsible. The odds are likely to be against that population.

Measuring the odds, or assessing the degree of Risk to a population of wild animals is a technique which can lead zoo and wildlife managers to take steps which can lower the odds, so that the population — and the species — can be salvaged.

Sometimes the population is so far gone that it is not possible to salvage it in the wild. Or maybe it is already gone in the wild and the only surviving individuals are in a zoo. The few remaining individuals have to be captured, bred in captivity until there is a healthy number, and released into an improved habitat. In this case we say the species has been "recovered" -- or, the odds have been raised.

This is the stuff of modern wildlife conservation — or perhaps we should say "wildlife salvation"— using captive and wild populations together to make up a "meta-population". The conservation managers then work with this "joint population" interactively to maximise its potential for survival and minimise its potential for going extinct.

A variety of disciplines are required even to assess the problem, and others to work out how to solve it. The science of Conservation Biology bridges the gap between wildlife management and population biology.

As educators, explaining the basics of small population dynamics, — particularly in the context of the contemporary social, political and economic state of the planet's tropical areas — provides a valuable opportunity to stimulate interest and raise awareness. Moreover, failure to do so deprives us of ammunition to answer the various critics of zoos.

The basic principles of conservation biology are the most interesting and relevant aspect of zoo activity today. Moreover, understanding "small population" as a concept and all that it implies, leads ineluctably to the conclusion that zoos and other ex situ facilities do not have merely "a role" to play in conservation but are, in fact, the crucial element or link in the process of conserving the earth's biodiversity.

## We can't do it without zoos; it is that simple.

This is not an exaggerated statement. While captive breeding is not a substitute for the wild, there are sciences of conservation today which make it possible for zoos to contribute to "sick" wild populations that would otherwise probably go extinct. Even if habitat is protected, there are groups of animals out there which can't make it without help. They are locked into a negative feedback loop which will spiral down and crash -- EXTINCTION.

Reducing the RISK of population extinction is the primary objective of single-species conservation programmes. Although in our zoo education programmes we are very particular to stress the "big picture": ecosystems, saving habitats, etc. . . . the bottom line of zoo conservation (as applied to your zoo) is deciding what individual species have been selected for intensive conservation work as opposed to maintenance for display.

One of the means of reducing the degree of risk of extinction and loss of genetic diversity to an endangered species is having a back up population ex situ. Zoos as the institutions which have the space, personnel, finance and expertise to carry out intensive and controlled or "managed" breeding and biological study of single species are then nodal agents in reduction of risk. Captive breeding or zoos is not a substitute for wild populations but does provide a means of strengthening them.

While it goes without saying that conservation and reclamation of natural habitat would seem to come first, in many cases, in many countries, the damage is so extensive and the momentum is so great, that it will not be possible to save sufficient habitat in time to save some species from total extinction. Without all the species available to maintain the ecosystem, the natural habitat may not persist once reclaimed.



In addition some species numbers or populations have already sunk so low that saving habitat alone will no longer be sufficient to save the population. The numbers of animals have to be increased to make the species secure against genetic, demographic and environmental factors which affect them.

One day -- perhaps -- we will work it all out and learn to live in a balanced manner, such that long range thinking will replace selfishness in rich countries and economic prosperity will replace impoverishment in poor countries. Therefore, we are conserving animals or genetic material, not just for future medicines or museum displays, but for dynamic use in reviving whole ecosystems. In this era of history, man is at war with himself. One day, when the war is over, we will want to restore *all* of Nature.

In the meantime, these beleaguered animals can be kept in our savings banks of zoos, and used as ambassadors and teachers as well as repositories of genetic material. If people come to understand this,

### **NOBODY can object to zoos.**

All we have to do is to figure out how to explain these concepts to our public ... which includes media persons, policy makers, anti-zoo lobby, as well as the all important visitors, governmental officials, policy makers and potential large donors. The Zoo Educator, then does not merely have a "role" to play in conservation but is a key link in attracting support and defusing criticism.

In order to explain and educate it is important for us as educators to keep up with the latest successes and failures as well in reproductive technology. The field is progressing very fast.

It is possible that many zoo educators avoid these subjects because they feel they do not have a firm grip on the subject matter themselves. At great personal risk the writer would like to propose that you don't need to understand all the

subtleties. You can convey the message with a minimum of technical terms and use cartoons, diagrams, and even humour, to teach small population theory.

It is not very difficult to explain, even to a small child, that if you have very few of something and there is an accident, you are more likely to be left with none, than if you had a great many. You can illustrate this with a bag of hard candies in fact. Drop a bag of hard candies with 500 in the bag and see how many you can salvage. Then drop a bag of 50 hard candies and see how many you can salvage. . That's the essence of small population dynamics in a nutshell. Of course its oversimplified -- that's the point.

Genetics doesn't have to be explained in detail. Even uneducated people know some family or other that intermarried until they became a little, ah..., *strange*. You can then say that the same phenomenon manifests as physical weakness in animals and in today's changing environment, animals have to be strong to adjust to new challenges and conditions. If they are not, they will not survive. That's evolutionary adaptation. The principle of a negative feedback loop, which is now familiar to readers of ZOOS' PRINT as the example of the Extinction Vortex, is easy to explain by recalling what happens when people don't have much money and start borrowing from a shop. "The rich get richer and the poor get poorer".

During one of the Workshops featured in this Issue, the Extinction Vortex was explained to a group of zookeepers in Madras using just this example ... of the downward spiral of debt in which one gets trapped when he takes goods or borrows money at high interest. A random event such as an illness or death in the family can produce total bankruptcy and ruin.

Conveying such principles to public and zoo personnel at all levels may take a bit of work -- and real science may suffer in the process, but the result would be well worth it. An enhanced and expanded view of the purpose of the zoo would lead to better work and behaviour as well as a deeper commitment to conservation.

*The pages that follow are a "first cut" at trying to explain some of these principles in an engaging and simple way. This method was first developed for a lecture in the zoo management course for curatorial and technical level personnel over a year ago and have evolved with various input and presentations. It was this lecture, incidentally, which began the process which ultimately led to the formation of CBSG, India.*

*The "boxes" represent overheads which can be used in giving a talk.*

*This is not complete -- and maybe not even entirely correct. The danger of oversimplification to the point of error is probably what has kept people who really know about these things from developing such materials.*

*Comments, corrections, criticism is invited and welcome.*

*Find your own way to explain some of the new zoo and wildlife theories and sciences. Share them with others -- particularly us so we can share them with the world.*

\* Adapted from a presentation given at I.Z.E. Conference, Sidney, 1992

A VERY, VERY  
BASIC  
INTRODUCTION  
TO  
SMALL  
POPULATIONS &



META-POPULATION MANAGEMENT  
for non-scientists



Written by S. Walker utilising a variety of written publications, lectures, and personal communications with Tom Foose, Uffe Seal, Colln Tudge and Malcolm Whitehead.  
(They should not be blamed, however.)

WHAT IS A "SMALL POPULATION"  
?????

IS IT THIS ?

A small number of BIG things?



