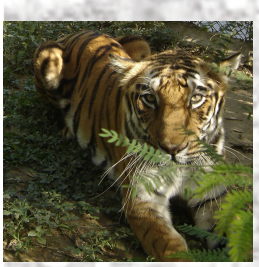
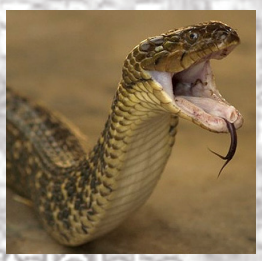
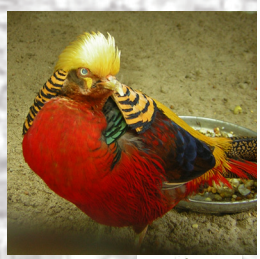
KAMLA NEHRU ZOOLOGICAL GARDEN
AHMEDABAD
MASTER PLAN PROPOSAL
2012-2022

Prepared by:Ahmedabad Municipal Corporation
Consultants:CEPT University



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Certificate

This Masterplan has been prepared by the Kamala Nehru Zoological Garden, Kankaria, Ahmedabad for submission to the Central Zoo Authority in accordance to their requirements. It includes in it all the expectations as listed in the submission list.

17/07/12

Dr. R. K. Sahu
Zoo Superintendent
Kamala Nehru Zoological Garden
Ahmedabad

Approved

Member Secretary
Central Zoo Authority
New Delhi

01/08/12

(55th meeting of CZA)

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Member Secretary
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With the guidance of the members of the CZA whose comments and observations are incorporated in this document.

With many hours of valuable inputs from **Dr. R.K.Sahu,** Zoo Superintendent/Director Kamala Nehru Zoological Garden.

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PREFACE

The history of the Kamala Nehru Zoological Garden is long, it being one of the earliest zoos to be established in the country, entwined in the memory of most of the present residents of the city. Built around the Kankaria Lake, the precinct has been synonymous with recreation and leisure for Ahmedabad. However, in the mid 80s, the zoo lost some of its importance as the city development focused on retail and commercial enterprise for recreation. Recent focus on development of the lake, the zoo and its precinct are making the place popular once again. Record numbers of visitors now visit the zoo. Pedestrianizing the precinct makes it a favoured recreational spot in the city.

Apart from recreation, the zoo has been developed with a strong focus on conservation breeding. From the time of its inception to today, it has made a valuable contribution in conservation breeding and overall welfare of the animals. Enrichment policies, innovative practices towards animal welfare mark the zoo. Dedicated staff deeply involved with the animals contributes greatly to the wellbeing of the animals. Large mature trees, variety of plantation, a rich flora and fauna apart from the captive animals are a salient feature of this zoo.

The proposed master plan is a well-researched document showing the direction for the next decade for the Ahmedabad Zoo. It states explicitly the policy intentions of the zoo, as well as defines the road map showing the path ahead. The vision for the zoo for the future is focused on education as a definitive message and priority. Regular outreach and training programs will support the message. Digital and emerging technologies offer a wide range of interactive tools to encourage empathy towards the animals and thus participate in the larger intention of wild life conservation. With this, the zoo aims to contribute towards mitigating the loss of biodiversity, aid in the survival or recovery of species and their habitats and to ensure the well being of the animals in captivity.

PREFACE

The design strategy combined with the extensive and in depth knowledge of the zoo personnel forges a path ahead that is respectful to the animal and encouraging the visitor. The animal enclosures are designed as naturalistic environments while the visitor is moved across the garden in an immersive environment thus creating an emotional connect. This becomes a way for sensitizing the visitors to the animals. Strong enrichment policy embedded in the zoo will be taken further. The zoo aims to raise the benchmark in the enrichment provided to its residents.

Despite being under developmental and commercial threat, the civic authorities are looking at ways to augment the present zoological garden, to expand its physical limits along with expanding its meaning in the lives of the people. The renovated precinct will provide more space to the animals to support their natural behavior as well as more open spaces for people to have a leisurely visit. Though it will continue taxonomy as its theme, the public open areas will try to resemble some of the specific environments. Overall, the zoo looks towards reinventing itself in a strong manner to become once again the locus of an Ahmedabad citizen, thereby carrying forward the intention of awareness and sensitization to ecology.

Dr. R.K.Sahu,

Zoo Superintendent/Director
Kamala Nehru Zoological Garden
Ahmedabad

FOREWORD

The history of zoological parks has come a long way from being menageries with cages to creating a naturalistic environment for the animal keeping in view its wellbeing. World over, considerable efforts are being made to create empathy towards the animal world providing immersive environments, both for the animal and the visitors. Apart from being educative in nature, this strategy shows the ecological relationships that exist in nature. It creates awareness amongst the human population of the vast variety of species that inhabit the various habitats across the globe.

The development of the Kamala Nehru Zoological Garden and its precinct is a key feature in the overall development of the city of Ahmedabad as a sustainable city. Being one of the fastest growing cities of India, the city has focused on providing adequate infrastructure in terms of services. With the development of the zoological garden, it takes infrastructure to a new level of interpretation. Creating places for public interaction that cut across class and community distinctions, the zoological garden adds value to the new imagination of Ahmedabad as a global city. It looks at a long term strategy of creating more open and public spaces for the citizens. Combining recreation with education, it creates a meaningful infrastructure that encourages people's participation.

The zoo is a distinctive precinct that places animals, which ideally should have been able to wander the world in a free manner, in captivity. In an ideal condition, one would want a world without zoos. However, till the human race is able to bring about a balance to their development aspirations and the implications to the environment, zoos are the only refuge for many endangered and scheduled species. They are also the places where conservation breeding can occur in conditions that are protected. In order for them to continue the valuable work that they are engaged in, their design and development needs care and consideration. The new vision for the Ahmedabad zoo incorporates the concern for the environment and outreach to the people with an aim to create empathy for the animals. I am sure that this Zoo would be a must-see landmark for all Amdavadis and visitors to this great city.

Shri. Guruprasad Mohapatra, IAS

Municipal Commissioner,
Ahmedabad Municipal Corporation

EXECUTIVE SUMMARY

One of the paradoxes of zoo design is that it is a completely artificial world where the animals have been deliberately moved away from their natural environs due to various reasons and yet, there is a contemporary emphasis on habitat, ecology and environmental attempts to recreate that very 'natural' environment in an artificial manner.

This report is a proposal towards the consolidation of the area around Kankaria lake as the Kamla Nehru Zoological Garden Precinct, Ahmedabad. It is a proposal towards the future development of the zoological garden.

1. It emphasizes on two aspects of the zoo:
   a. Its pivotal role in providing the animals a naturalistic habitat and conservation breeding.
   b. It being an urban landmark, it's role in generating awareness and education.

2. The theme of the zoo will be immersion and its message education. This will be made possible by designing immersive enclosures with enrichment.

3. The first part of the report is an introduction and analysis of the existing features. Some critical weaknesses to be addressed are:
   a. Small enclosures for some animals, of the cage type
   b. Public circulation is broken into too many loops creating heavy concentration in some areas and neglect of some areas. There is lot of crisscrossing of people in this route.
   c. Services and public movement overlap
   d. Visitors view the animal, at places from above
   e. Exhibits are randomly placed as the zoo develop in bits and pieces

4. Its strengths, to be enhanced and emphasized are:
   a. It has a large varied collection
   b. It is an urban oasis
   c. A dedicated staff
   d. Full of green, large, mature trees

   A SWOT analysis is provided discussing the details.

EXECUTIVE SUMMARY

5. The master plan proposal provides adequate space for the animals by rationalizing the available area.

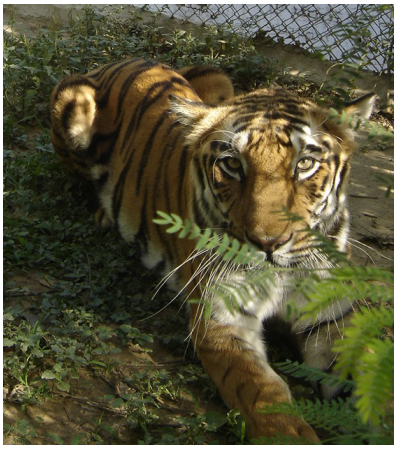
6. The AMC has approved that over a period of time more land will be made available for the development of the precinct. The first step is allocation of more than 2acres of land for nocturnal house.

7. Circulation has been made simpler, but more exciting by creating bridges, tunnels and places of pause that are congenial to the enclosures. This enhances the experience and leads to the immersion theme.

8. The master plan proposes the addition of animals to the zoo. Some of the animals and birds to be added to the collection are:
   Birds - Ostrich, Rhea, Cockatoos, Macaws, Lorikeets, Parakeets, etc.
   Mammals - Chinkara, Chowsinga, Giraffe, Zebra, Chimpanzee, Orangutan, Gorilla, Kangaroo, etc.
   Reptiles – King cobra, Snake Russel's Viper, Snake Saw Scaled, Anaconda, Iguana Green, Tortoise Giant, Krait, Boa Sand, Python Malaysian, etc.
   This is not a comprehensive list , but only suggestive.

9. The zoo has a successful history of conservation breeding, a practice it intends to continue actively. It proposes to breed following:
   Birds - Pigeon Nicobar, Spoonbill White, Pelican Rosy, Ibis White, Cormorant Little, Peacock White, Peacock Common, Pigeon Pied Imperial etc.
   Mammals – Chinkara, Chowsinga, Black Buck, Elephant Indian, Otter Common, Jackal, Porcupine Bengal, Civet Common Palm, Lion Indian, Tiger, Bear Sloth, Langur Common, etc.
   Reptiles - Snake Keelback Checkered, Tortoise Indian Star, Turtle Fresh Water, Crocodiles, Monitor Lizards, Gavial False, King cobra, Snake Russel's Viper, Snake Saw Scaled, Anaconda, Python Malaysian, etc.

Part I



CHAPTER I INTRODUCTION

CHAPTER II APPRAISAL OF PRESENT ARRANGEMENT AND CONSTRAINTS

chapter I

INTRODUCTION

a Introduction

b History of the Zoo

c Vision
Mission Statement
Strategy

d Objectives

e Physical features
Geology
Rock and Soil

f Flora and Fauna in the zoo premise

g Climate
Rainfall
Season

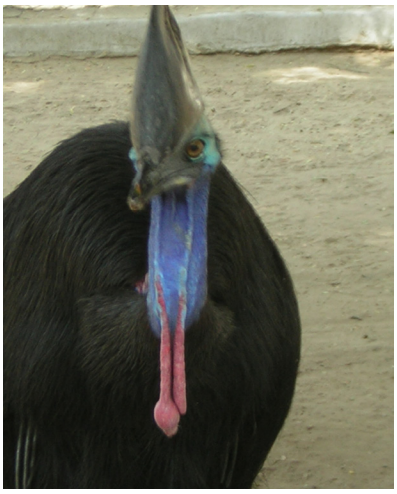
h Approach

i Demography of the surrounding area

j Legal status of the land

k Sources of pollution

a INTRODUCTION



Zoos play a leading role in educating the public about wildlife conservation issues. They help to promote awareness, understanding and appreciation of this incredible world that we share with millions of other species. By raising public consciousness, zoos help to promote a more responsible, environmentally ethical and hopefully a more informed society – one that will adopt laws and regulations to preserve wildlife and their natural habitats.

Zoos today emphasize breeding animals in captivity, for conserving healthy and pure species, not capturing them from the wild. They maintain pedigree and breeding records so they are able to make good management decisions and optimize the genetic diversity of various species. This is beneficial to the health of future generations of animals. Zoos also provide temporary and long-term homes for animals injured in the wild or confiscated by Custom Agents.

Good zoos attempt to provide their animals with rich, naturalistic, ecologically sound environments. Keepers strive to provide their charges with choice in their daily lives and stimulate them with diverse schedules and new activities. Good hygiene, proper nutrition and regular veterinary care are combined to extend the life expectancy of most zoo animals.

b HISTORY

The Kamla Nehru Zoological Garden was established in 1951 by Padmashree Reuben David. He was an animal lover and a compassionate conservationist with a great experience with animals. He experimented with several animals and strived to create a better environment for them. He faced a tough resistance for housing carnivorous animals in a mainly vegetarian culture of the city of Ahmedabad that preferred a zoo of the herbivorous tribe. It was in 1952, that the zoo started housing the carnivorous animals.

Padmashree Reuben David aimed to create a near natural habitat for animals, birds and reptiles and develop a distinct style of zoo architecture. He planted innumerable trees in the zoo and its surroundings and created a green zone - the zoo complex that included a zoo - Kamala Nehru Zoological Gardens, a children's park - Chacha Nehru Balvatika and a museum - Reuben David Natural History Museum.

Over a period of time, the zoo has nurtured its wards with care and sensitivity that have become benchmarks. Continuous innovations in animal care and visitor facilities and comfort marks the zoo.

c MISSION/VISION/STRATEGY

"The Kamala Nehru Zoological Park, by virtue of its location, will be an urban oasis. The Park will bring into an urban centre, experiences of natural habitat sensitizing the popular generating respect for the animals, their environment and their characteristic behavior. Keeping the welfare of the animals as its primary concern, the park will engage in the promotion of conservation breeding thus complementing a global concerted effort of sustaining the rich biodiversity of the earth."

d OBJECTIVES

The zoo primarily aims for,

1. Public awareness and education
2. Conserve the endangered species
3. Breed the endangered species in captivity and save them from extinction
4. Be a place of recreation amidst nature for a dense urban fabric
5. Facilitate research activities
6. Training
7. Rescue and rehabilitate animals

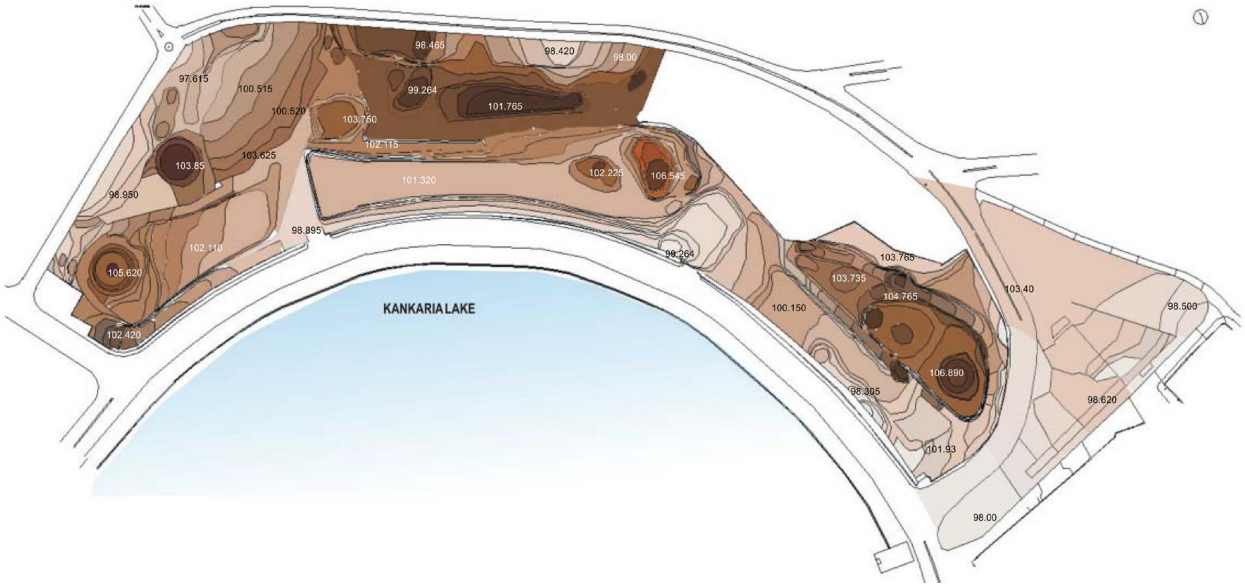
The main objective of the zoo is to educate people and spread awareness regarding wildlife related issues, along with conserving the wildlife, especially the endangered species.

