

Zoo Design and Animal Welfare

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Summary

The Central Zoo Authority in India was constituted in 1992, and one of its first tasks was to evolve a set of norms for zoo design and management in order for a zoo to be recognized, which was given legal status through a gazette notification from the Ministry of Environment and Forests in 1992. The truth of the matter is that most zoos in India do not conform to the planning and design guidelines of the notification, either through lack of funds, lack of will, or lack of knowledge. This makes them open to criticism from citizens of the country and particularly from animal rights activists from India and around the world - which no zoo administrator wants.

While it would be the desire of every Indian zoo administrator to more than comply with the norms set down by the Central Zoo Authority with regards to design, most of them have their hands full dealing with the day to day issues of running a zoo — to be too bothered about design requirements. This presentation, then, examines each clause of the 1992 Notification with respect to zoo planning and design and highlights the issues and options open to a zoo administrator. The aim is not only to describe the minimum requirements to comply with the Notification in spirit, but to look at cost-effective alternatives to conventional solutions. The resulting better standards of health and safety are desirable from all points of view.

Section 10 of the Notification states that:

The Central Zoo Authority shall grant recognition with due regard to the interests of protection and conservation of wildlife, and such standards, norms and other matters as are specified below:

Clause 15: All animal enclosures in a zoo shall be so designed as to fully ensure the safety of animals, caretakers and the visitors.

- **Animal safety:** All holding areas should be designed without any sharp projections that may hurt an animal. Masonry edges should be rounded off and steel and wood joinery embedded and hidden.
- **Keeper safety:** All holding areas for dangerous animals must have vestibules with double doors, safe zones, feeding and watering slots to allow remote operation. Old enclosures that do not have these features should be modified.

Clause 15: Stand off barriers and adequate warning signs shall be provided for keeping the visitors at a safe distance from the animals.

- **Visitor safety:** Zoning off service areas from the public automatically adds to visitor safety. Guard rail (safety barrier) design should be such that only vertical bars are used - or at least horizontal bars are not used so that people cannot climb over the barrier. Chainlink mesh is an economical option. This is especially required at areas with dangerous animals.
- **Warning signs:** few zoos in India have good signage of any kind let alone good warning signs. It is time for zoos to take human life seriously and invest in signage systems that include comprehensive warning signage. Long-lived materials that can be used include aluminium and aluminium-composites, powder-coated steel, and acrylic.

Clause 16: The Zoo Operators shall take adequate safeguards to avoid the animals being unnaturally provoked for the benefit of viewing by public and excessive stress being caused by visibility of the animals in adjoining enclosures.

- **Zoning off non-public areas:** Many zoos in India have no zoning between public and service areas, especially for the animals not at the periphery of the zoo. As a result visitors can walk all around the enclosures creating a dinner-plate kind of experience. Zoning is required to keep the public away from service and holding areas and to create a sense of protection for the animals.
- **Fences & screens:** Fences and screens are a cost-effective and economical method of zoning off areas even in existing zoos. These can be constructed out of wood or bamboo, mounted on steel or wood frames.

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- **Vegetative barriers:** Trees and shrubs can be planted in dense clumps to screen off adjoining enclosures and unsightly backdrops - and thus add to the natural habitat experience.

Clause 17: The Zoo Operators shall endeavor to simulate the conditions of the natural habitat of the animal in the enclosures as closely as possible.

- **Simple natural habitat design:** The common impression is that natural habitat design as practiced by the best zoos abroad is an expensive and time-consuming process. While to achieve 100% does take time and money, a lot can be done by the zoo on it's own, namely:
 - **Boulders and rocks:** most wild animals live in rocky and stony areas. Small boulders and rocks can be bought by the truckload and arranged inside enclosures with the help of a crane hired locally
 - **Deadfall:** dead and fallen trees are part of all wild habitats. They can be bought or supplied from forest departments.
 - **Cultural artifacts:** vernacular huts and granaries, which should certainly be considered part of natural habitats - can be constructed by local craftsmen from the region being represented.

Clause 17: Planting of appropriate species of trees for providing shade...