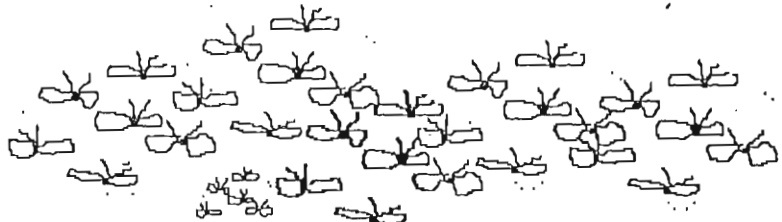
OR THIS?

A small number of SMALL things?



OR THIS?

A large number of SMALL things?



OR

None of the above

Um, No. Well, yes. Maybe. Some of those . . .



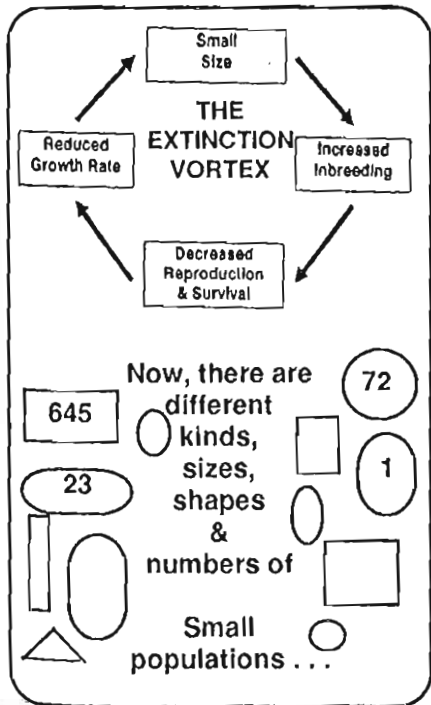
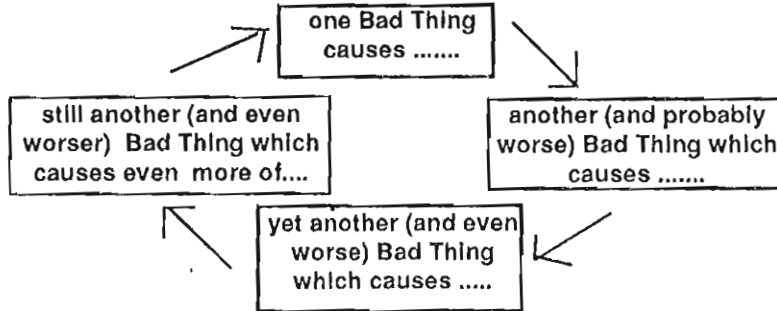
A  
"small POPULATION"  
IS A GROUP OF CREATURES  
(OF THE SAME SPECIES )  
THAT CANNOT  
RETAIN  
ENOUGH GENETIC DIVERSITY  
OR  
SUSTAIN  
ENOUGH DUMB LUCK  
TO SURVIVE  
(and we GOT TO survive!)\*

TO SURVIVE  
INBREEDING  
AND  
RANDOM CATASTROPHES  
(BAD THINGS)  
OVER A  
**SHORT**  
SPAN  
OF TIME  
OR, TO  
EVOLVE ADAPTATIONS  
TO INSURE EVOLUTION  
AND SURVIVAL  
(e.g., ADJUST)  
OVER A LOOOOOONG SPAN  
OF TIME

A SMALL POPULATION  
IS ONE THAT IS  
VULNERABLE.  
VULNERABLE TO **RISK**  
THAT IS, RISK OF *EXTINCTION*  
(e.g., NO MORE  
animals...forever)  
BY A SORT OF ATTRITION.  
ATTRITION =  
NEGATIVE FEEDBACK =  
"ONE BAD THING  
LEADS TO ANOTHER  
AND MAKES IT EVEN WORSE!"  
THE  
**EXTINCTION VORTEX**

\* Bob Marley, Kingston, 1987

**NEGATIVE FEED BACK MODEL**



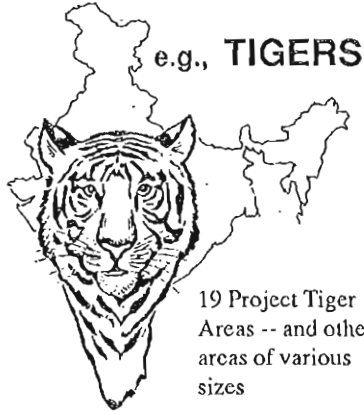
A SMALL POPULATION MAY BE A SINGLE (SMALL) POPULATION...e.g. Sangai (76) IN ONE AREA ONLY e.g. Kelbul Lamjao N.P., Manipur

OR ASIATIC LIONS -- (300 ONLY) IN THE GIR FOREST ONLY

OR A FEW (SMALL) POPULATIONS IN A FEW FRAGMENTED AREAS e.g., LION-TAILED MACAQUES

IN THREE SOUTH INDIAN STATES

OR MANY  
(SMALL)  
POPULATIONS IN  
MANY AREAS  
WITH NO  
NATURAL  
CORRIDORS



NOW, USUALLY

a "SMALL POPULATION"  
consists of

a few 10's

a few 100's

or even a few 1000's

of individuals

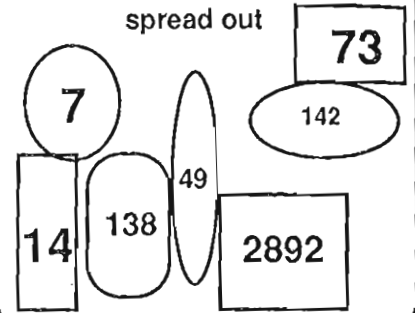
50 RHINOS  
may be as  
EFFECTIVE A  
POPULATION AS  
100 L.T.M.'S  
OR 1000 FLAMINGOS  
OR 1000000000 FROGS

because ... The meaning of

"SMALL"  
( or large, for that matter )

depends in part on

HOW  
numbers in the population  
are  
spread out



...how they are spread out... in small numbers,  
in isolated, fragmented and otherwise  
stressed-out habitats

## WHY ?

Because of

### Walker's Law

... huh?

A very small population could  
survive in the wild

IF

NOTHING WENT WRONK,

BUT according to

Walker's Law

IN LIFE  
(AND IN NATURE)

## THINGS GO WRONK



And what things can go wrong  
in Nature, pray tell?

WELL,

1. DEMOGRAPHIC THINGS

DISTORTED SEX RATIO  
(i.e., a run of all male births ...)

UNSTABLE AGE  
STRUCTURE  
(i.e., too many kids and too  
many grandmas)

REPRODUCTIVE FAILURES  
(i.e., low romance factor?)





**SURVIVAL IN CAPTIVITY**  
Maintenance of sufficient genetic variation necessary to **MINIMISE INBREEDING.**

Some population biologists suggest **50 breeding adults** or a census population of **250**

**SURVIVAL IN THE WILD**  
Maintenance of sufficient genetic variation necessary for **ADAPTIVE EVOLUTION**

Some population biologists suggest **500 breeding adults** or a census population of **2500**

THESE NUMBERS ARE "RULES OF THUMB" NOT "HARD AND FAST" RULES  
SMALLER POPULATIONS HAVE SURVIVED, E.G.

Sangai -- from 14 to 87 Manipur  
Asiatic lion -- 20 to 300 Gir Forest  
Indian Rhino -- 16 to 1100 Kaziranga

EVEN LARGER POPULATIONS HAVE GONE EXTINCT

Passenger pigeon 200,000,000 and odd to 0 U.S.A.