The zoo's objectives are;

1. Educating people, particularly children of the natural ecosystem and spreading awareness
2. To create empathy for animal behavior and habitats
3. To conserve wildlife, especially the endangered species and where possible multiply their population
4. To provide good living conditions identical to their naturalistic environment, hygiene, food and enrichment
5. To provide better facilities to encourage research for the betterment of animal life in the zoo and conserve wildlife
6. To provide an impressive environment to the visitor with adequate facilities for relaxation

e PHYSICAL FEATURES

Topography of the area



The site topography is sloping on northern as well as southern edge with ridge forming in central spine.

Thus the storm water should drain along these natural slopes and the necessary water catchments should be adequately located so as to take the optimum advantage of the site

The contours on the site offers a good potential for the viewing points, especially visual links to kankaria lake

Animal health conditions are directly related to natural waste water drainage in its immediate surroundings. Sensitive usage of topography has a direct implication on the storm water drain and maintaining the dryness or wetness of the soil condition

PHYSICAL FEATURES

GEOLOGY

The major portion of the district is covered by recent and sub-recent formations. The area is almost flat covered by brown sandy and clayey soil and has a gentle southerly and south westerly slope. It forms part of Cambay basin. The sub-surface geological history of the Ahmedabad district has to be understood along with that of the entire Cambay sedimentary basin as the area covered by this district forms a small part of it.

During Upper Cretaceous times tensional faults developed along the basement trends and the first marine transgression from south took place in the basin. Thereafter, sedimentation continued in the basin from Paleocene onwards under varying depositional environments. The four stages recognized in the evolution of the basin are

1. Wacke and Formative stage
2. Negative Stage
3. Oscillatory or stage of inversion
4. Positive Stage

In the first stage, trap-conglomerates, silts and clay stones are deposited under unstable conditions with an inconformity over Deccan Trap basalt floor. In the second stage uniform dark-grey to black fissile shale, pyritigerous at places and rich in organic matter was deposited under stable conditions. In the third stage carbonaceous gray shale with thin coal beds, silts and sandstones, sometimes in cyclic order, were deposited under unstable, oscillatory conditions. In the fourth stage chloritic, micaceous sands pebbly towards top with variegated clay stones, silt clays, silts and thin carbonaceous streaks were deposited under conditions of unstable and positive movements in the basin.

SOIL AND ROCKS

The stratigraphic succession met with the wells drilled in the district belong to the second, third and the fourth stages described above, however ,in Dhandhuka Taluka of the district minor ridges of limestone of cretaceous age and trap rocks are occurring .

Gujarat alluvium is formed 100 meters in thickness and its character is unconsolidated coarse sand, pebbly with kankar and minor clays.

SOURCE-Ahmedabad District Gazetteer-Gujarat State Gazetteers-1984

f FLORA AND FAUNA IN ZOO PREMISE

No.	Local name	Total number	Botanical name
1	Banyan	34	Ficus bengalensis
2	Badam	25	Prunus amygdalus
3	Gum	42	
4	Asopalav	319	Polyalthia longifolia
5	Neem	442	Azardirachta indica
6	Date Palm	05	Phoenix dactylifera
7	Jujube (Jamun)	07	Syzygium cumini
8	Copperpod	1614	Peltophorum pterocarpum
9	Keyshia	08	
10	Borsalli	164	Mimusops elengi
11	Tamarind	16	Tamarindus indica
12	Peepal	54	Ficus religiosa
13	Kachnar	02	Bauhinia
14	Coconut Palm	08	Cocos nucifera
15	Gulmohar	20	Delonix regia
16	Drumstick	08	Moringa oleifera
17	Bottle Palm	02	Hyophorbe lagenicaulis
18	Eucalyptus	03	Eucalyptus spp.
19	Sevan/Sun flower	04	Heptacodium miconiodes
20	Leburnum	01	Watereri
21	Neem	35	Azardirachta indica
22	Mahogany	93	Swietenia macrophylla
23	Kadam	175	Neolamarckia cadamba
24	Silver rock	03	
25	Amla	01	Phyllanthus emblica
26	Spethodia	138	
27	Banyan	05	Ficus bengalensis
28	Mango	05	Mangifera indica
29	Jujube (Jamun)	01	Syzygium cumini
30	Meswak	01	Salvadora Persica
	Total	3207	

g CLIMATE

Seasons

- There are three main seasons: summer, monsoon and winter. Aside from the monsoon season, the climate is dry.
- The weather is hot through the months of March to June — the average summer maximum is 36 °C (97 °F.), and the average minimum is 23 °C (73 °F).
- From November to February, the average maximum temperature is 30 °C (85 °F.), the average minimum is 15 °C (59 °F.), and the climate is extremely dry.
- The southwest monsoon brings a humid climate from mid-June to mid-September.

Rainfall

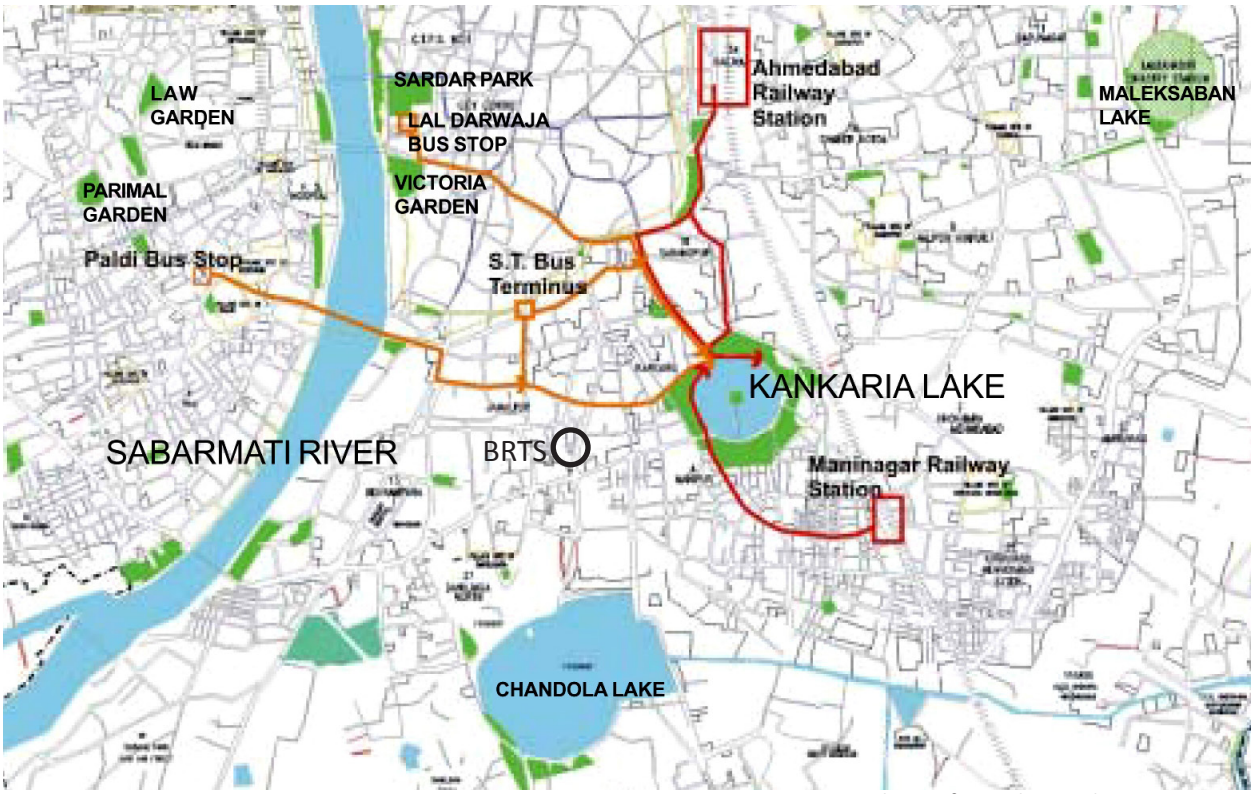
- The average rainfall is 93.2 cm (36.7 inches), but infrequent heavy torrential rains cause the river to flood.
- The highest temperature recorded is 47 °C (116.6 °F) and the lowest is 5 °C (41 °F).

(Degree Centigrade)												
Months	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb
Season	Summer				Monsoon				Winter			
Max	36.0	39.9	41.8	38.4	33.3	31.9	33.4	35.8	33.2	29.8	28.4	37.3
Min	18.8	23.4	26.2	27.0	25.7	24.8	24.8	20.9	16.5	13.0	11.7	13.8

h APPROACH

Accessibility to the zoo

- The Kankaria Lake is one of the most significant open spaces of the city accessible to all sections of the society.
- The precinct is a public realm and has public recreation facilities surrounding the lake front.
- It is well connected with important transit nodes –and has a dedicated BRTS bus stop on its southern edge.
- The Kankaria precinct due to its easy accessibility and connectivity fetches a lot of visitors from different parts of the city as well as the tourists from across the state and nationally.
- The specially restructured ring road around it makes it a complete pedestrian precinct.
- The main railway station of the city is within the radius of 4km from the zoo and soon the extended network of BRTS will connect it directly to the zoo.
- State transport terminus is just 2Km away.

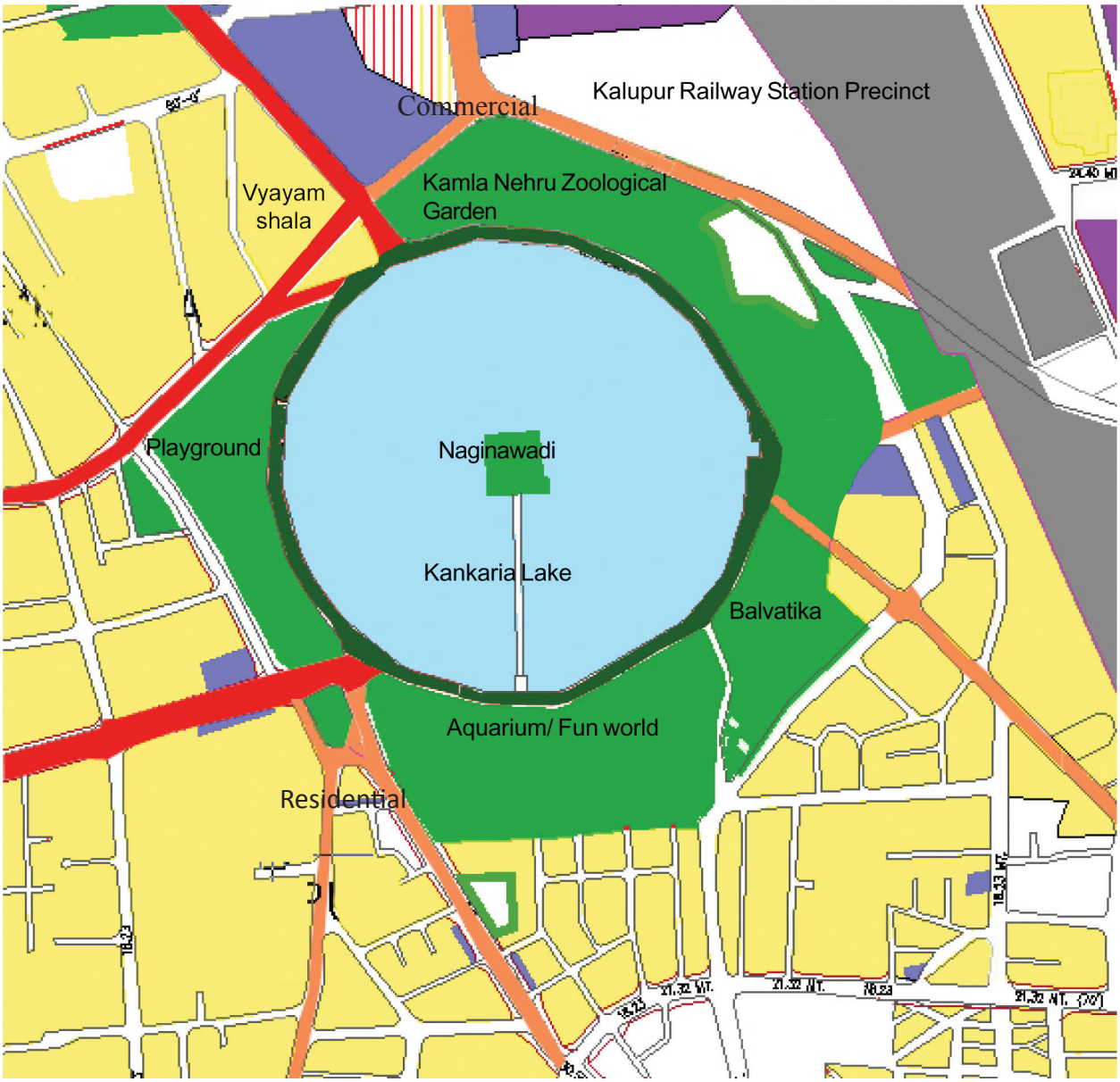


Approach map for Kankaria Lake

LANDUSE / DEMOGRAPHY

Surrounding land use

- The surrounding land use of the precinct is mainly residential and supportive commercial with some offices.
- It functions as one of the most active and important recreational areas of the city, with amusement parks, the Kankaria lake and the Kamla Nehru Zoological Garden.
- A railway yard and the defunct Ahmedabad dairy lies on the northern edge.



