Environmental Enrichment of Exhibits for Zoo Inmates and its Features

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There are man Indian wild animal species such as Lion-tailed Macaque, Great Indian Bustard, Tiger, Elephant, Owl, Vulture, etc., some of which are threatened with extinction. The IUCN Red List a maintained by IUCN Species Survival Commission documents their status.

In India there are about 350 species of mammals and 1200 species of birds apart from the migratory birds. The country is losing both numbers and species of mammals, reptiles and birds at an alarming rate. The main reasons for their decline are habitat destruction, poaching, environmental factors such as pollution and overpopulation, and conflict between man and animal. Thus, forest reservoirs, animal rescue centers and zoos play an important role in conservation of wildlife, both flora and fauna.

In the last decade, Indian zoos have continued rennovating their old style cages to open enclosures, open moats and other types of exhibits, so that animals have more space and freedom of movement in their enclosures. In addition to providing mere space, zoo managers also need to carry out environmental enrichment in zoo exhibits. Whenever you visit a zoo, you will find many animals sleeping, sitting and/or displaying stereotypic behaviors. Although the nature of some species is to sleep many hours during the day, others simply do not have sufficient diversity in their environment to stimulate them. The perception of visitors about the animals which are inactive or indulge in stereotypic behaviour often is disappointment. Accordingly he may try to stimulate the animal and make it move or react by external stimuli such as making noise, throwing stones, offering food or other harmful objects, etc. Such activities are usually harmful to animals.

Thus, the introduction of environmental enrichment in zoos will improve the captive environment for the animals and thus enhance care. By factoring in the needs of the inhabitants' behavioral biology and natural history zoos can improve the welfare of their dependents a great deal. This is a dynamic process in which changes to structures and husbandry practices are carried out with the goal of increasing behavioral choices available to animals and drawing out appropriate behaviors and abilities species-wise, thus enhancing animal welfare.

These types of activities will also support the whole spectrum of conservation activities such as breeding of threatened species, research, public education, training and advocacy. It is estimated that zoos and aquariums of the world attract about 600 million visitors per year.

Environmental enrichment of exhibits and activities for zoo animals

Enrichment is the provision of choices. We want each animal to express as much natural behaviour as as possible, as if they were in the wild. Zoos can help them do this by providing opportunities that make it possible for them to take their own behavioural decision or inclination. In their natural environment, wild animals go through complex development stages, involving countless external environmental stimuli, which equip them for the various trials of nature.

Objectives of environmental enrichment for animals in captivity

-- To increase the behavioral repertoire of captive animals
-- To reduce abnormal behavior characteristic of wild animals in captivity,
-- To encourage positive utilization of the whole enclosure space (both horizontal and vertical),
-- To enhance the ability to cope with novelty, and (in some instances)
-- To prepare the animal for re-introduction programs.

Items that prove to be enriching for one individual or group of animals may not work for others. When introducing a new enrichment device or item to animals that are easily stressed, it should be done slowly. Starting with placement of the item outside the cage so the animal can see it, then moving it to a less traveled area of the exhibit for the animals to investigate it and finally into the viewing area when it is clear that the device is benign. Placing a favoured food on the item can also encourage curiosity. However, staff should be prepared to quickly remove the item if it creates panic within the animal population or is harmful in any way. Enrichment devices carry their own inherent risks. Thus, we should follow safety considerations for various categories of enrichment listed below.

Various Categories of Enrichment

Dietary Enrichment:

Feeding frequency; feeding time; rawhide bones; unchopped and unpeeled foods; shape, size, and color variation; hidden food in the furnishing of the enclosure, etc.

Exhibit Furniture:

Any object with which the animal can safely interact. Popular items are trees, tree trunks, branches, rocks; ropes; suspension platforms; plants, sand, water, sawdust, etc. Some can be moved, added and removed from an enclosure to add novelty, create new locomotive pathways, and encourage exploratory behaviors. Non-stationary furniture can add unpredictability to locomotion.

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Olfactory Enrichhment:-
Using different sounds to attract the attention of the animal. e.g., recordings; vocal sounds, etc.

Manipulability Enrichment: Providing several types of objects enables animals to choose among them. Exchanging or adding items periodically will increase their desirability and use over longer periods of time, and there should be enough objects so that dominant individuals do not monopolise them. These objects may be perceived by the animal as novel if they are changed frequently to stimulate investigatory behaviors, e.g., wooden balls; rings; cardboard boxes; etc.,

Novel/Social Enrichment: In some species it may be possible to provide the opportunity of interaction with animals of the same or different species in order to stimulate natural behaviore, e.g. communication, social grooming, etc.

Physiological Enrichment: The provision in the enclosure of proper temperature, humidity and photoperiod conditions can stimulate natural behavior in each species.

Safety considerations:
-- Animals can become entangled in ropes, nesting material or novel hanging items.
-- Plants or parts of plants may be toxic to some animals.
-- Dietary enrichment can lead to weight gain if not properly managed.
-- Animals may become aggressive toward each other in mixed species exhibits.
-- Animals can choke on large pieces of food.
-- Live insects such as mealworms have been known to bite small birds that swallow them; whole worms should be killed before being offered to small birds.
-- Parasites are a potential risk with some enrichment; items such as feathers or snake-sheds should be sterilized (heated, frozen, autoclaved) to eliminate the risk of parasite contamination.
-- Foreign items, (pieces of toys, bedding material, plastic bags, etc.) if ingested, can cause indigestion, infection and impaction.