WHY DO POPULATION BIOLOGISTS SAY YOU NEED LESS TO INSURE SURVIVAL 50/250 IN CAPTIVITY THAN 500/2500 IN THE WILD ?

BECAUSE -- IN CAPTIVITY -- YOU HAVE

## CONTROL

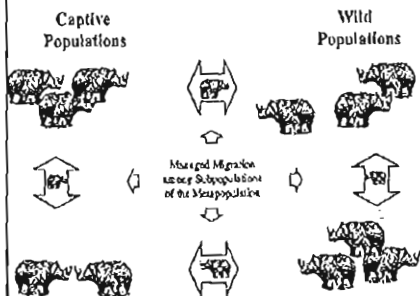
There are many advantages to captivity for small, "sick" populations

# HOW TO HAVE ENOUGH?

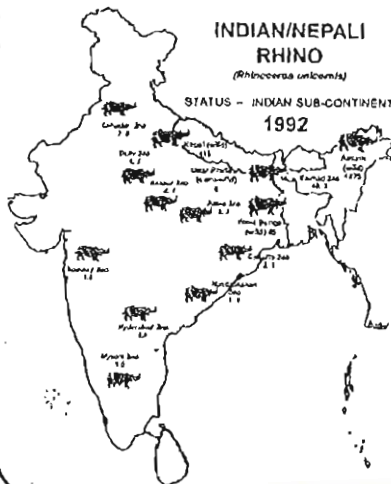
when so many things are going wrong  
In the wild and the world ?

## METAPOPULATION MANAGEMENT IS ONE WAY

Metapopulation



## WE MAKE USE OF THE TOTAL POPULATION CAPTIVE & WILD



USING A VARIETY OF THE "NEW ZOO SCIENCES" & MODERN MANAGEMENT TECHNIQUES IN WILD AND CAPTIVE POPULATIONS IN COOPERATIVE MANAGEMENT PROGRAMMES THROUGHOUT THE WORLD'S ZOOS



## 2. GENETIC FACTORS

DRIFT AND SELECTION

FOUNDER EFFECT  
AND BOTTLENECKS

INBREEDING DEPRESSION

OUTBREEDING  
DEPRESSION



## 3. ENVIRONMENTAL EVENTS

Natural disasters

STORMS  
FLOODS  
FIRE  
DROUGHT  
PLAGUE  
EARTHQUAKE  
VOLCANIC ERUPTION

Human-caused disasters

DISEASE (domestic livestock)  
SOCIAL (unrest)  
POLITICAL (discontent)  
ECONOMIC (Instability)

... just to name a few

Any one of these could wipe out a small population in short order

TO MEET SUCH CHALLENGES

GENETIC VARIATION,

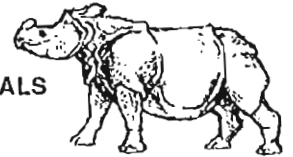
AS WELL AS SIZE

IS IMPORTANT FOR BOTH

INDIVIDUALS

AND

POPULATIONS



## INDIVIDUALS

need Genetic Variation to be fit, .. healthy .. vigorous so that they can reproduce...

-- for survival

## POPULATIONS

need Genetic Variation to be fit .. healthy .. vigorous so that they can adapt to the challenges of our changing world, or ...

-- to evolve.

### Then, what to do?

How to save  
species  
and populations

in the circumstances  
of our modern world...

Population Explosion  
Human pressure on land  
Shrinking habitat  
Fragmented habitat  
Isolated populations

### BE SURE YOU HAVE ENOUGH

So that these problems  
DON'T MATTER

### HOW MANY ARE ENOUGH?

TO BE FIT...?  
TO INCREASE THE POPULATION?  
TO SURVIVE...?  
TO TRANSCEND RISK...?  
TO PRESERVE GENETIC  
VARIATION...?

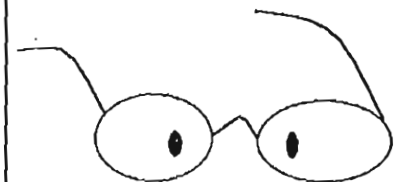
NOBODY KNOWS  
(for sure)  
but here are some

RULES OF THUMB



OR

VERY EDUCATED GUESSES





THAT'S WHY WE SAY

**ZOOS GIVE  
WILD ANIMALS  
WITH  
NO CHANCE**

A  
**LAST  
CHANCE**

ZOOS ARE LIKE A



WHERE WE CAN KEEP A SMALL  
POPULATION SAFE  
AND INCREASE IT

IN CAPTIVITY You can:

- ..move animals more easily  
to readjust sex ratio and age  
distribution
- ..keep track of their identity--  
age, sex, lineage, etc.
- ..pair them according to genetic  
and demographic profile and the  
needs of the meta-population
- ..protect them from harm
- ..Increase numbers faster
- ..promote them as Ambassa-  
dors for their Species
- ..find out more about them

#### ADVANTAGES TO CAPTIVITY

There is  
PROTECTION FROM POACHERS and LESS ENVIRONMENTAL PERTURBATIONS, as well as  
MORE GENETIC MANAGEMENT, as well as MORE DEMOGRAPHIC MANAGEMENT, and  
further HEALTH/DISEASE MANAGEMENT, and otherwise SECURE EXPANSION OF  
POPULATION, and, moreover, PUBLIC EDUCATION AND SUPPORT, and, last but not least  
RESEARCH USEFUL FOR CONSERVATION

ALL THIS, WITHOUT  
DISTURBING THE WILD ONES!

ZOOS ARE NOT A  
**SUBSTITUTE**

FOR THE WILD

BUT THEY ARE

(-- OR CAN BE --)

A  
**SUPPORT**  
FOR THE WILD

SO FOR

**INTERACTIVE  
MANAGEMENT**

EX SITU  $\Leftrightarrow$  IN SITU  
ZOO  $\Leftrightarrow$  WILD

ZOOS  
CAPTIVE BREEDING CENTRES  
GENOME BANKS

CAN PROVIDE "BACK-UP" OF

WHOLE LIVE ANIMALS  
OR THEIR  
REPRODUCTIVE MATERIAL

TO STRENGTHEN  
SMALL, WILD POPULATIONS

...  
GENETICALLY  
NUMERICALLY  
DEMOGRAPHICALLY

IN SANCTUARIES,  
NATIONAL PARKS,  
RESERVE FORESTS, ...  
PROTECTED AREAS

**IF REQUIRED**

**ANOTHER METHOD IS INTENSIVE MANAGEMENT OF THE WILD POPULATION**

- \* Marking/monitoring of individual animals
- \* Enhanced protection measures
  - \* Habitat Improvement
  - \* Disease prevention
  - \* Livestock control
- \* Relocation of human settlements
- \* Creating alternative populations in safer areas
  - \* Translocation / reintroduction / introduction, etc.