Land use map for Kankaria area

j LEGAL STATUS OF LAND

- Entire zoo property is owned and run by AMC (Ahmedabad Municipal Corporation). In terms of finance, the zoo is self supportive and is not dependant on any authorities for daily and routine . It gets periodic grants for any special work it takes up.

k SOURCES OF POLLUTION

- The site is developed in the city centre and abuts a lake. It is an open land mostly.
- Earlier, it had mill areas around it but these all have been shut down. Therefore there is no industrial pollution threatening the site.
- What used to be a peripheral road towards the south has also been made a fully pedestrian way in December 2008, thus greatly reducing the noise pollution.
- The only source of pollution is the noise generated from the traffic abutting the zoo on its northern periphery. Some of this is buffered by another property between the zoo and the road.
- Further buffering is required on the northern periphery of the zoo to provide better and more peaceful environment.
- Trees are planted towards the road side which act as buffer for noise pollution.

THE ZOO TODAY

The zoo today accepts its challenging role as a vital part of the city's commitment to the environment. It is visited by approximately 20 lakh visitors that include; students of schools, colleges – zoology, botany, veterinary sciences, art, design, architecture, landscape, tourists, families, wild life enthusiasts, conservation experts, etc. Every year and the number is constantly increasing.

What sets this zoo apart is the personal touch of the excellently devout staff and an able guidance of the superintendent. It also has a continued support of the Ahmedabad Municipal Corporation, offering the best possible services.

Serene, peaceful, yet lively, the zoo is one of the most sought after destinations in the city. Large mature trees, presence of kankaria lake, a pedestrian precinct with entertainment make it a favoured spot for families. Its popularity cuts across the class and communities barriers making it a truly holistic public space .

A large variety of flora and fauna apart from the captive animals enrich the experience.

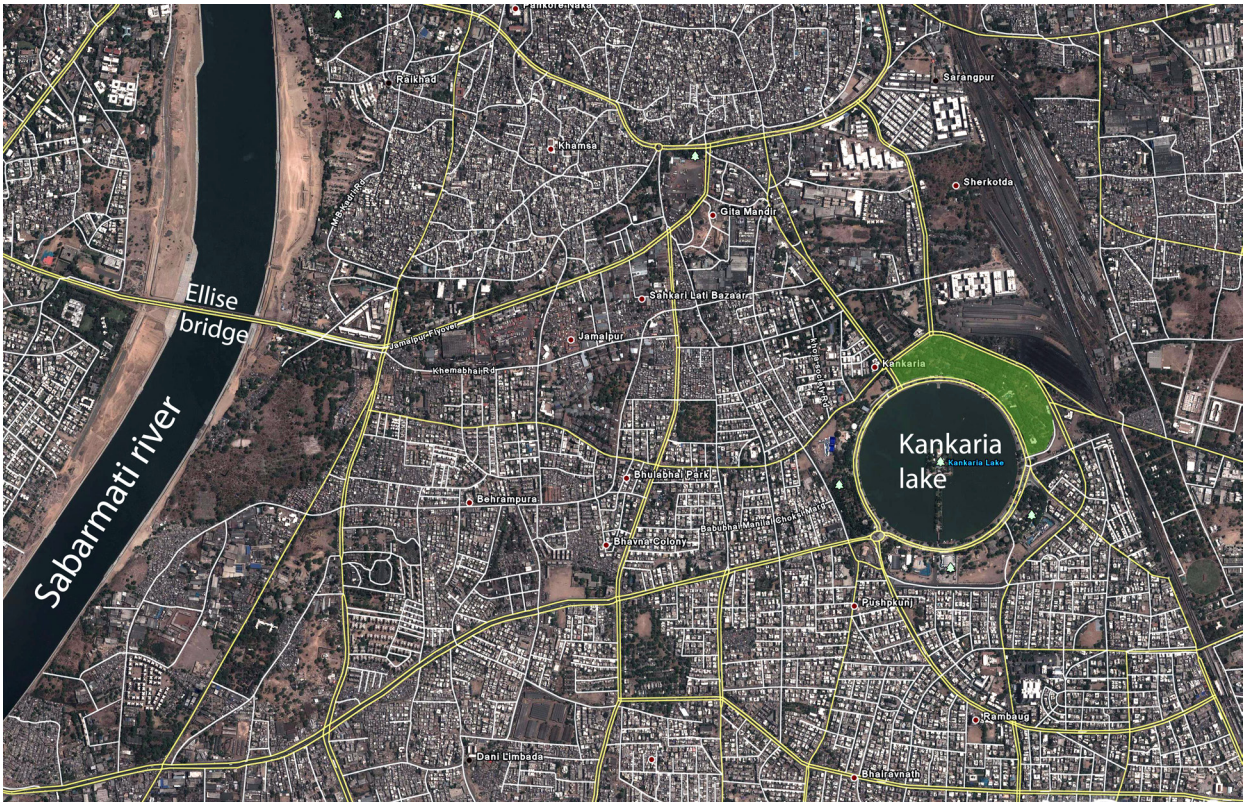
However, potentials remain untapped and a more concentrated effort needs to be taken to fully realize the role and the intent of the zoo in the city.

LOCATION

The Kamla Nehru Zoological Garden is situated on the outer periphery of Kankaria lake, a very important landmark of the city of Ahmedabad and spreads over an area of 36 acres.

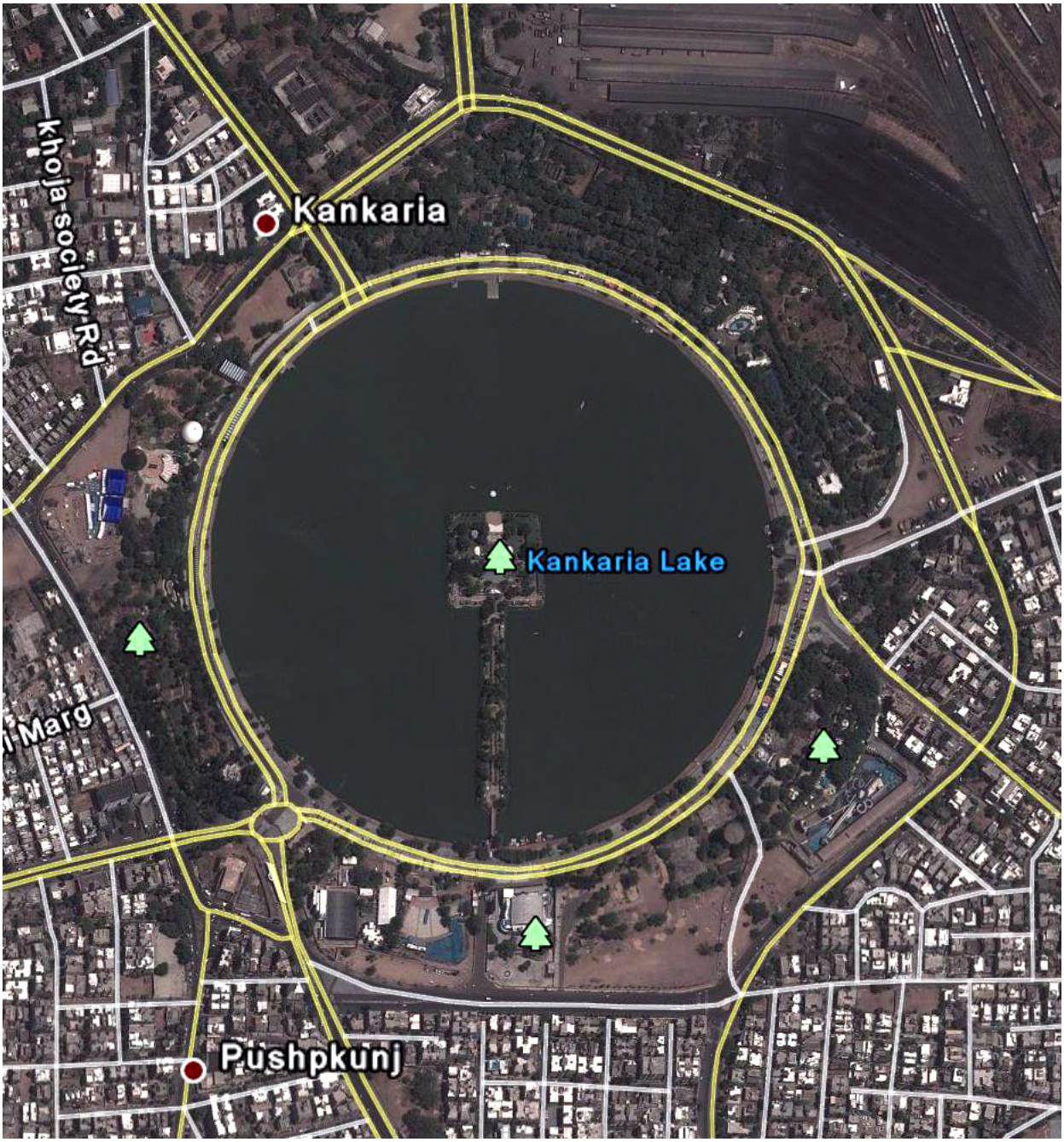
Longitude: 72˚36'
Latitude: 23˚00'
Altitude: 53m (174 ft.) from sea level.

The Kankaria lake is an active urban space of the city and it fetches a huge number of visitors majorly during the mornings, evenings and night time.



Location map for Kankaria Lake

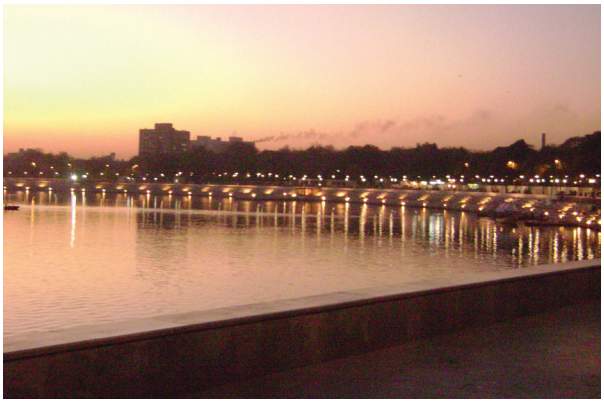
PRESENT DEVELOPMENT



Aerial view of Kankaria Lake, 2012

ACTIVITY PATTERNS ON THE LAKE EDGE

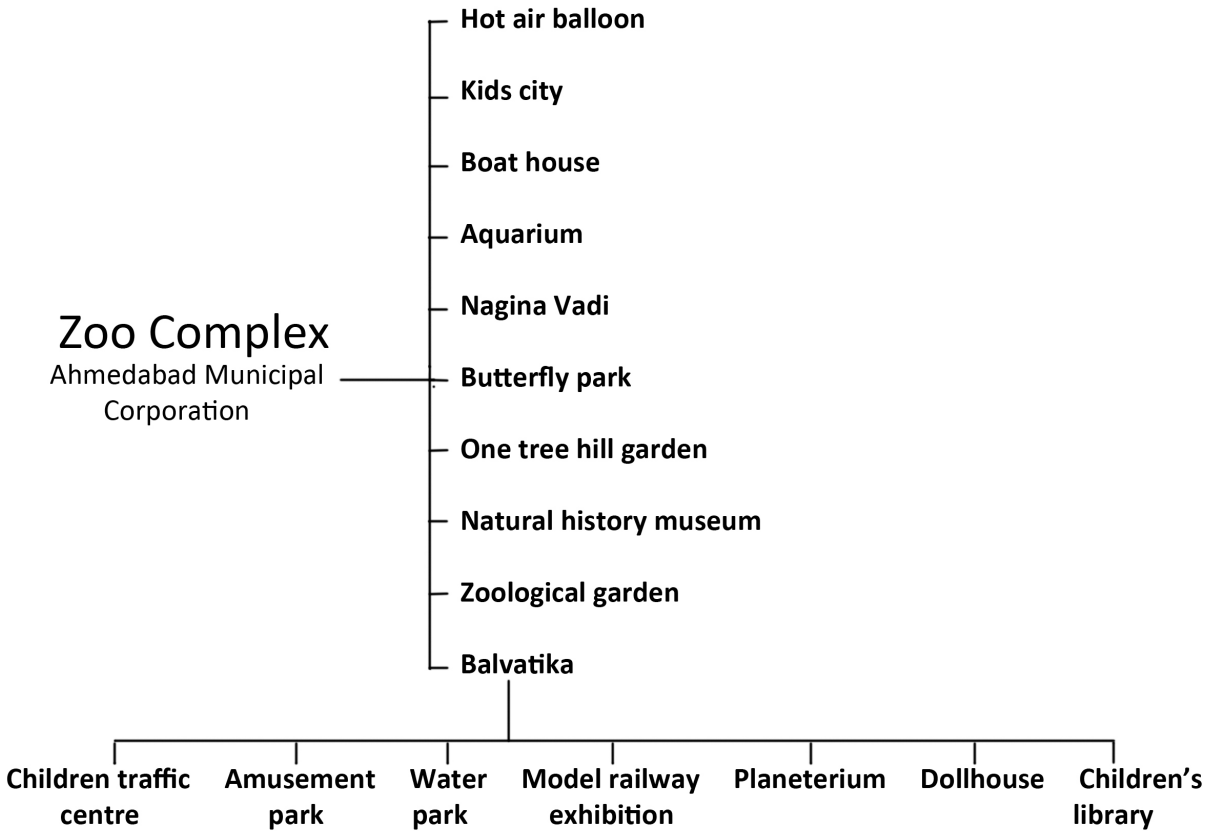
- Lake edge is mainly surrounded by informal eateries and some amusement activities . The lake is also used for boating and other water sports which is popular among the visitors.
- Due to the lake and surrounding dense vegetation it attracts many migratory birds.
- The zoo is located along the edge of the Kankaria lake which is one of the significant destinations for the city dwellers as well as the visitors.
- The zoo in the vicinity plays a significant role in adding generating vitality to the space.
- A children's train runs around the lake connecting all the abutting activities.



FACILITIES SURROUNDING THE ZOO

The zoo is surrounded by a variety of activities that attract a lot of city dwellers and visitors. The precinct is very popular among all age groups, and especially with children.

There are recreational activities like boating, cart rides, glider rides at One tree hill gardens, musical fountains at Naginavadi, etc. There are also educational activities like Amusement park, Water Park at Balvatika, Children traffic Centre, Model Railway exhibition, Planetarium, Doll house, Children's library, Boat house, Reuben David natural history museum, etc. The precinct also offers facilities like open air theatre for hosting cultural / educational programs.



DIFFICULTIES FACED

Firstly, the zoo in the past did not have adequate lands to comfortably house the number of animals it had. Also, there were problems with availability of land in the surrounding areas to consider the option of extending the zoo. At present, the zoo authorities and the Municipal Corporation are adding lands to the zoo, to facilitate its extension and house more animals comfortably.