Enrichment framework : SPIDER Model for Implementation
S— Setting goals process may identify the natural history of the species, individual history of the animal, husbandry/management constraints, enrichment goal, development tool, prioritizing behaviours to be encouraged.

P— Planning stage involves some sort of approval process, and then the budgeting of time and money to design and create the enrichment devices should be approved by veterinarians or nutritionists so that the device or activity would not endanger the health or safety of the animals.

I— Implementation:
It is important to clarify the various roles of keepers/veterinarians, supervisors/managers by listing enrichment to be given on a calendar., Alternatively, if additional enrichment initiatives are provided, these can be added to the calendar, and docmented that they are provided on schedule.

D—Documenting:
Key points for Enrichment Documentation: (i) asking specific question about the way the animals interact with specific enrichment plan or device, (ii) collecting information in a consistent and valid manner, (iii) information such as who used the enrichment, when, for how long, and with what intensity, (iv) information regarding possible negative impact.

E— Evaluating:
Staff should discuss any information collected and look for trends and patterns in that information. Staff should assess whether the enrichment initiatives are meeting their behavioural goals, and whether they have enough information to answer any questions about the way the animals interact with the enrichment.

Information can be evaluated by:
-- Making a written summary of observations;
-- Summarizing the information by putting it in a graph or a table;
-- Or simply, discussing any information collected at a staff meeting.

Enrichment Rating Scales:
-- Direct Evidence (keeper observes animal and assess its level of interaction with the enrichment initiative):
-- Indirect Evidence (keeper is unable to observe animal's response to enrichment, and so uses indirect evidence of the animal's use of enrichment, e.g., cardboard box all ripped up versus untouched):
-- Goal Scale (keeper assesses whether the animal uses the enrichment for the intended goal):
-- Inter-observed reliability.

R— Re-adjusting:
Based on the evaluation of trends and the answers to the questions posed, : Is there anything we need to do to make the enrichment we provide more effective or safe? Is it necessary to re-adjust any of the enrichment provided? Which enrichment initiatives should we continue? New enrichment initiatives can be suggested and less than successful ones discarded.

Features of Environmental Enrichment Exhibits/ Activities:
-- It is easy to implement and can be replicated by other zoos.
-- It's a continuous process once adapted.
-- It will be benefited by Zoo Community & zoo inmates in India & Abroad.

-- The visitors will not only get an idea of the physical appearance of the animal but also of their natural habitat and behavior
-- Enrichment devices that stimulate the ability of the animal in captivity may serve the purpose of 'training' them for eventual reintroduction.
-- Increased behavior repertoire can reduce stereotypic behavior.
-- Optimum utilization of resources.
-- It will serve the purpose of educating the visitors.
-- It is integrated teamwork and involves all the relevant staff member including Director, Curator, Veterinarian, Vet-Nutritionist, Horticulture, Engineers, Animal Keepers, etc., and can be supported at all levels of the institution.
-- Enrichment plays an important role in maximizing good animal welfare both in term of health (increasing activities -> decreasing obesity) and psychological well-being (providing opportunity for animals to perform species appropriate behavior.)

Assessing the Benefits & Risks of Environmental Enrichment (Duncan 1997)

BENEFITS	HIGH	Initiatives that have low risk and high benefits.	Initiatives that have high risk and high benefits.
	LOW	Initiatives that have low risk and low benefits.	Initiatives that have high risk and low benefits.
		LOW	HIGH
	RISKS		

With the rate of extinction of wildlife there may come a time when the only way to restore natural biodiversity is through well organized reintroduction programme. Then zoos and other holding facilities around the world will be called upon to supply healthy individuals for reintroduction.

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Converting Zoo waste to Energy

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As we begin the 21st century we are faced with an ever-increasing human population that consumes vast amounts of resources. In the face of such pressure the environment suffers. Reports of pollution, logging, urban sprawl, land degradation, mass starvation, decreased fisheries, global warming, the extinction of species and much more, are legion, and paint a bleak and overwhelming picture.

As the earth becomes more crowded and our landfills start to overflow, people will be forced to address the issue of waste. If current trends in the global economy continue, human consumption will have increasingly serious consequences for our ecosystems. As conservation centers, Zoos must address sustainable relationships between humankind and nature. If we are to evolve as organizations we should actively support strong environmental messages. Through the development of organic waste, such as compost, zoos could reduce the amount of waste going to landfill substantially by utilizing waste-to-energy activity.

Waste collected:
Our zoo disposes of some of 105-110 tons of zoo waste per year.

Animal waste: Manure, straw, sand, food scraps, etc., (95-105 tons/year)

Visitor waste: Food wrappers, drink cups, assorted paper, etc., (1-1.2 tons/year)

Miscellaneous solid waste: Office paper, (0.4-0.5 tons per year) which is dispose of landfill.

Objective:
Contribution to the alternative sources of energy.

Creation of an organic recycling program that is sustainable.

Help solve the Zoo waste problem.

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