**OF LIVE ANIMALS OR REPRODUCTIVE MATERIAL**

**ACTIVE INTERVENTION can save species & populations**

1. Adding animals or their reproductive material to restore
  - a. numbers
  - b. demographic stability
  - c. genetic diversity
2. Translocating populations (or parts of populations)
3. Culling sometimes actually helps populations increase
4. Initiating Alternative populations using stock from zoos or from other "too small to save" populations in wild
5. Initiation of captive breeding programmes "too small to save" populations in wild

**WHAT DOES IT TAKE TO SAVE A small POPULATION)**

**COOPERATION, COORDINATION COMMUNICATION**  
e.g., lots of people working together -- Action

**RESOURCES RESEARCH RECORDS**  
e.g., lots of money, expertise and INFORMATION

Some High-tech reproductive techniques that will put captive animals or their reproductive material **BACK TO THE WILD**

Artificial insemination  
Superovulation  
*In vitro* fertilisation  
Cloning  
Genetic selection

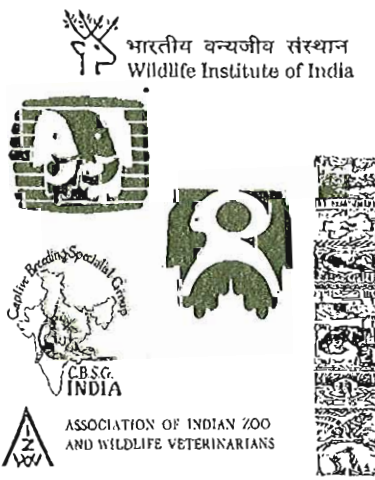
Synchronisation of estrus  
Embryo transfer  
Parthenogenesis  
Chimera formation  
Gene transfer

Induction of estrus  
Oocyte maturation *in vitro*  
Cryopreservation  
Sex selection

**COOPERATION, COORDINATION COMMUNICATION**  
from global to grass roots



**RESOURCES RESEARCH RECORDS**



**BY COMBINING INFORMATION AND ACTION**

**IT IS POSSIBLE TO RESCUE A SMALL POPULATION WITH A RECOVERY PROGRAMME**



ONCE A  
POPULATION  
BECOMES A  
SMALL POPULATION,  
IT IS PROBABLY

## HISTORY

...  
UNLESS  
WE INTERVENE  
WITH A  
RECOVERY  
PROGRAMME

WHAT'S  
SMALL POPULATIONS  
GOT TO DO WITH  
BIODIVERSITY

EVERYTHING!!!

MASS EXTINCTIONS OF  
MANY, MINUTE  
POPULATIONS IN  
MULTIPLE AREAS OF  
HIGH BIODIVERSITY  
(SOME OF THEM WE DON'T  
EVEN KNOW EXIST)  
=  
LOSS OF BIODIVERSITY

ZOOS AND  
ZOO SCIENCES  
WORKING WITH FIELD  
MANAGERS IN AREAS  
OF HIGH BIODIVERSITY  
CAN REVERSE THE

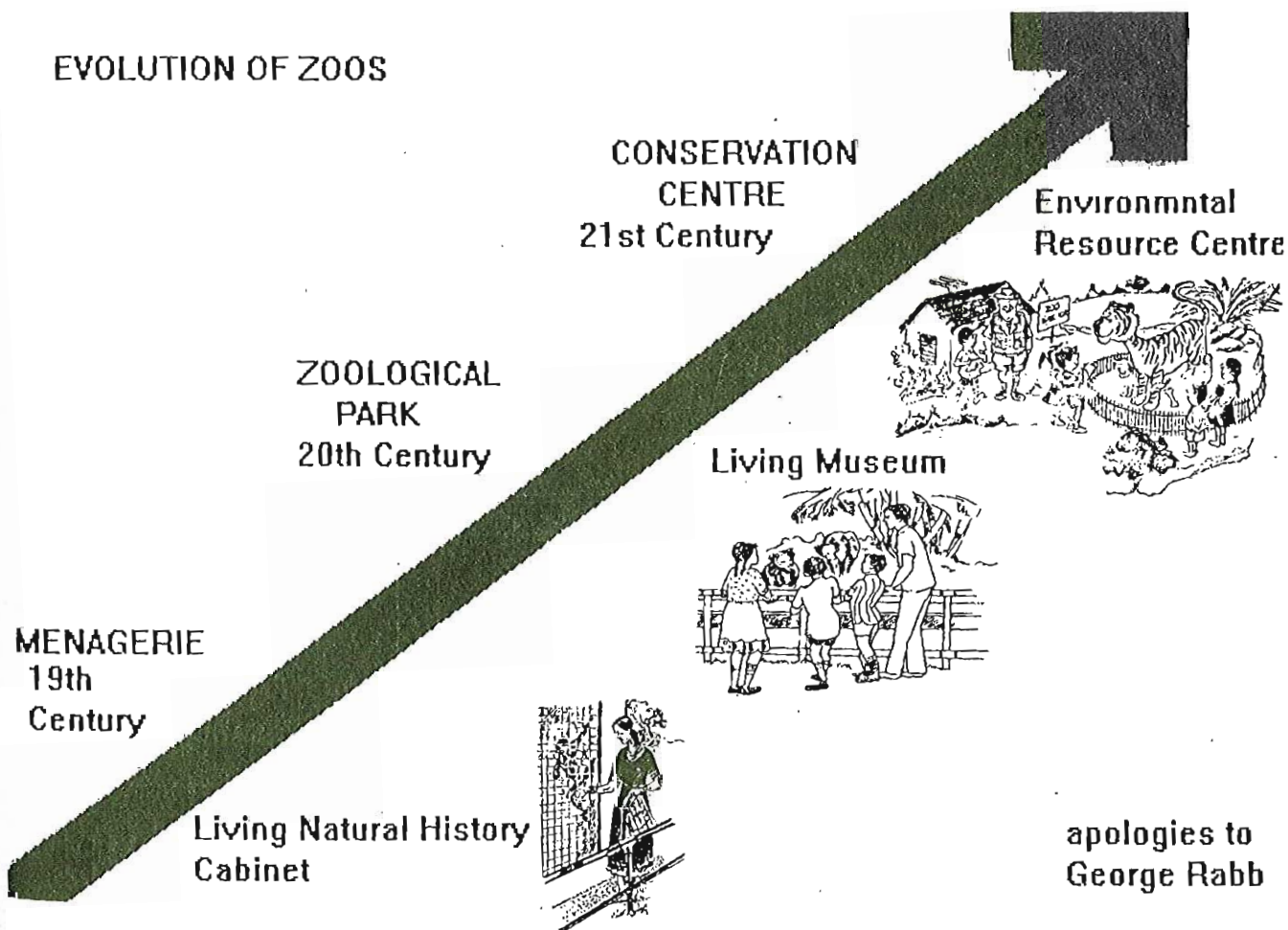
EXTINCTION

VORTEX

FOR MANY  
SPECIES

## GOOD ZOOS CAN HELP CONSERVE BIODIVERSITY

EVOLUTION OF ZOOS



# PHOTOGRAPHY IN THE ZOO

David Lawson, John the Lens

Many of the animals you see in the zoo would be impossible to see in the wild, much less to photograph. The zoo -- with its rich diversity in a limited area -- offers a unique opportunity for photography.

**Equipment** -- Starter kit: A Single Lens Reflect (SLR) camera with a zoom lens with a range of 80 mm to 200 mm. This will cover most of the zoo subjects easily. All of the photographs in this article and at the Biodiversity workshops were taken with such a lens. The brand of camera is not so important as long as it is reliable and has good quality accessories available for the time when you want to expand your outfit. Canon, Minolta, Nikon, Pentax and Yashica are all reliable and provide a good supply of accessories.