- Planting of trees is the easiest of activities and the more trees the better for a zoo environment, except for those areas where grass for recreation is needed.
- Trees planted should be of indigenous varieties and locally suited to the zoo environment.
- Trees may be planted for their particular shape to support natural habitat interpretation
- Trees should be planted near grass areas keeping the density of their shade in mind.

...and constructing shelters which would merge with the overall environment of the enclosures shall also be provided. (Clause 17):

- **Holding buildings:** Why is it that holding buildings in our zoos everywhere are the most unimaginative PWD type heavy-construction possible? The table below looks at basic construction parameters and aesthetic considerations for holding buildings of different species.
 - Heavy masonry buildings do not merge with a 'jungle' environment and need to be hidden from public view.
 - Light masonry and mesh buildings are perfectly safe if well designed and can be designed to look like vernacular structures and are easier to hide with vegetation.

| ANIMAL / CONTAINMENT TYPE | TYPICAL SPECIES | HOLDING BLDG WALLS | HOLDING BLDG ROOF | AESTHETIC STRATEGIES |
|--------------------------------|---|--|--------------------------------------|---|
| Climbing / Heavy | Tiger, Lion, Bear | Masonry | Concrete with skylights | Hide behind vegetative barriers, mounds, rockwork & screens |
| Climbing / Medium | Panther, Leopard | Masonry (lower) + chainlink mesh (upper) | Corrugated steel / fibreglass | Paint dark green, use vegetation screen |
| Climbing / Light | Small cats | Chainlink mesh | Corrugated steel / fibreglass | Paint dark green, use vegetation screen |
| Terrestrial / Very heavy | Elephants | None required in warm climates | Corrugated steel on concrete columns | None needed - open to public view. |
| Terrestrial / heavy | Rhinoceros, Hippoptamus, Wild Buffalo, Large Deer | Masonry (lower) + open (upper) | Corrugated steel on concrete columns | Paint dark green, use vegetation screen |
| Terrestrial (jumping) / medium | Deer sp., Wolves, Jackals, Wild Dogs | Masonry (lower) + chainlink mesh (upper) | Corrugated steel / fibreglass | Paint dark green, use vegetation screen |

· **Moats vs fences:** In India at least moats are the preferred means of containment due to the mindset that an animal in a cage automatically implies that it will be behind heavy grilled bars -and that moats support the 'open' zoo concept. However for certain species of animals, high chain-link fences with glass viewing windows are a more than feasible option where space is limited. A comparison between the two containment types is given in the table below:

| | MOATS & OPEN VIEWING | CHAIN-LINK FENCES & GLASS VIEWING |
|-------------------|---|---|
| SPECIES | Can be used for almost any type of animal. | Cannot be used for animals that climb such as leopards and bears. |
| SPACE | Greater space required, higher cost of land development - larger zoos | Less space required - can be effectively used for small to medium zoos. |
| VIEWING | Open view to animal, but animal is much further away due to minimum barrier distance. | View to animal through glass, but potential for close-up viewing. |
| AESTHETICS | Difficult to hide the large amount of concrete walls. | Can be unsightly to look at, but can be painted to match foliage and hidden behind green buffer planting. |

Clause 16: All animal enclosures in a zoo shall be so designed as to meet the full biological requirements of the animals housed therein.

Clause 18: The enclosures housing the endangered mammalian species...shall have feeding and retiring cubicles / cell of minimum dimensions in the said appendix.

· **Minimum cubicle sizes:** A preliminary survey of the minimum holding / cubicle requirements recommended by the Central Zoo Authority indicate that several of these are less than those recommended by Mr. J.H. Desai / Wildlife Institute of India in *Standards and Guidelines for Indian Zoos*. It would make sense therefore to follow the WII / Desai guidelines which would more than fulfill the CZA requirements.

Clause 18: Each cubicle / cell shall have resting, feeding, drinking water and exercising facilities, according to the biological needs of the species.

· **Raised platforms & dens:** climbing animals usually prefer not to sleep at ground level - holding cubicles for such species should be provided with platforms at different heights for resting. Many animals prefer dens for sleeping - holding cubicles for such species should contain small semi-enclosed and covered areas away from the doors.