Secondly, the zoo did not have enough funds for its further development - to procure land and animals. With the help of organizations like; Friends of Zoo and Central Zoo Authorities, the funds are made available for the betterment of zoo and life of the animals residing in it. Also with a lot of visitors visiting the zoo in the recent years, the zoo has made itself self supportive, financially.

Thirdly, the zoo did not have expertise inputs for animal welfare. Today the zoo is provided with an expertise team by CZA and other organizations for the betterment of animals residing in the zoo. The zoo also had problems with acquiring new species – availability of animals for its collection plan. This problem is solved to an extent but not completely.

chapter II

APPRAISAL OF PRESENT ARRANGEMENT AND CONSTRAINTS

a Present arrangement and constraints

Animal Section

Veterinary Section

Store And Feed Section

Sanitation Section

Maintenance and security Section

Water Supply Section

Disposal Of Solid Waste And Liquid

Visitors Amenities

Lawns And Garden - Landscape Section

Visitors Circulation

Signages

Topography

b Collection Plan

c General Zoo Administration Section

d Research

e Conservation Breeding

f Education and Awareness

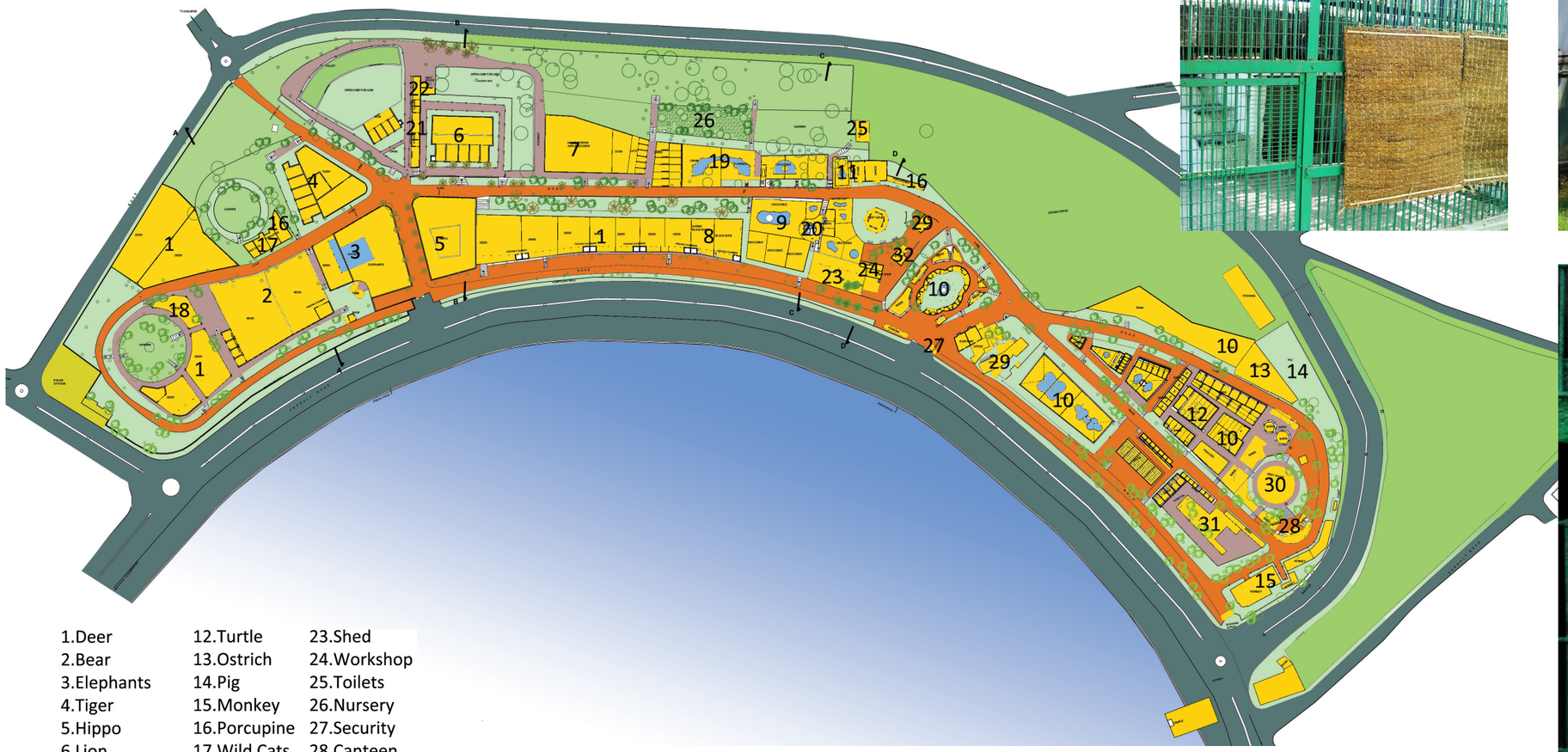
g Other Activity Peculiar to the Zoo

h Summary

a

PRESENT ARRANGEMENT AND CONSTRAINTS

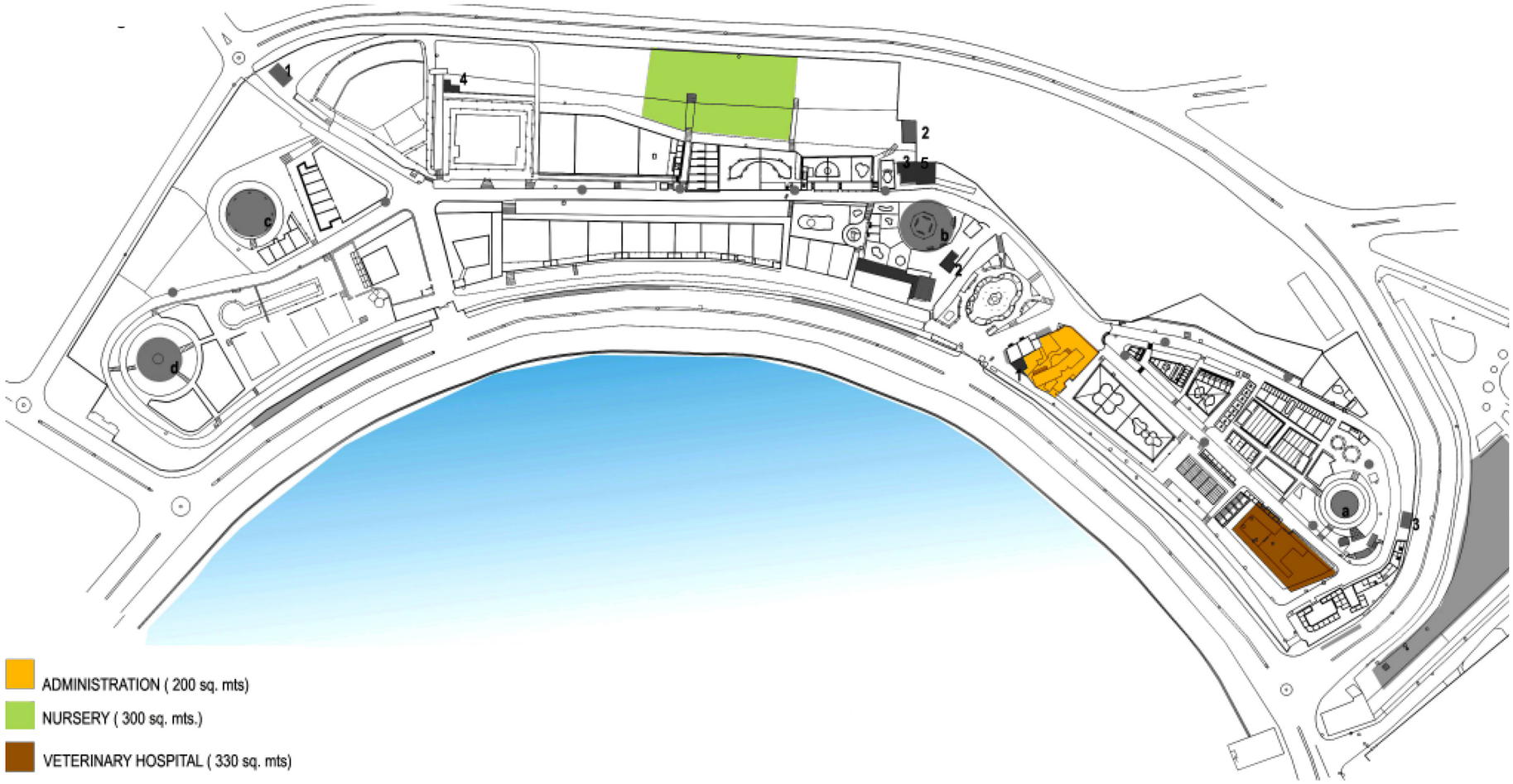
ANIMALSECTION-ENCLOSURES



1.Deer
2.Bear
3.Elephants
4.Tiger
5.Hippo
6.Lion
7.Manipur Brow Antlered Deer
8.Black Buck
9.Crocodile
10.Birds
11.Otter
12.Turtle
13.Ostrich
14.Pig
15.Monkey
16.Porcupine
17.Wild Cats
18.Hyena
19.Crane& Flamingo
20.Watercats
21.Wolf
22.Jackal
23.Shed
24.Workshop
25.Toilets
26.Nursery
27.Security
28.Canteen
29.Office
30.Rest house
31.Hospital
32.Store

- Most enclosures at the zoo are made decades ago and are of the cage type.
- They do not provide any enrichment to the animal. Hence many animals display boredom.
- The animals are displayed locked up in their feeding enclosures.
- Several enclosures are not of adequate size.
- The material of the cages is showing wear and tear and decay.
- The enclosures are stacked one after the other,often without any gap in between.

VETERINARY SECTION



ADMINISTRATION (200 sq. mts)

NURSERY (300 sq. mts.)

VETERINARY HOSPITAL (330 sq. mts)

Present arrangements and constraints

- The zoo has a veterinary doctor as the zoo director.
- The zoo has a veterinary hospital which was recently renovated. It has facilities like operation theatre - well equipped with medical equipment and a laboratory to conduct regular tests of animal samples.
- The hospital has both indoor and outdoor facilities for the patients.
- The zoo provides round the clock veterinary services to its residents and rescued animals. It has 2 veterinary doctors who render their services in alternate shifts.
- The hospital is linked with an outdoor space where rescued animals are kept.

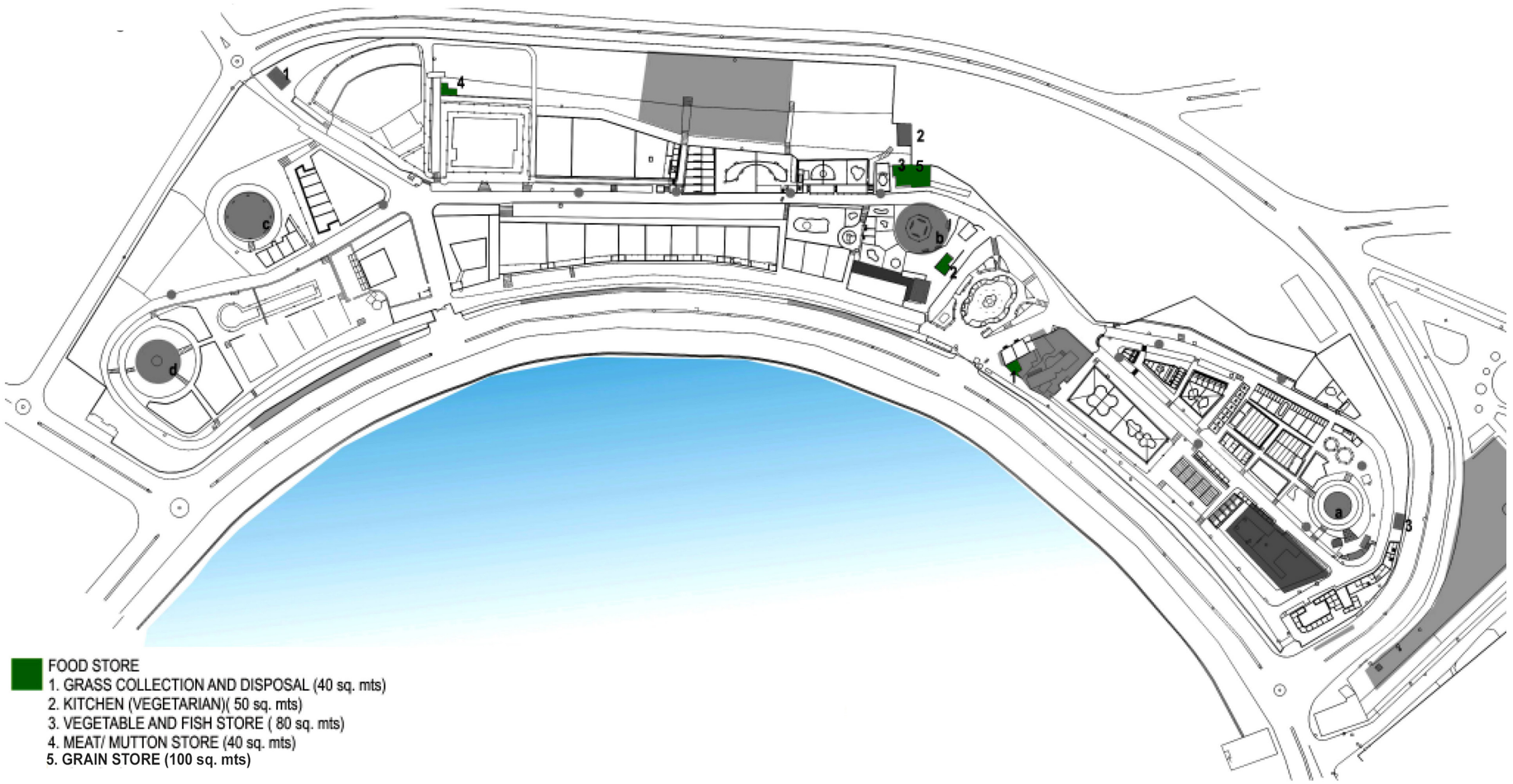
Veterinary Hospital

Veterinary Hospital - Laboratory

Veterinary Hospital - Operation Theatre

Administration

STORE AND FEED SUPPLY SECTION



FOOD STORE
1. GRASS COLLECTION AND DISPOSAL (40 sq. mts)
2. KITCHEN (VEGETARIAN)(50 sq. mts)
3. VEGETABLE AND FISH STORE (80 sq. mts)
4. MEAT/ MUTTON STORE (40 sq. mts)
5. GRAIN STORE (100 sq. mts)