**Film** -- Only experimentation will tell you what film suits you best. The use to which you will put the photos also determines the type of film you choose. If you require colour prints then a negative type film is best, although prints can be made from transparencies (slides). These are not as good when made from transparency film. Transparency film is usually preferred by professionals as it is the preferred medium from which photographs are commercially reproduced. It has less tolerance to incorrect exposure, usually only 1/2 stop.

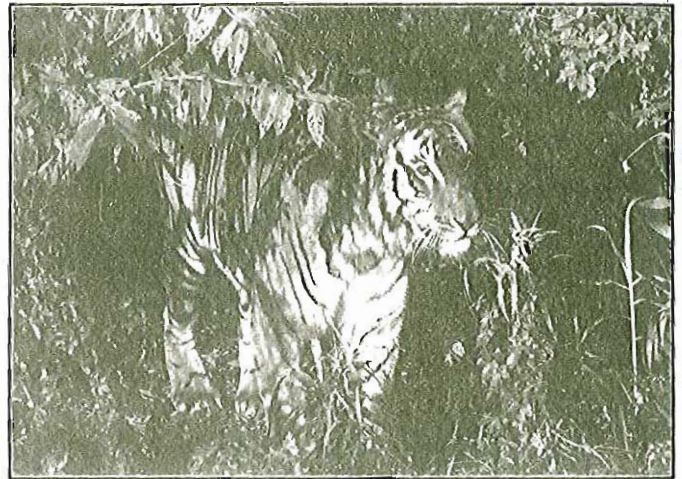
The lower the film speed the finer grain structure and therefore a clearer sharper image will be produced. The problem with low speed films is that longer exposures may be required which can cause camera shake (when the camera moves during an exposure and the image is blurred). A word about shutter speeds to be used in order to avoid this problem is to use a shutter speed equal to that of the lens in use. For example, with a 200mm lens a shutter speed of at least 1/200th of a second will be required. If this is not possible, a support must be used. This is usually a tripod but around the zoo there is quite often a tree or a wall against which the camera can be steadied. I would suggest starting with a good quality iso 100 film. If you are using Transparency film by uprating it 1/3 it will give more saturated colours. Transparencies always look better underexposed as they appear washed out (faded) when overexposed. There with Transparencies you should expose for highlights, i.e. the brighter part of the subject. Note that the opposite is true with negative/print film. This is only a general rule and rules sometimes have to be broken in order to get the desired effect. For instance, if your subject is in deep shade you will have to expose for that area.

**Photography in the Zoo** -- To start photography in the zoo choose animals in which you have a special interest and affection. It is not recommended to just go around the zoo photographing as many animals a day as you can fit in. Your result is likely to be a lot of photos with something wrong with many of them. Having a definite programme of a few animals you want to "capture" is a good discipline.

## Techniques

**1. Sensitivity and patience.** You need sensitivity and patience when photographing animals. For instance, Tigers lay down and rest for long periods, so to get an interesting photograph you will have to find out when and where they are active. Zoo keepers are the best source of this information. The animals also know at what time they will be fed and associate certain sounds and events with their daily life pattern. The early morning and evening when crowds are not around is always a good time to take photographs as the animals are not so distracted and do not hide so much.

**2. Lighting.** Observe the lighting of enclosures at different times of the day to see when it looks best. An example of this is the Tiger photograph which was taken early in the morning with the sun at a low angle. Later on during the day, the area would have been shaded and the photograph would have been dull and had less impact.



Tiger in Nehru Zoo, Hyderabad. D. Lawson

**3. Observation.** -- With this approach you become an observer of animal behaviour. You recognise how animals react to the situations they are in. You should take care that you do not distress or disturb the animals you are photographing. Sometimes keepers will try to "help" you by making the animal move, using methods that are less than friendly. This should be discouraged. You should set an example to the public as well. The animal -- and its feelings -- are more important than the picture of it.

After you have been photographing for a while, you will know what extra equipment you require in order to improve your pictures. Perhaps you need a long telephoto lens to photograph the primates up in the trees, or to get closer shots of big cats in open, moated enclosures. Maybe you have become interested in the smaller animals and want to take close ups -- you will require a Macro lens, which will focus on items which are very close.



**4. Flash.** -- In close up photography you will find a flash very useful. This will give you extra light so you can use a smaller aperture and get greater depth of field (the amount of a photograph from foreground to background in sharp focus). You will become aware as you focus closer that this area of sharp focus gets less for a given aperture. By looking at the depth of field scale on a lens this can be observed.

Another use of flash is illustrated in the photograph of the young Hyaena in its den. This required the extra light produced by the flash in order to get a high enough shutter speed and a reasonable aperture late in the day as the natural light faded.



*Hyena in Nehru Zoo, Hyderabad. D. Lawson*

A flashgun with a guide number of around 30 is a good starting point. This size of flashgun will cover most situations without being too costly.

When shooting with the camera and flash on automatic and through wire or glass, reflected light from their surface may fool the flashgun's sensor and give an incorrect exposure. This fact is also true if daylight is reflecting off the wire or glass. To avoid this, you must get your lens right against the glass or between the wire, or use a shield to cut off the light. If this is not possible then shoot through wire in shaded areas and avoid reflecting surfaces in the frame.

Be sensitive when using a flash. Don't use it in situations which could cause undue stress and tragic consequences. An example of this might be of a very new mother and her cubs - disturbance sometimes causes animals to leave their young and never return to care for them.

**5. Fooling the focus** -- A further technique to use when photographing through wire that you cannot get close to is to use a large aperture on a telephoto lens to minimise the depth of field. This will throw the wire so much out of focus as to make it completely invisible.

**6. Eyes for impact** -- Just as zoo graphics should "grab the attention" of the visitor, so should photos grab the attention of your viewer. The easiest way to achieve this is to have eye contact with the animal, so even if the animal is just laying down, its eyes will give a point of interest on which to focus. Try

different angles. Low angle shots can be more dramatic so crouch down and see what effect that has. As most people take photographs standing up, yours will immediately look different from most snapshots. Become aware of how different focal length lenses affect an image. This will provide another way of changing how the final picture looks.

**7. Action is the Magic Word -- and Practice** -- Action photographs are usually more interesting. This is where your knowledge of the animal and its behaviour will be of great help. To photograph an animal that is moving, a good technique to use is to pre-focus. This method is to focus on a point where you know the animal will pass and press the shutter when it comes into the frame. This technique requires practice and can be tried without film in the camera, perhaps at home for a few minutes a day. Continually re-focusing as the animal moves towards you is a much more difficult technique to master but one that is perfected by film makers. A film maker described developing this technique by focusing on cars driving toward him! When framing a shot look at the whole area of the viewfinder, if you have time, to see that no unsightly barriers or objects are in view which could spoil a good shot.

**8. Share your Work.** -- What will you do with all of your photographs? Many pictures will not turn out to be exactly what you want. Instead of throwing them away or just leaving them in a drawer, I offer them to the zoo or a nature club. People doing conservation education always need photographs, (especially ones they do not have to pay for) in brochures, guides and talks. I do not take any payment for these photos, but invariably the zoos respond to this service by giving me information and assistance when I am photographing there.