Clause 18: Proper ventilation and lighting for the comfort and well being of animals shall be provided in each cell / cubicle / enclosure.

· **Enclosure shade:** In outdoor enclosures the issue is actually one of providing enough shade from the sub-tropical sun. This is normally achieved by planting of shade trees just outside the enclosure making sure that there are no overhanging branches for the animal to escape on.

· Shade trees can also be planted inside the enclosure but in the case of animals such as bears and cats, which scratch the bark off, the tree trunks need to be protected by chainlink mesh or even astroturf wrapped around them. Alternatively shade structures to blend in with the exhibit landscape can be constructed.

· **Skylights for day lighting:** Traditionally the only daylight in holding buildings enters through the doors, while nowadays skylights are the accepted way to allow light into interior holding areas. In earlier days the problem was one of appropriate materials (glass being breakable) and sealing of joints from rainwater. However today newer technologies are readily available - clear fibreglass or Lexan can be obtained as sheets or even as pre-manufactured skylights and joints are sealed with

silicone. While fibreglass is tough, and Lexan is virtually unbreakable, it is still advisable to protect the skylight from the animal below by a grid of welded wire mesh.

- **Air shafts for ventilation:** Providing adequate air exchange through cross-ventilation of holding buildings is crucial to keeping them dry and the animals healthy. The rule of thumb would normally be more ventilation rather than less. In our zoos the related factor is usually one of cost since ventilation openings need to be barred with grilles and steelwork is a lot more expensive than masonry work. One option would be to construct masonry holding buildings with vertical airshafts in their roofs, which create forced air circulation through convection and increase the comfort conditions inside greatly. Lightweight roofs can be designed with clerestories to perform a similar function.

Clause 19: Proper arrangement of drainage of excess water and arrangements for removal of excreta and residual water from each cell / cubicle / enclosure shall be made.

- **Drainage design:** usually the most ignored aspect of any project design in India - taken very seriously in other countries.
- **Internal Gutters:** All holding areas within a building should slope at minimum 1% to drain to cement surfaced gutters on one side of the cells. The gutter does not need to have a grating except at the keeper access points. The gutter leads outside to an exterior gutter, which in turns leads to a soak pit.
- **Ring drains:** In humid areas particularly, steelwork needs to be protected at the base from ground moisture through concrete plinth protection as well as adequate peripheral drains around the building.
- **Site drainage:** Strategy dependent on soil type and zoo topography. Generally not a problem on sloping sites, and those with sandy soils. A big problem in flat sites, especially with silt or clay soils. Drainage should lead to landscape and grass areas for groundwater recharge, with reverse bore wells installed if soil has low absorption capacity.

Recommendations:

- **Safety** is achieved in zoos through sensible design and good management - good **warning signage** reflects on the zoo manager's concern for human life.
- **Zoning** is easy to achieve, costs little, and offers a lot of management benefits, apart from adding greatly to the natural habitat experience.
- Simple **natural habitat design** need not be expensive and time-consuming – it only requires imagination and a little effort – it includes the habitats occupied by tribal peoples
- **Tree planting** to improve the zoo environment is the easiest of activities and the more trees the better. Trees selected should be **indigenous**, and suited to the climate
- Heavy masonry buildings do not merge with a 'jungle' environment - **light masonry & mesh** buildings are easier to construct, last as long, and are easy to hide with vegetation
- Moats are not always the best option, especially for small to medium sized zoos where space is a constraint. **Tall mesh enclosures** can be used as effectively and use less space.
- The W.I.I. / J.H. Desai minimum standards for cubicle size are more stringent and thus preferable to the CZA minimum standards.
- Providing for the **biological needs** of a species requires common sense and observation.
- Zoos should look beyond old and conventional solutions to current mainstream architectural solutions often involving **new technologies**.
- **Good drainage design** is the hallmark of a well thought-out project and is critical to maintaining health standards. It is often the most ignored planning aspect in India.
- In the end, **good design matters** – it makes life easier for the zoo administrator by improving health and safety standards.