Vegetarian Store

Grain Store

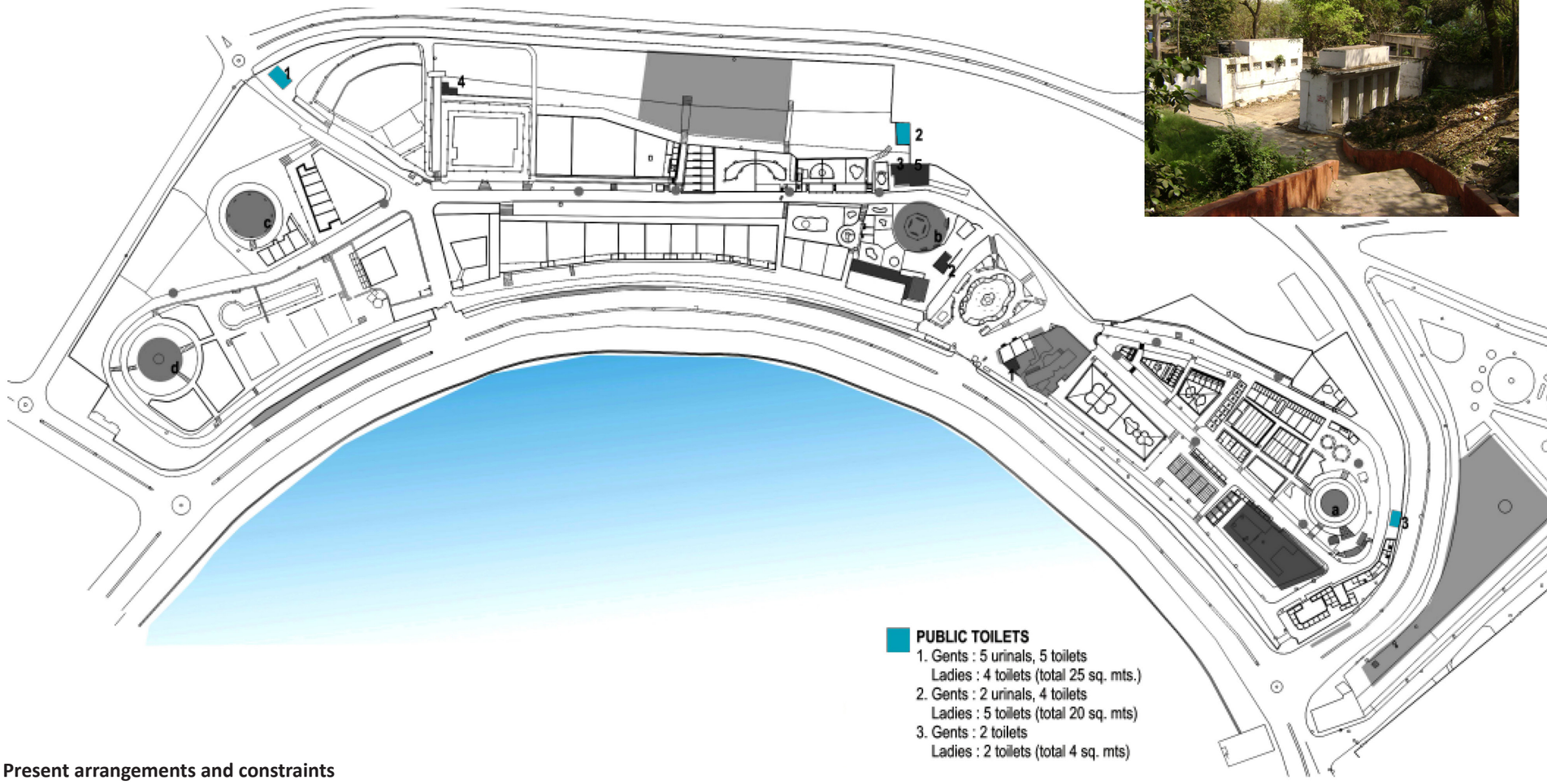
Kitchen

Meat/mutton Store

Present arrangements and constraints

- There are 5 animal food stores – grains, grass collection and disposal, Kitchen (vegetarian), vegetable and fish store and meat/ mutton store at different locations.
- The stores are located directly on the visitors' route.
- The areas allocated to each of these stores are inadequate.

SANITATION SECTION



PUBLIC TOILETS
1. Gents : 5 urinals, 5 toilets
   Ladies : 4 toilets (total 25 sq. mts.)
2. Gents : 2 urinals, 4 toilets
   Ladies : 5 toilets (total 20 sq. mts)
3. Gents : 2 toilets
   Ladies : 2 toilets (total 4 sq. mts)

Toilets

Toilets

Drinking water spot

Drinking water spot

Drinking water spot

Present arrangements and constraints

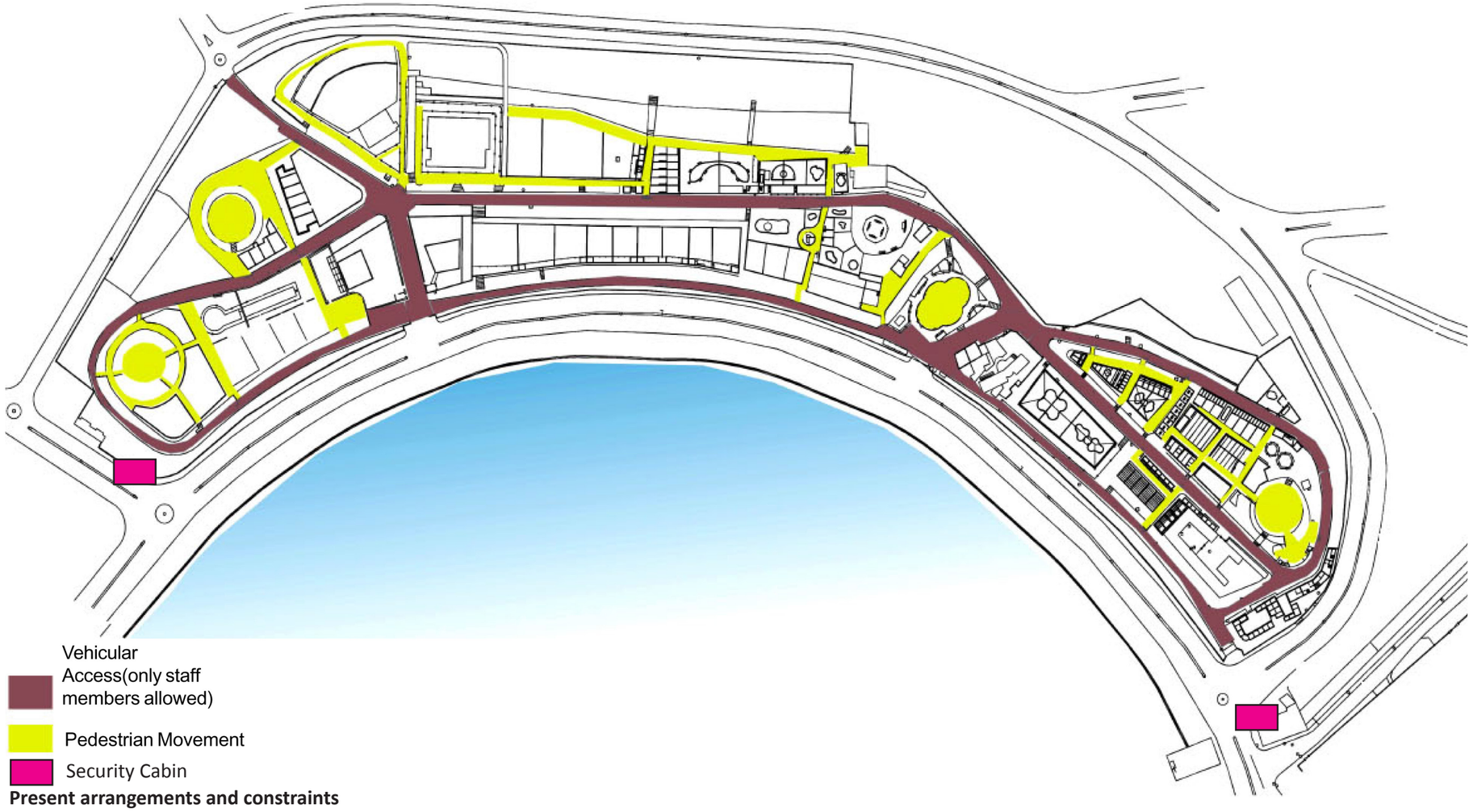
for Visitors

- Drinking water points for the public are not only inaccessible and inadequate but also ill-maintained.
- Public toilets are inadequate in number for the number of visitors visiting the zoo,though some recent additions have been made.
- Locations of these toilets are inappropriate. Neither are they located at regular intervals along the route nor are clearly visible to the visitors. These toilets are also ill-maintained.
- Public toilets are not easily accessible by the differently able.

for Animals

- All enclosures are provided with drinking water tanks and the water supply is controlled by the personnel.

MAINTENANCE AND SECURITY SECTION



Vehicular Access(only staff members allowed)

Pedestrian Movement

Security Cabin

Present arrangements and constraints

- Vehicular access, only for staff members, is provided to all enclosures, for emergencies.
- This access is the same as visitors' movement route and thus they conflict.
- The vehicles from visitors are restricted to the parking on the periphery.
- The surface of the vehicular access is done in tar, some of the pedestrian routes are either paved in tiles or have flagstones in cases of sidewalks. However the quality of the same is poor.
- Shady trees, and sometimes elements like pergolas with creepers are used to create shade along walkways.
- However, in cases of some cages and aviaries, shading elements are completely absent.
- The access to the cages is sometimes as narrow as 2.5m, which can be a hindrance to the vehicles.

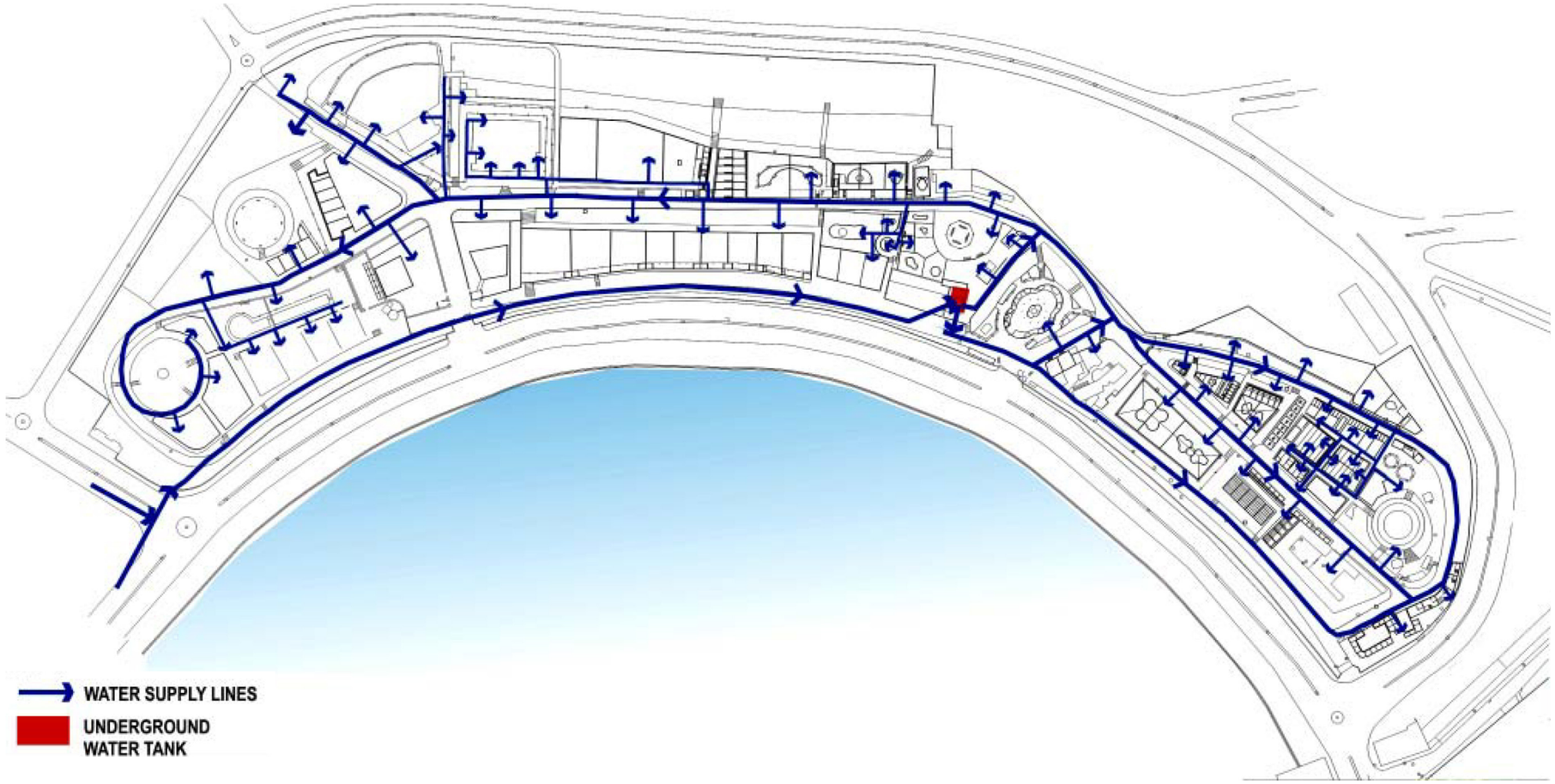
Conflict between visitor's movement and service movement