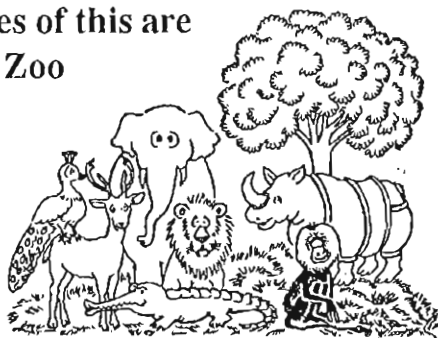
**9. Get out and Do It.** -- This information may be useful, but it is just theory until you actually go out and put it to work. The only way to gain the skills you require is to take pictures, make mistakes and work out solutions to your problems as you go along. Books and other photographers can help you with technical problems. Looking at the work of respected photographers will give you a standard to work towards.

10. Enjoy -- Above all, enjoy your photography.



*John the Lens demonstrating a "close-up" technique to a Workshop participant at Hyderabad*

Course handouts were collected in a bound Briefing Book. Copies of this are available for Rs. 100/- from Zoo Outreach Organisation.



## USING THE ZOO TO TEACH BIODIVERSITY BRIEFING BOOK

### CONTENTS

#### *Section 1*

##### *An Introduction to Biodiversity.*

Rhoades D. (1989) Piglet's Higher Purpose: Protecting the Global Commons. From Journal of the International Association of Zoo Educators (IZE), 21:7-12.

World Conservation Union/World Conservation Monitoring Centre (IUCN/WCMC) (1992) Global Biodiversity.

#### *Section 2*

##### *Why People visit zoos Behaviour in the zoo*

Turner W.R. (1987) - Observation, Conservation and the Zoo Visitor. Journal IZE 17:29-32

Shepherdson D., Brownback T. and James A. (no date). Universities federation for Animal Welfare /Zoological Society of London (UFAW/ZSL) - Mealworm Dispenser for Meerkats.  
Environmental Enrichment Report No.2.

#### *Section 3*

##### *Teaching Habitats in the Zoo*

Andersen L.L., (1992)- Exhibit Design-How to Interpret. Journal IZE, 25:5-8.

Education Department Chester Zoo-Animal Homes at Chester Zoo. Rodrigues Fruit Bat.

Whitehead M.P. (1987)- Fruit Bats Affect Your Life. Journal IZE 17:55-58.

#### *Section 4*

##### *The Role of Zoos in Biodiversity Conservation*

World Conservation Union/World Conservation Monitoring Centre (IUCN/WCME) (1992) - Global biodiversity - Extract from Ex-situ Conservation of Animals - 563-571.

Wildlife Preservation Trust - Jersey Zoo (1991) - Zoo Educator Training Course Manual - Successful Captive Breeding Programmes - 23-25.

Knowles J.M. (1992)-Captive Breeding Specialist Group - In Zoo Fed. News. Sum. 1992:55-57.

Seal U.S. (1990) - Captive Breeding Specialist Group - In Species, 15: 81-82.

Foose T.J., Ellis - Joseph S., Seal U.S. (1992) - Captive Breeding Specialist Group :73.

Stanley-Price M. (199 ) Extract from a review of Mammal Reintroductions (p.12-13) In Glipps J. (ed.) Beyond Captive Breeding. Symposia of the Zoological Society of London 62.

#### *Section 5*

##### *Getting the message across- Telling people what zoos do.*

Whitehead M (1991) - Twelve Things You Probably already know About Communicating Conservation to Zoo Visitors But We're Going to Tell You Anyway: 16-19 in Blackwell S. (ed.) Zoos: Future Considerations and Initiatives. Proc. symposium Assoc. of British Wild Animal Keepers (ABWAK) 15, 1990.

Tudge C. (1991)-New Philosophy of Zoo Labelling. Int. Zoo News 230, 38/5: 5-11.



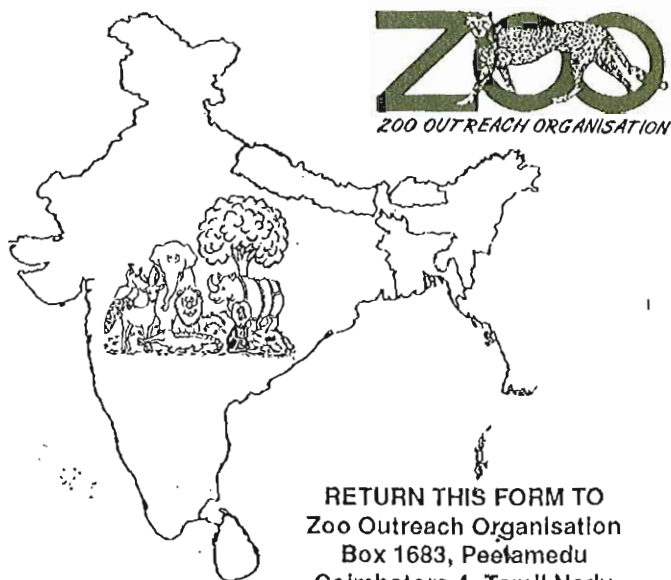
**USING THE ZOO  
TO TEACH BIODIVERSITY**

**ZOO EDUCATION WORKSHOPS**

**TWYCROSS ZOO  
ZOO OUTREACH ORGANISATION  
CBSG, INDIA  
BRITISH COUNCIL  
BRITISH AIRWAYS ASSISTING  
NATURE CONSERVATION**

**EVALUATION FORM**

**PLEASE FILL IN AND RETURN TO US  
SO WE CAN DO EVEN BETTER NEXT TIME,  
(OR AT LEAST NOT GET ANY WORSE!)**



**RETURN THIS FORM TO  
Zoo Outreach Organisation  
Box 1683, Peelamedu  
Coimbatore 4, Tamil Nadu**

<b>1. DID THE ZOO EDUCATION WORKSHOP LIVE UP TO YOUR EXPECTATIONS?</b>		<b>4. DURATION OF COURSE</b>		
IF SO, HOW SO?	44	JUST RIGHT		31
IF NOT, HOW NOT?	04	TOO SHORT		18
		TOO LONG		02
<b>2. WHAT PARTS OF THE WORKSHOP DID YOU LIKE BEST:</b>		<b>5. IN GENERAL, WHAT DO YOU THINK OF HOLDING FREQUENT, LOW BUDGET ON SITE WORKSHOPS?</b>		
LECTURES	11	Positive replies	42	Negative replies 00
SLIDE/LECTURE PRESENTATIONS	28	<b>6. THE PARTICIPANTS OF SUCH WORKSHOPS SHOULD BE:</b>		
ZOO ENCLOSURE DEMONSTRATION LECTURES	22	ONLY ZOO PERSONNEL		05
PARTICIPANTS ACTIVITY IN THE ZOO	14	WILDLIFE FIELD PERSONNEL		09
PARTICIPANTS REPORTING	08	N.G.O.'S	01	TEACHERS 01
WHICH WAS YOUR FAVOURITE LECTURE/ACTIVITY/SESSION:	26	A MIXTURE OF ALL		42
<b>3. COURSE HANDOUTS / BRIEFING BOOK</b>		<b>9. WOULD YOU LIKE TO ATTEND ANOTHER COURSE IN ZOO EDUCATION WITH A DIFFERENT THEME?</b>		
RELEVANT AND INTERESTING	47	Yes	51	No 00
NOT RELEVANT AND NOT INTERESTING	00	<b>10. COULD YOU SUGGEST SOME THEMES, OR IDEAS FOR IMPROVING THE NEXT WORKSHOP</b>		<b>47</b>
NOT RELEVANT BUT INTERESTING	01			

Out of 104 participants, 51 returned the Evaluation Form above, which was sent out soon after the Workshops. The number of responses to each query is given beside it.



**BIODIVERSITY ZOO EDUCATION WORKSHOP**  
**ZOO OUTREACH ORGANISATION/TWYXCROSS ZOO**  
**COIMBATORE, HYDERABAD, MADRAS &**  
**MYSORE ZOOSLIST OF PARTICIPANTS**



**COIMBATORE ZOO**

1. **R. Marimuthu**  
Zoo Outreach Organisation  
Box 1683, Peelamedu  
Coimbatore 641 004
2. **B. Rathinasabapathy**  
Coimbatore Zoological Park  
"Pioneer House"  
Peelamedu 641 004  
Coimbatore
3. **M. Kumaragurubaran**  
Zoo Outreach Organisation  
Box 1683, Peelamedu  
Coimbatore 641 004
4. **G. Latha Devi**  
Zoo Outreach Organisation  
Box 1683, Peelamedu  
Coimbatore 641 004
5. **B. Latha**  
Coimbatore Zoological Park  
"Pioneer House"  
Peelamedu 641 004  
Coimbatore
6. **P. Manoharan**  
Zoo Outreach Organisation  
Box 1683, Peelamedu 641 004  
Coimbatore
7. **N. V. K. Ashraf**  
Coimbatore Zoological Park  
"Pioneer House"  
Peelamedu 641 004  
Coimbatore
8. **George Amalraj**  
Coimbatore Zoological Park  
"Pioneer House"  
Peelamedu 641 004  
Coimbatore
9. **B. Rajagopalan**  
Coimbatore Zoological Park  
"Pioneer House"  
Peelamedu 641 004  
Coimbatore
10. **Sugabramam**  
Coimbatore Zoological Park  
"Pioneer House"  
Peelamedu 641 004  
Coimbatore
11. **P. Ponnaiah**  
Coimbatore Zoological Park  
"Pioneer House"  
Peelamedu 641 004  
Coimbatore

12. **Govind**  
Gita Lodge  
Behind Cheeran Towers  
Coimbatore
13. **N. Venkatesh**  
Shell India Traders  
PNR Building  
8A/1012, Avanashi Road  
Coimbatore 18
14. **M. Senthil Kumar**  
Thar Span Nature Club  
1-A, West Anna Nagar  
Peelamedu 641 004  
Coimbatore
15. **Rajkumar**  
Thar Span Nature Club  
1-A, West Anna Nagar  
Peelamedu 641 004  
Coimbatore
16. **Ravindran**  
Superintendent  
Trichur Zoo, Trichur  
Kerala
17. **Sasindran**  
ZEST  
Sugatha  
P.O. Ayyanthole  
Trichur 3
18. **Dr. Francis Xavier**  
Puthenpurackal  
R.V. Puram P.O.  
Kuttumukku, Thirsur  
Kerala 680 681
19. **Miss. Khusnum Mama**  
Student  
College of Animal & Vety.sci  
Mannuthy  
Trichur Kerala
20. **Dr. Krishnamurthy**  
Project Officer  
Salim Ali Centre for Ornithology &  
Natural History  
Kalampalayam Post  
Coimbatore- 641 010
21. **Dr. Savithiri Natarajan**  
Head of Dept.Dept.of Zoology  
P.S.G.R.Krishnammal College  
Peelamedu,Coimbatore-641 004
22. **Mrs. Kamala Ganesan**  
Dept.of Zoology  
P.S.G.R. Krishnammal College  
Peelamedu,Coimbatore-641 004

**MYSORE ZOO**

1. **Sri B.G.Mugadur**  
Director, Mysore Zoo  
Indira Nagar  
Karnataka 570 010
2. **Sri N.L.Shanthakumar**  
D.C.F.Wildlife Division  
Shimoga, Karnataka
3. **Sri B.S.Adappa**  
Conservator of Forest  
North Wildlife Circle  
Shimoga, Karnataka
4. **Sri H.S.Harishankar, Lecturer**  
Institute of Kannada Studies  
Manasagangotri, Mysore  
Karnataka 570 006
5. **N.Padmanabha,D.C.F.Wildlife**  
Wildlife Division  
Kudermukh National Park  
Karkala,D.K.DIST  
Karnataka
6. **Dr.Mewa Singh**  
Reader in Psychology  
University of Mysore  
Manasagangotri, Mysore-6
7. **Smt.K.B.Lalithamba**  
Science Teacher  
J.S.S.Public School  
Siddarthanaga, Mysore
8. **Smt.Sarvamangala S.Kumar**  
Teacher in Geography  
J.S.S.Public School  
Siddarthanaga, Mysore
9. **Smt.B.S.Bharathi**  
Science Teacher  
J.S.S.Public School  
Siddarthanagar, Mysore
10. **Smt.T.R. Mujeeba Khanum**  
Educational Asslstant  
Natural History Museum  
23-A Manasara Road  
Indiranagar, Mysore 10
11. **Dr. S. Nagaraju**  
Asst. Director, A.H. & V.S.  
Mysore Zoo, Mysore 10
12. **Dr. B. Venugopal, Scientist**  
Natural History Museum  
23-A, Manasara Road  
Indiranagar, Mysore  
Karnataka 10

13. **Sri Pundreeka Rao, Warden**  
Mysore Zoo  
Mysore 10, Karnataka
14. **Sri. S. Nagaraju, Engineer**  
Mysore Zoo  
Mysore 10, Karnataka
15. **Dr. C. Renukprasad**  
Scientist 2  
Institute of Animal Health & Veteri-  
nary Biologicals  
Bangalore 24, Karnataka
16. **Sri S. Shivanna**  
Manager, Mysore Zoo  
Mysore 10, Karnataka
17. **Sri A. R. Prakash**  
Staff, Mysore Zoo  
Mysore 10, Karnataka
18. **Sri H. S. Rajendraprakash**  
First Division Asst.  
Mysore Zoo, Mysore  
Karnataka 10
19. **Sri B. Kaverappa**  
Artist and Photographer  
Mysore Zoo, Mysore  
Karnataka 10
20. **Sri S.K. Ramalinge Gowda,**  
D.C.F.  
Aranaya Bhavan, Ashokapuram  
Mysore, Karnataka
21. **Dr. T. Gopal, Director**  
Institute of Animal Health  
and Vety. Biologicals  
Hebbal, Bangalore
22. **Dr. K. Mukund, Doctor**  
Panchavati Farm  
Chamundi Hill Road  
Mysore 10, Karnataka
23. **Sri M. Rajashekar, Staff**  
Mysore Zoo, Mysore  
Karnataka 10
24. **Sri. M.S. Srinath**  
Social Worker  
No. 959 Zoo Garden Road  
Indiranagar, Mysore 10
25. **Sri Balaji Singh**  
Sadhana, Temple Road  
Jayalakshmpuram Post  
Mysore 12, Karnataka