Vehicular path in tar and pedestrian in paved tiles

Use of pergola with creepers

Narrow alleys sometimes inaccessible for service vehicles

WATER SUPPLY SECTION



Water pipes

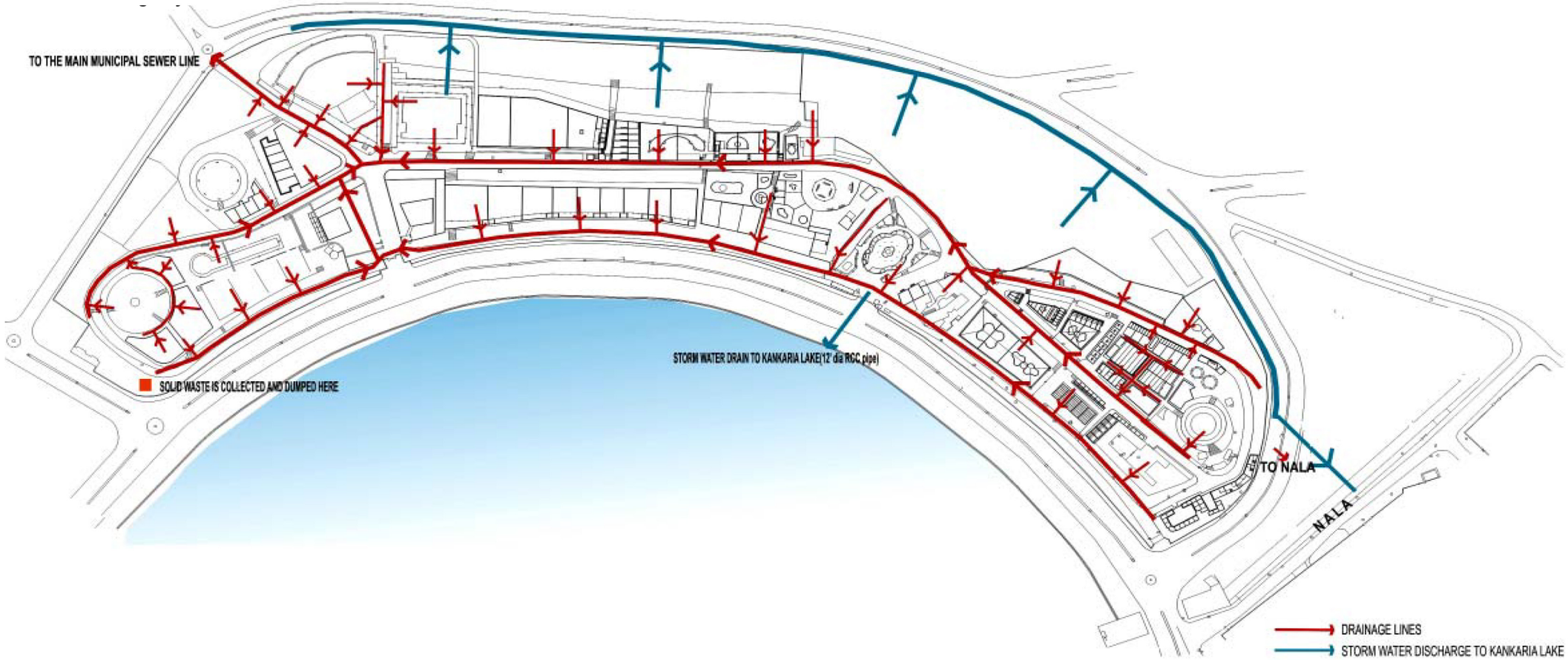
Waterbody

Water tank

Present arrangements and constraints

- The water is supplied to the site through :
  (1) One tree Hill Garden Bore Well and (2) Pilot tube well station (Municipal Corporation)
- Main Pipe line diameter 6” G. I Pipe, whereas the rest vary from 2” to 4” cast iron pipe.
- Nearly 500 water points exist inside enclosures and around the road side.
- No overhead tanks exist.
- Two submersible pumps; pump the water throughout the site.
- The timings of the water supply are 8 a.m. to 12 p.m. and 2 p.m. to 6 p.m.
- The size of water tank is 8 X 6 X 6m; the total capacity of this water tank is 3 lakh gallons. The water is emptied and refilled twice a day; hence the total consumption is 6 lakh gallons per day.

DISPOSAL OF SOLID AND LIQUID WASTE
SEWERAGE



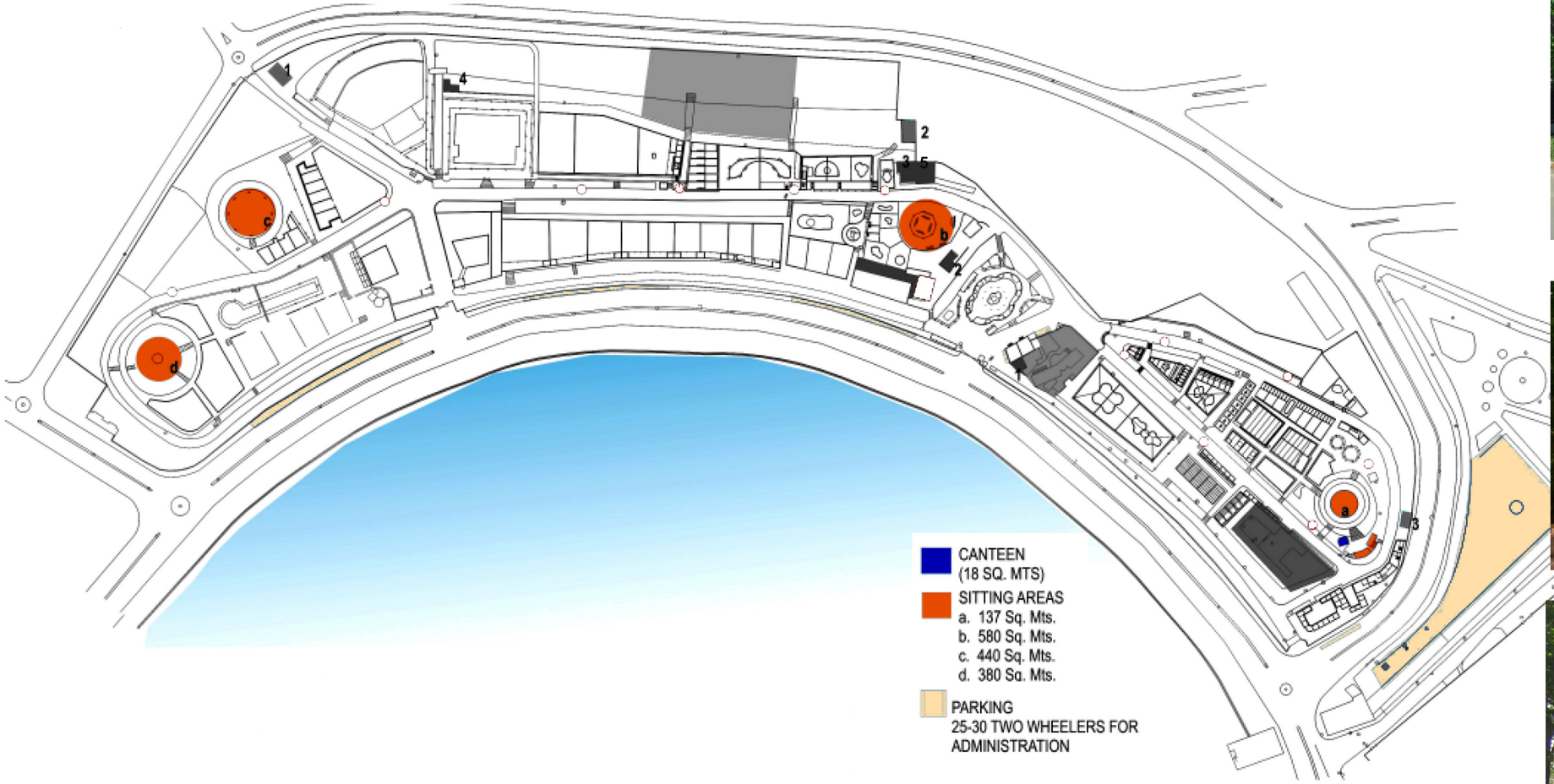
Present arrangements and constraints

- There is no provision for solid waste recycling.
- Drainage pipe is of 42” diameter.
- The internal lines are connected to municipal sewer lines passing through the North edge of the roadside.
- The solid waste is collected at a point and is taken away from the site by municipal van, daily.
- Location of solid waste disposal is inappropriate because it happens from a single point only.
- The storm water drains itself in two ways:
  (1) Towards Kankaria lake through 12” underground R.C.C pipe,
  (2) Towards Nala running on the east/ west edge of the site.

Water inlet and outlet for individual enclosure

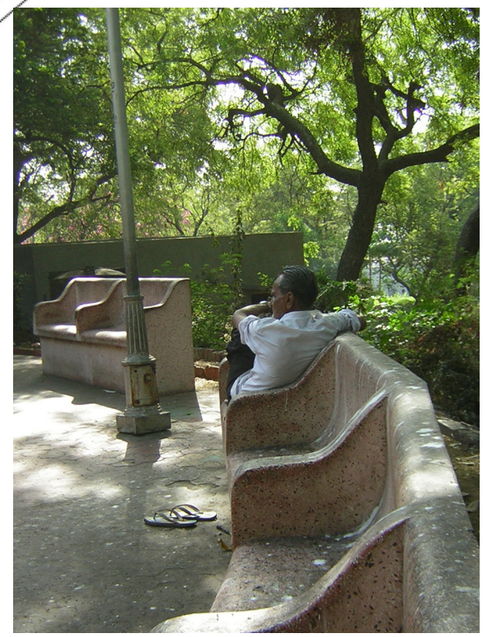
Open pit for waste collection

VISITOR'S AMINITIES SECTION



Canteen

Resting area


Sitting area

Present arrangements and constraints

- The food stall is cumbersome to access because of its location on the elevated plane.
- The visitor route is reasonable long and there are inadequate pause areas for visitors to sit and rest.
- The parking for two-wheelers and four-wheelers for public is not separate. Also the location of parking facility is cumbersome, since it is away from the entrances.
- There are no signages for the facilities.
- The movement often has cages on both sides leading to a lot of criss crossing.
- The facilities are designed like ordinary stalls and do not contribute to any special experience.

LANDSCAPE SECTION

Transparent compound wall does not form much of a buffer for noise pollution

Present arrangements and constraints

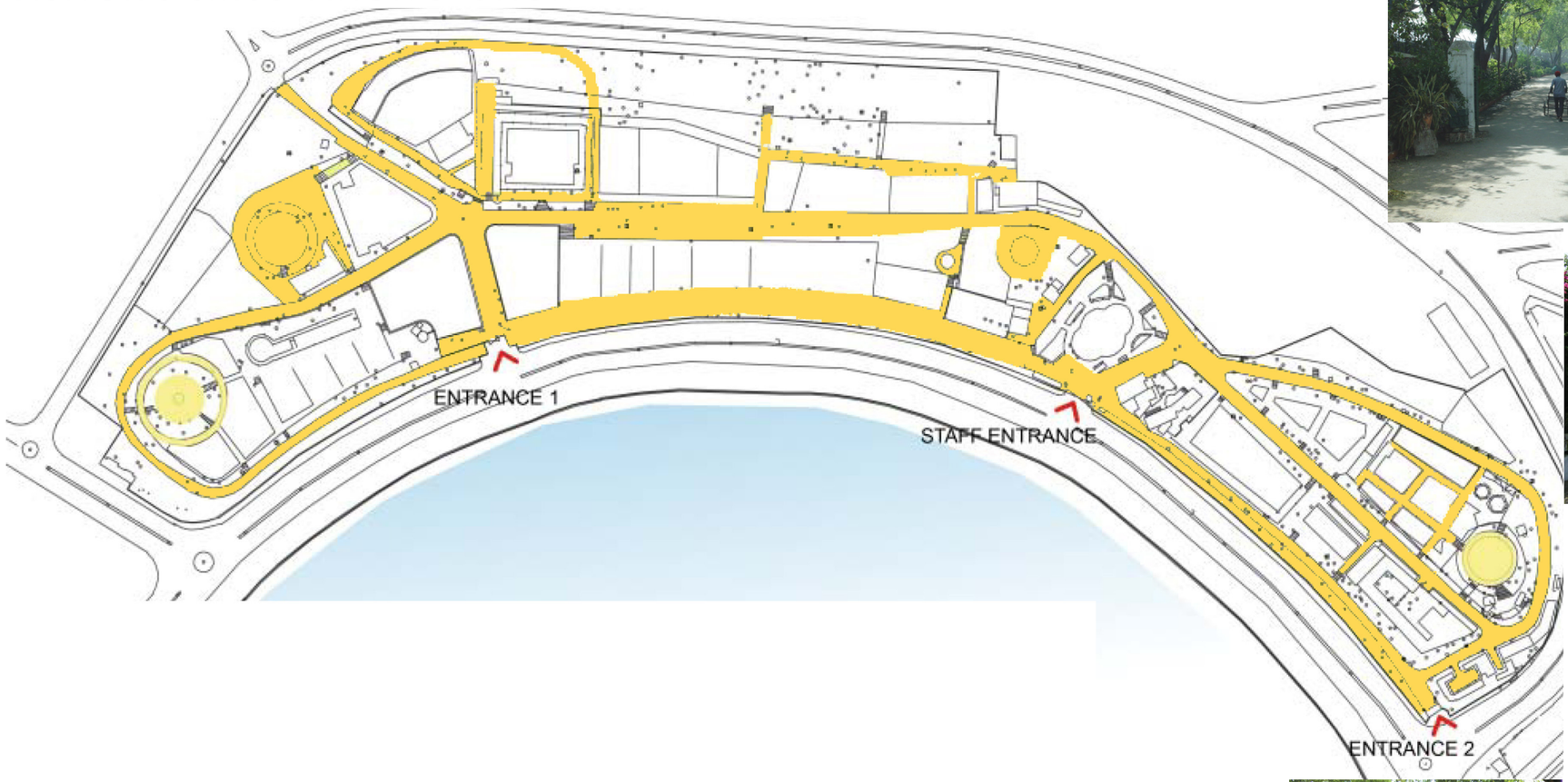
- Tree foliages on the site edges provide good shade to the footpath, however they do not act sufficiently as a buffer on lower levels.
- The recently acquired adjacent plot does not have much vegetation except for a few trees.
- The visitors' routes are shaded by means of large shady trees – Neem, Asopalav, Peepal, Banyan and other larger ficus varieties are used.
- The retaining walls are mostly covered by means of vegetation which grows in the shade, hence mostly crotons and other small shrubs and herbs are used.
- The walkways are covered by means of low pergolas having creepers. The creepers are mostly Parda vel and Bougainvillea, which have a good spread and flowering.
- The enclosures for herbivorous animals are not provided with ground cover, but are provided with shady tall trees.
- Reptile house is shaded with creepers, but it is sparse to contribute to the climatic conditions of the enclosure.
- Trees on both sides of the walkways create an avenue for the visitors.

Reptile house shaded with sparse creepers

Creepers on enclosures

Retaining walls covered with vegetation

VISITOR'S CIRCULATION SECTION



Diverging routes in Kankaria Zoo

Entrance to Kankaria Zoo

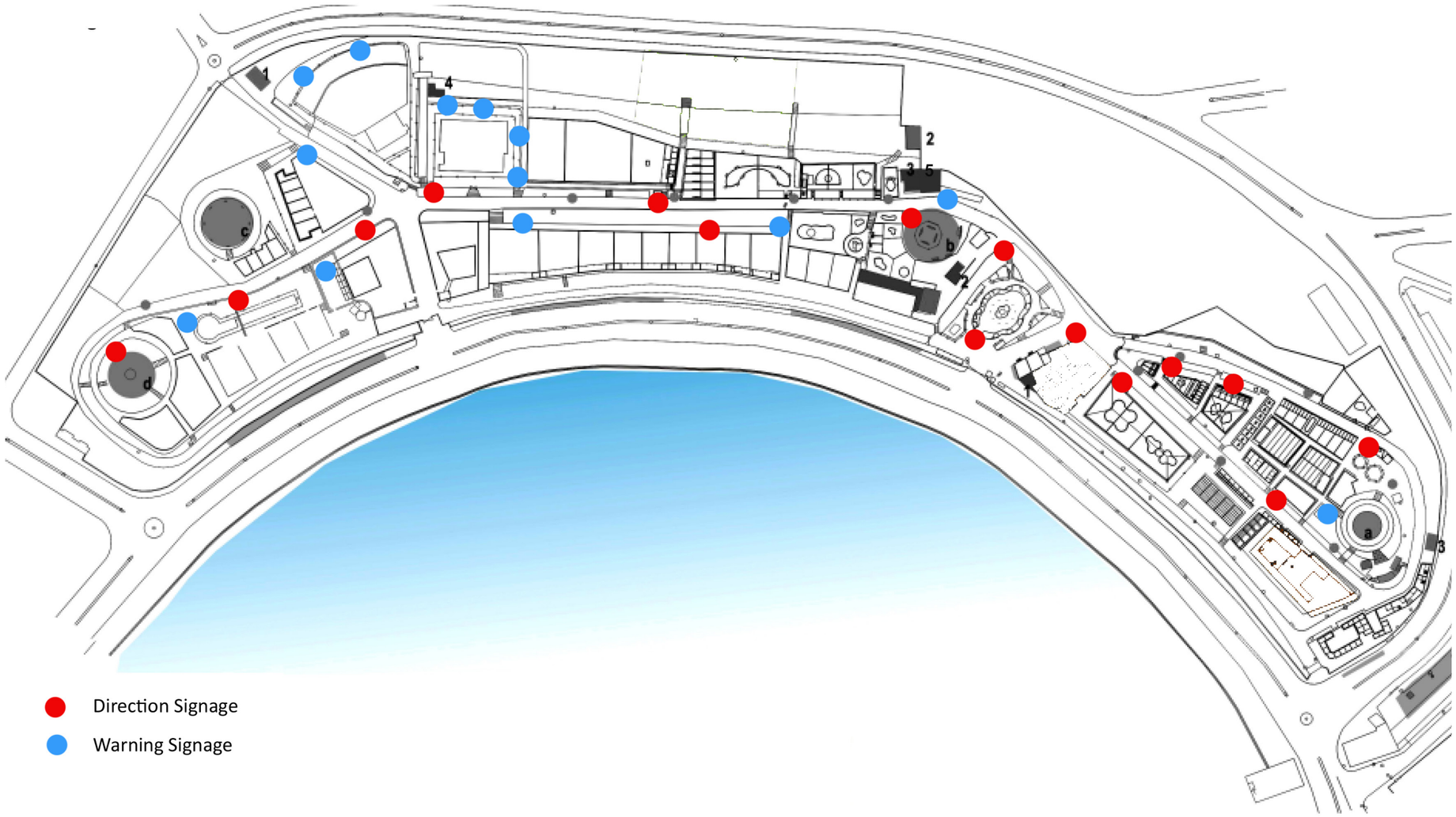
Entrance to Kankaria Zoo

Diverging routes in Kankaria Zoo

Present arrangements and constraints

- As seen in the plan most of the routes taken by the visitors result into repetition and/or omissions of certain enclosures.
- The route taken from both the gates thus creates confusions and conflicts.
- Visitors spend on an average 1-2 hours in the zoological park.
- Visitors' vehicles are forbidden from coming inside the zoo. Only authorized vehicles from the zoo are allowed to reach the enclosures for feeding, cleaning and other service purposes.
- Only in case of emergencies of shifting of animals authorized vehicles are allowed.
- Visitors view animals from an elevated plane,generally considered an unethical practise.

SIGNAGES



Direction Signage

Warning Signage

Directional Signages

Directional Signages

Informative Signage

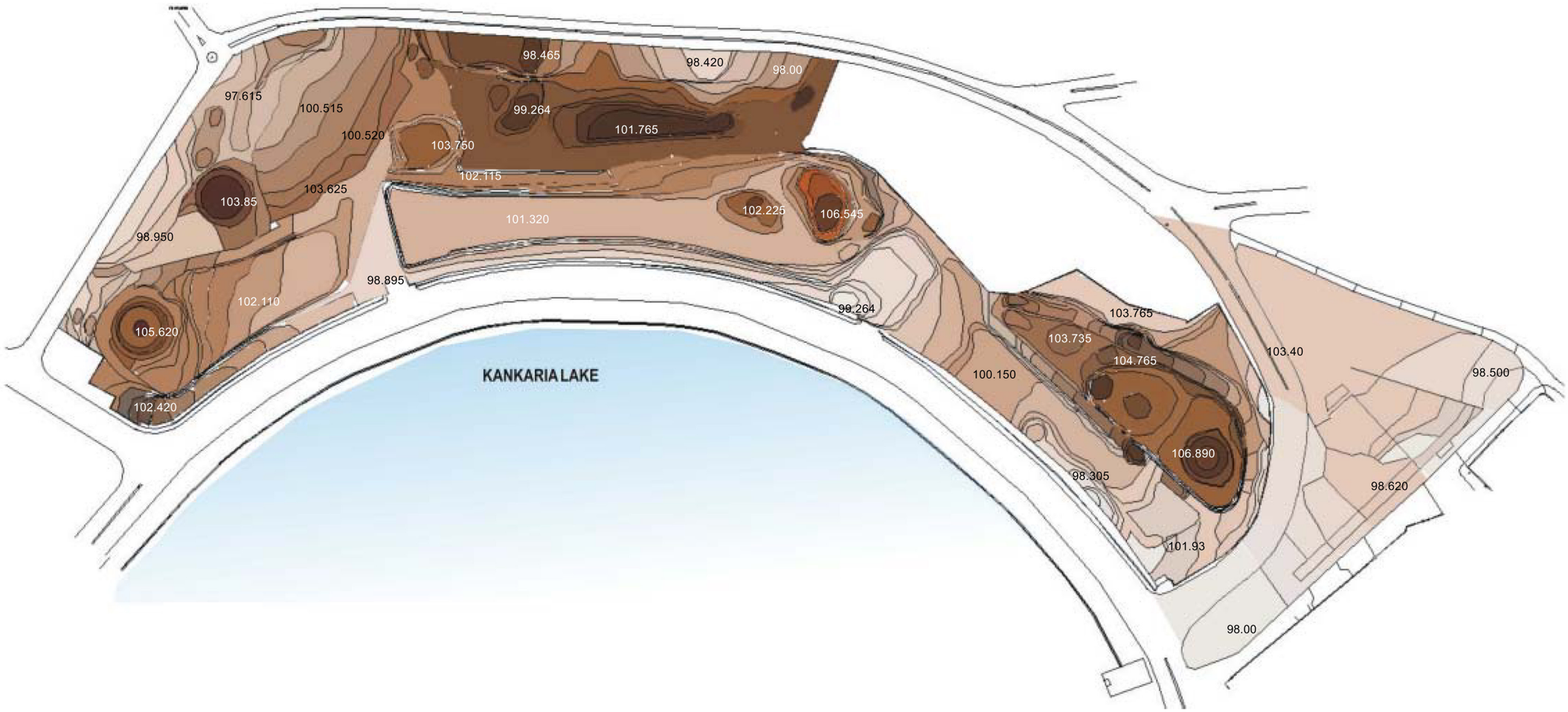
Warning Signage

Warning Signage

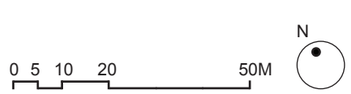
Present arrangements and constraints

- The signages for the enclosures need to be designed sensitively.
- The existing signages are rusting and deteriorating due to their exposure to harsh climate.
- They are all different, using different typology and this does not present a consistent picture.
- The visibility is poor and they are hardly read.

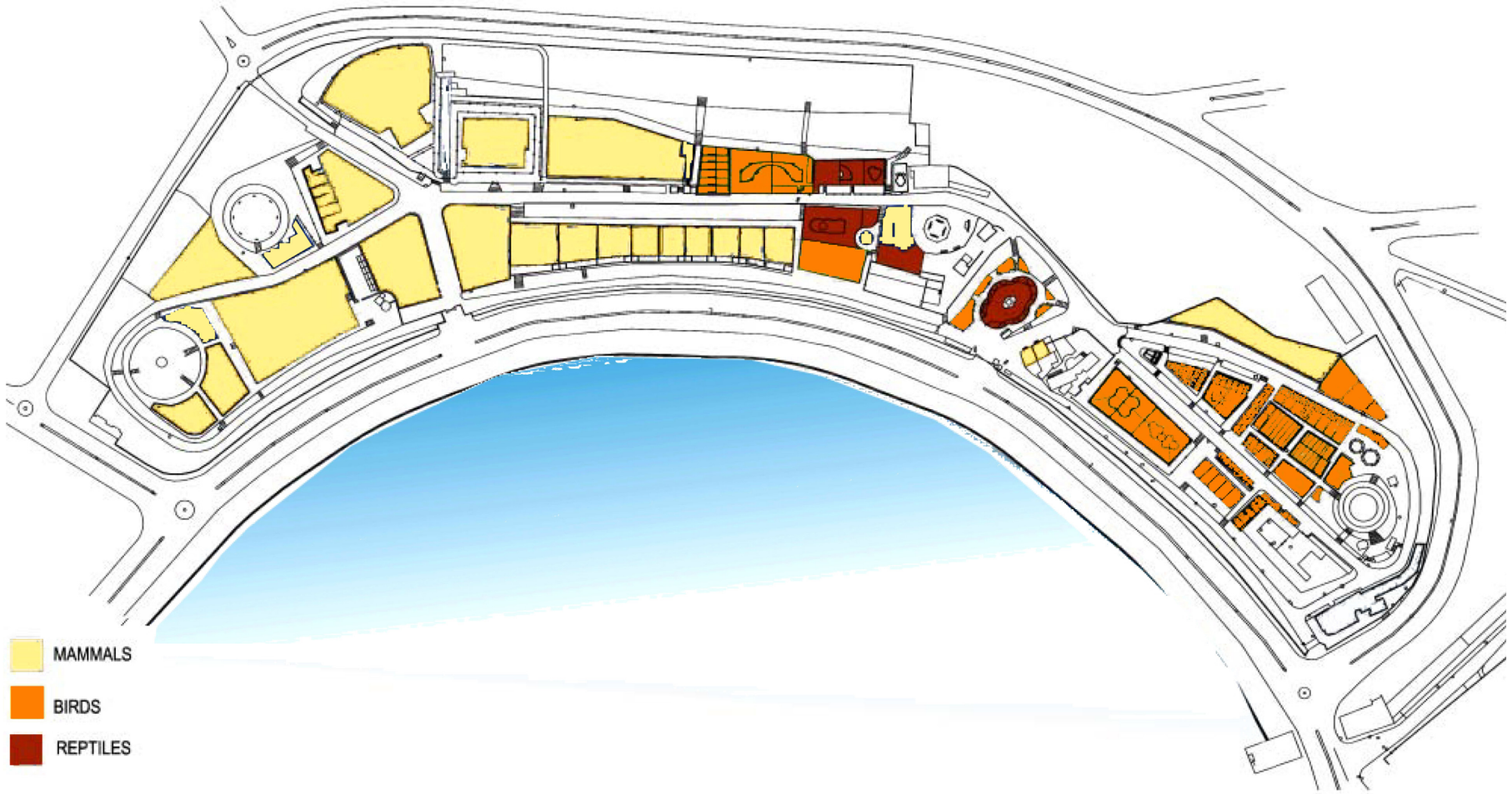
TOPOGRAPHY OF THE SITE



- The site topography is sloping on the Northern as well as the Southern edge, with the ridge forming the central spine.
- Thus the storm water should drain along these natural slopes and the necessary water catchments should be adequately located so as to take the maximum advantage of the site. The proposal should control undesirable visual contacts between various species.
- The contours site offers a good potential for the viewing points, especially visual links to Kankaria lake.
- Animal Health conditions are directly related to natural waste water drainage in its immediate surroundings. Sensitive usage of topography of the site has a direct implication of storm water drain and maintaining the dryness or wetness of the soil conditions.



ANIMAL SECTION-ZONING



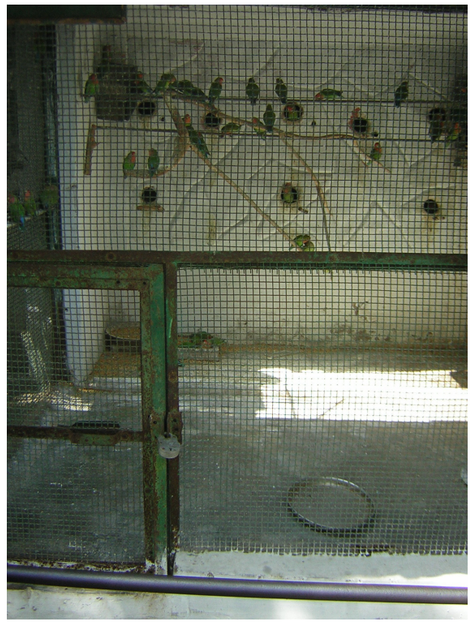
Present arrangements and constraints

- The theme for display is taxonomic – mammals, reptiles and birds.
- Some bird enclosures are located amidst carnivores' enclosures. This forms mismatch both in terms of social set-up of animals and chronology of display for visitors.
- Antlers and antelopes are scattered.
- Birds are scattered.
- Thematically, there is no consistency.
- Random additions also makes it inconsistent.