26. Mrs. Devaki Singh  
Sadhana, Temple Road  
Jayalakshimpuram Post  
Mysore 12, Karnataka

27. Sri S. Sathyanarayanan  
Office Staff  
Mysore Zoo, Mysore  
Karnataka 10

28. Smt Sowmyahuliraj  
Door No 117, Gokulam III Stage  
10th Cross, Mysore, Karnataka

29. C. Srinivasan, D.C.F., Wildlife  
Hunsur Division  
Hunsur, Karnataka

30. Dr. K. A. Nanjappa  
Veterinary Office, Aranya Bhavan  
Mysore South Circle  
Mysore, Karnataka

31. Sri B.M.T. Rajeev, A.C.F.  
and Research Officer  
Bandipur National Park  
Hediyala, Nanajangud Taluk  
Mysore Distt. Karnataka

#### HYDERABAD ZOO

1. K. S. Bhargawa, Curator  
S. V. Zoological Park  
Kapilaterdam, Tirupati 517 507

2. B. Chandra Mouli  
D.F.O. Wildlife Management  
Medak 502 110

3. Mr. Badluddin  
Asst. Director  
Project Tiger, Achampet

4. M. Ravikumar  
D.F.O. Wildlife Management  
Jannaram (P.O.)  
Adilabad (Dist), Andhra Pradesh

5. B. Anand Mohan  
Dy. Conservator of Forests  
Sri Venkateswara National Park  
K. T. Road, Tirupathi 517 507  
Andhra Pradesh

6. K. N. Benarjee, Curator  
Nehru Zoological Park  
Bahadurpura  
Hyderabad-500 264, AP

7. K. Thulasi Rao  
Asst. Conservator of Forests  
Nehru Zoological Park  
Bahadurpura  
Hyderabad 500 264

8. A. V. Joseph, IFS  
Conservator of Forests  
Wildlife Management Circle  
Kapilaterdam, S.N. Puram  
Tirupathi

9. M. A. Waheed  
Divisional Forest Officer  
Wildlife Management  
Subedar, Hanamkanda  
Warangal 506 010

10. K. V. Subrahmanyam  
Divisional Forest Officer  
Wildlife Management  
Sulurpet 524 121, Nellore Dt.

11. K. Shaker Reddy  
Assistant Curator - II  
Nehru Zoological Park  
Bahadurpura  
Hyderabad 500264

12. Vidhya Sagar Rao  
Forest Range Officer  
Eturunagaram (core)  
Wildlife Management Circle  
Warangal, A.P.

13. G. Vasant Mohan  
Asst. Curator I  
Nehru Zoological Park  
Bahadurpura, Hyderabad 500 264

14. K. Anjalsh  
Forest Range Officer  
Pulicat bird Sanctuary  
Sullurpet, Andhra Pradesh

15. Dastagir Saheb  
Forest Range Officer  
S.V. National Park  
Tirupati, Andhra Pradesh

16. G. Devaraj  
Forest Range Officer  
S.V. Zoological Park  
Tirupati, Andhra Pradesh

17. Sri Mallikarjuna  
Forest Range Officer  
Project Tiger  
Srisaillam, Andhra Pradesh

18. M. A. Azeem  
Forest Range Officer  
Project Tiger  
Mannanur (Alempet), A.P.

19. V. Pardha Saradhi  
Field Director, Tiger Project  
Nagarjuna Sagar  
Srisaillam Sanctuary  
Srisaillam, Andhra Pradesh

#### MADRAS ZOO

1. R. Sundararaju, IFS  
Director, Arignar Anna Zool. Park  
Vandalur, Madras - 48

2. H. Basavaraju, IFS  
Deputy Director  
Arignar Anna Zoological Park  
Vandalur, Madras - 48

3. S. V. Manisankar  
Assistant Conservator of Forests  
Arignar Anna Zoological Park  
Vandalur, Madras - 48

4. V. Balakumar, Ranger  
Arignar Anna Zoological Park  
Vandalur, Madras - 48

5. S. Gopalakrishnan, Ranger  
Arignar Anna Zoological Park  
Vandalur, Madras 48

6. S. Elayaperumal, Ranger  
Arignar Anna Zoological Park  
Vandalur, Madras 48

7. S. Subramanian, Ranger  
Arignar Anna Zoological Park  
Vandalur, Madras 48

8. C. O. Basavaraju, Forester  
Arignar Anna Zoological Park  
Vandalur, Madras 48

9. S. Vellasamy, Forester  
Arignar Anna Zoological Park  
Vandalur, Madras 48

10. V. Sivakumar, Forester  
Arignar Anna Zoological Park  
Vandalur, Madras 48

11. S.E. Ranganathan  
Forest Guard  
Arignar Anna Zoological Park  
Vandalur, Madras 48

12. Y. Syed Mohamed Saleem  
Forest Guard  
Arignar Anna Zoological Park  
Vandalur, Madras 48

13. K. Veeran, Forest Guard  
Arignar Anna Zoological Park  
Vandalur, Madras 48

14. M. Jayaraman  
Animal Keeper  
Arignar Anna Zoological Park  
Vandalur, Madras 48

15. N. Alexander  
Animal Keeper  
Arignar Anna Zoological Park  
Vandalur, Madras 48

16. K. Jayaseelan  
Animal Keeper  
Arignar Anna Zoological Park  
Vandalur, Madras 48

17. P. Rathinakumar  
Animal Keeper  
Arignar Anna Zoological Park  
Vandalur, Madras 48

18. M. Rajendran  
Animal Keeper  
Arignar Anna Zoological Park  
Vandalur, Madras 48

19. P. Tharman, Animal Keeper  
Arignar Anna Zoological Park  
Vandalur, Madras 48

20. R. Sivakumar  
Animal Keeper  
Arignar Anna Zoological Park  
Vandalur, Madras 48

21. S. Sithirai, Animal Keeper  
Arignar Anna Zoological Park  
Vandalur, Madras 48

22. G. Subramani, Animal Keeper  
Arignar Anna Zoological Park  
Vandalur, Madras 48

23. V. Srinivasan, Animal Keeper  
Arignar Anna Zoological Park  
Vandalur, Madras 48

24. Dr. M. D. Yuvarajan  
Veterinary Officer  
Arignar Anna Zoological Park  
Vandalur, Madras 48

25. Dr. N. Paneerselvam  
Veterinary Assistant  
Arignar Anna Zoological Park  
Vandalur, Madras 48

26. Dr. R. Thiruthalainathan  
Veterinary Assistant  
Arignar Anna Zoological Park  
Vandalur, Madras 48

27. A. Manimozhi  
Wildlife Biologist  
Arignar Anna Zoological Park  
Vandalur, Madras 48

28. N. Baskar  
Wildlife Biologist  
Arignar Anna Zoological Park  
Vandalur, Madras 48

29. M. Sekar  
Wildlife Biologist  
Arignar Anna Zoological Park  
Vandalur, Madras 48

30. P. Asalthambi  
Wildlife Biologist  
Arignar Anna Zoological Park  
Vandalur, Madras 48

31. S. K. Srivastava, IFS  
Wildlife Warden  
Point Calimer Sanctuary  
Nagapattinam 611 002

32. Mr. Sri Kumar Natarajan  
World Wide Fund For Nature  
C/o Arignar Anna Zoological Park  
Vandalur, Madras 48