Enclosures for crocodiles

Enclosures for snakes

Aviaries and cages for birds



Enclosures for birds

b ANIMALCOLLECTION PLAN EXISTING 2011-2012

Ahmedabad Zoo

Schedule I

	Species	Opening stock as on 1/4/2011	During Birth	the Year Acqstn	Sale	Disposal	Death	Closing stock as on 31/3/12
S.N.	**BIRDS**	M F U T	M F U	M F U	M F U	M F U	M F U	M F U T
1	Hawks(Accipitridae)	nil						nil
2	Peafowl (Pavo cristatus)	... ... 30 30	 3				1 2 ..	... ... 30 30
3	Pheasant Peacock (Polyple	nil						nil
	ctron bicalcaratum)							
4	Pigeon Nicobar (Caloenas	... ... 21 21	2					... ... 23 23
	nicobarica pelewensis)							
5	Spoonbill White (Platalea	10 8 1 19	 4					10 9 4 23
	leucorodia)							
	TOTAL BIRDS	10 8 52 70	 9				1 2 ...	10 9 57 76

	Species	Opening stock as on 1/4/2011	During Birth	the Year Acqstn	Sale	Disposal	Death	Closing stock as on 31/3/12
S.N.	**MAMMALS**	M F U T	M F U	M F U	M F U	M F U	M F U	M F U T
6	Ass Wild Indian-Ghorkhar	nil						nil
	(Equus heminous khur)							
7	Bear Himalayan Black	1 1 2						1 1 02
	(Selenarctos thibetanue)							
8	Bear Sloth	1 1 ... 02					... 1 ...	1 01
	(Melursus ursinus)							
9	Binturong	nil						nil
	(Arctictis binturong)							
10	Black Buck- Krishna Mrig	2 02					1	1 01
	(Antilope cervicapra)							
11	Black Buck- White	6 4 2 12	 2				3 1 ...	5 3 2 10
12	Cat Jungle	nil						nil
	(Felis chaus)							
13	Cat Leopard	1 01					1	nil
	(Felis bengalensis)							
14	Chinkara- Indian Gazella	nil						nil
	(Gazelia gajelia bennetti)							
15	Civet Common Palm	nil						nil
	(Paradoxurus hermaphco-							
	ditus)							
16	Civet Himalayan Palm	nil						nil
	(Pagoma larvata)							
17	Deer Brow-Antlered-Sangai	nil						nil
	Manipur (Cervus eldi eldi)							
18	Deer Swamp	1 01						1 01
	(Cervus duvauceli)							
19	Elephant Indian	... 1 ... 01						... 1 ... 01
	Elephas maximus							
20	Jackal	5 3 1 09	 3				1	5 3 3 11
	(Canis aureus)							
21	Langur Capped	nil						nil
	(Presbytis pileatus)							
22	Langur Common	9 2 ... 11		2				11 2 ... 13
	(Presbytis entellus)							
23	Leopard / Panther	4 4 08						4 4 ... 08
	(Panthera pardus)							
24	Lion Indian	1 1 02						1 1 02
	(Panthera leo persica)							
25	Loris Slow	nil						nil
	(Nycticebus coveang)							
26	Macaque Bonnet	7 1 ... 08					1	6 1 ... 07
	(Macaca radiata)							
27	Macaque Pig Tailed	nil						nil
	(Macaca nemestrina)							

ANIMAL COLLECTION PLAN
EXISTING
2011-2012

		Opening stock as	During	the Year				Closing stock
		on 1/4/2011	Birth	Acqst	Sale	Disposal	Death	as on 31/3/12
S.N.	**MAMMALS**	M F U T	M F U	M F U	M F U	M F U	M F U	M F U T
28	Macaque Rhesus	21 22 4 47	 4				1 1	22 23 4 49
	(Macaca mulatta)							
29	Macaque Stump Tailed	nil						nil
	(Macaca speciosa)							
30	Otter Common	1 2 ... 03					1 1 ...	... 1 ... 01
	(Lutra lutra)							
31	Porcupine Bengal	... . 39 39	 3				1	... ... 41 41
	(Hystrix indica)							
32	Ratel	nil						nil
	(Mellivora capensis)							
33	Tiger bengal	1 2 ... 03					... 1 ...	1 1 ... 02
	(Panthera tigris tigris)							
34	Tiger bengal (White)	nil						nil
	(Panthera tigris tigris)							
35	Wolf Indian	nil						nil
	(Canis lupas pallipes)							
	TOTAL	61 44 46 151	 12	2			10 5 ..	59 41 50 150

		Opening stock as	During	the Year				Closing stock
		on 1/4/2011	Birth	Acqst	Sale	Disposal	Death	as on 31/3/12
S.N.	**REPTILES**	M F U T	M F U	M F U	M F U	M F U	M F U	M F U T
36	King cobra	nil						nil
37	Cobra Indian	... . 15 15						.. ... 15 15
	(Naja naja)							
38	Crocodile Long Snouted-	.... . . 04 04						.... 04 04
	Gharial (Gavialis ganget-							
	icus)							
39	Crocodile Marsh (Mugger)	.... 18 18						... .18 18
	(Crocodylus palustris)							
40	Crocodile Salt Water	2 1 ... 03						2 1 ... 03
	(Crocodylus porosus)							
41	Monitor Lizard/ Common In-	1 2 ... 03						1 2 ... 03
	dian (Varanus bengalensis)							
42	Monitor Water Lizard	... 1 ... 01					... 1 ...	nil
	(Varanus salvator)							
43	Python Indian-Rock	... ... 6 06		 1				... ... 7 07
	(Python molurus molurus)							
44	Snake Russel's Viper	... ... 4 04						... ... 4 04
45	Snake Keelback Checkered	... . 7 07						... ... 7 07
	(Zeno chrophis piscator)							
46	Snake Rat/ Dhaman	... ... 3 03						... ... 3 03
47	Krait	... ... 3 03					 1	... ... 2 02
	TOTAL	3 4 60 67		 1			... 1 1	3 3 60 66

ANIMAL COLLECTION PLAN
EXISTING
2011-2012

		Opening stock as	During	the Year				Closing stock
		on 1/4/2011	Birth	Acquisit	Sale	Disposal	Death	as on 31/3/12
S.N.	BIRDS	M F U T	M F U	M F U	M F U	M F U	M F U	M F U T
1	Babbler Common	... ... 4 04					 1	... ... 3 03
	(Turdodies caudatus)							
2	Budgriger	... ... 340 340	 62		 34		 22	.. ... 346 346
	(Melopsittacus undulatus)							
3	Bulbul Red Vented	nil						nil
	(Pycnonotus cafer)							
4	Cannary	nil						nil
5	Cardinal Red Crested	nil						nil
6	Cassowary	1 01						1 01
7	Cebia Black Headed	nil						nil
8	Cockatiel	... ... 368 368	 74		.. . 28	4 4 ...	 17	... ... 389 389
	(Nymphicus hollandicus)							
9	Cockatoo	... . 6 06						... ... 6 06
10	Connure Black Headed	nil						nil
11	Connure Brown Eared	... . 7 07					1	... ... 6 06
12	Connure Jandaya	nil						nil
	(Aratinga jandaya)							
13	Connure Patagonian	5 1 ... 06						5 1 ... 06
14	Connure Peruyian	nil						nil
15	Connure Red Headed	2 1 03						2 1 ... 03
16	Cormorant Little	.... 17 17	 6					... ... 23 23
	(Phalacrocorax niger)							
17	Crane Crowned	1 1 02						1 1 ... 02
	(Grus grus)							
18	Crane Demoseille	nil						nil
	(Anthropoidus virgo)							
19	Crane Sarus	nil						nil
	(Grus antigone)							
20	Crow White	nil						nil
	(Corvus splendens)							
21	Dove rufous turtle	... ... 19 19						... ... 19 19
22	Duck Brahminy-Ruddy She-	nil						nil
	l Duck (Tadorna ferruginea)							
23	Duck Comb	... ... 39 39				2 2 ...	5 6	... ... 24 24
	(Saskidiornis aelanotos)							
24	Duck common	nil						nil
25	Duck Pin Tail	nil						nil
	(Anas acuta)							
26	Duck Spotbill	nil						nil
	(Anas poecilornyncha)							
27	Egret Cattle	.... 12 12	 2					... . 14 14
	(Bubulcus ibis)							
28	Emu	... . 04 04					... 1 ...	... . 03 03
	(Dromaius novaeholladiae)							
29	Finches	... ... 12 12					2	... ... 10 10

ANIMAL COLLECTION PLAN
EXISTING
2011-2012

		Opening stock as	During	the Year				Closing stock
		on 1/4/2011	Birth	Acquisit	Sale	Disposal	Death	as on 31/3/12
S.N.	BIRDS	M F U T	M F U	M F U	M F U	M F U	M F U	M F U T
30	Flamingo	... ... 10 10					... 1 ...	... ... 9 09
	(Phoenicopterus roseus)							
31	Fowl Jungle Grey	nil						nil
	(Gallus sonneratii)							
32	Fowl Jungle Red	nil						nil
	(Gallus gallus)							
33	Fowl Painted Spur	nil						nil
	(Gallopardix lunulata)							
34	Fowl Red Spur	1 01						1 01
	(Gallopardix spadiceal)							
35	Goose	nil						nil
	(Anser anser)							
36	Goose Bar Headed	nil						nil
	(Anser indicus)							
37	Goose Canadian	nil						nil
38	Goose Grey Leg	nil						nil
39	Heron Grey	nil						nil
	(Ardea cinevea)							
40	Heron Indian Reef	... . 1 01						... ... 1 01
	(Egretta gularis)							
41	Heron Night	... ... 39 39	 8				 2	... ... 45 45
	(Nycticorax nycticorax)							
42	Heron Pond	nil						nil
	(Ardeola grayii)							
43	Hornbill Common Grey	nil						nil
	(Tockus bitrostis)							
44	Ibis Black	... ... 1 01						... ... 1 01
	(Preudibis papillosa)							
45	Ibis White	.... 30 30	 3			2 2 ...		.... 29 29
	(Thresk ornis acthiopica)							
46	Kite	.... 1 1						... . 1 1
47	Koel	1 ... 2 03						1 ... 2 03
	(Eudynamys scolopaces)							
48	Lapwing Red Wattled	.... 02 02						.... 02 02
	(Vauellus indicus)							
49	Lorry Black	nil						nil
50	Lorry Black Capped	nil						nil
51	Lorry Black Winged	nil						nil
52	Lorry Chattering	3 2 05					1 1 ...	2 1 ... 03
53	Love Birds	... ... 138 138	 7				 15	.. .. 130 130
54	Macaw Blue & Yellow	nil						nil
55	Macaw Illiger's	nil						nil
56	Macaw Military	nil						nil
57	Macaw Yellow Collard	nil						nil
58	Moorhen	nil						nil
	(Gallinula chloropus)							

ANIMAL COLLECTION PLAN
EXISTING
2011-2012

		Opening stock as	During	the Year				Closing stock
		on 1/4/2011	Birth	Acquisit	Sale	Disposal	Death	as on 31/3/12
S.N.	BIRDS	M F U T	M F U	M F U	M F U	M F U	M F U	M F U T
59	Moorhen Purple	nil						nil
	(Porphyria porphyria)							
60	Moorhen White Breasted	nil						nil
61	Munia Red	nil						nil
	(Estrilda amandava)							
62	Munia Spotted	nil						nil
	(Lonchura punctulata)							
63	Munia Three Colour	... . 1 01						... ... 1 01
64	Munia White Throated	nil						nil
	(Lonchura malabarica)							
65	Myna Brahminy	nil						nil
	(Sturnus pagodarum)							
66	Myna Common	... ... 4 04	 1					... ... 5 05
	(Acridotheres tristis)							
67	Myna Hill	... . 1 01						... . 1 01
	(Gracula religiosa)							
68	Myna Pied	nil						nil
69	Owl Barn	nil						nil
70	Pakin Robin	nil						nil
71	Parakeet	.... 11 11		 1			1 1 ...	... ... 10 10
	(Psittacula eupatria)							
72	Parakeet Alexandrine	.... 47 47	 6				2 4 ...	... ... 47 47
	(Psittacula eupatria)							
73	Parakeet Blossum Headed	3 3 ... 06					1	2 3 ... 05
	(Psittacula cyanocephala)							
74	Parakeet Rose Breasted	13 11 3 27					4 1 ...	10 12 ... 22
	(Psittacula krameril)							
75	Parakeet Rose Ring	25 22 4 51	 3				... 1 ...	26 24 3 53
	(Psittacula krameril)							
76	Partridge Grey	3 2 2 07					2 1...	3 1 ... 04
	(Francolinus pondicerianus)							
77	Partridge Swamp	nil						nil
	(Francolinus gularis)							
78	Peafowl White	3 5 08					... 1 ...	3 4 ... 07
	(Pavo cristatus)							
79	Pelican Dalmatian (Pelec-	... . 01 01						.... . 01 01
	anus philippensis crispus)							
80	Pelican Rosy/ White	17 19 3 39	1			1 1 ...		18 19 1 38
	(Pelecanus onocrotalus)							
81	Pheasant blue ring necked	2 1 ... 03						2 1 ... 03
82	Pheasant Edward	nil						nil
83	Pheasant Golden	1 01						1 01
	(Chrysolophus pictus)							
84	Pheasant Lady Amherset	1 1 2						1 1 02
	(Chrysolophus amherstiae)							
85	Pheasant Silver	5 6 ... 11					1	4 6 ... 10
	(Lophura nycthemera)							
86	Pigeon Crowned	6 1 07						6 1 ... 07
87	Pigeon Green Imperial	nil						nil
	(Ducula aenea)							
88	Pigeon pied imperial	1 1 ... 02						1 1 ... 02
	(Ducula bicolor)							

ANIMAL COLLECTION PLAN
EXISTING
2011-2012

		Opening stock as	During	the Year				Closing stock
		on 1/4/2011	Birth	Acqustn	Sale	Disposal	Death	as on 31/3/12
S.N.	BIRDS	M F U T	M F U	M F U	M F U	M F U	M F U	M F U T
89	Pigeon Southern Green	nil						nil
90	Quail Jungle Bush-Bater	nil						nil
	(Perdiula asiolica)							
91	Rosella Crimson	nil						nil
92	Rosella Eastern	nil						nil
93	Sea Gull Brown Headed	nil						nil
	(Larus brunnicephalus)							
94	Sparow Common	nil						nil
95	Sparow Java	... ... 121 121					 17	... ... 104 104
	(Padda oryzivora)							
96	Stilt Black Winged	nil						nil
	(Himantopus himantopus)							
97	Stork Adjutant	... . 01 01						.. ... 01 01
	(Leptoptilos dubius)							
98	Stork Black	nil						nil
	(Ciconia nigra)							
99	Stork Black Neck	1 01						1 01
	(Ephippiothynchus asiatius)							
100	Stork Painted	3 2 2 07		.. 1 ...			2	3 3 ... 06
	(Mycteria leucocephala)							
101	Stork White	nil						nil
	(Ciconia ciconia)							
102	Stork White Neck	... . 02 02						.... 02 02
	(Ciconia episcopus)							
103	Swan Black	nil						nil
	(Cygnus atratus)							
104	Teal Common	nil						nil
	(Anas crecca)							
105	Teal Lesser Whistling	... ... 3 03					 1	... ... 2 02
	(Dendrocygna javanica)							
106	Turaco White Cheeked	nil						nil
107	Vulture Black	nil						nil
108	Vulture King	nil						nil
	(Sarcogyps calvus)							
109	Vulture Scavenger	nil						nil
	(Neophron percnoptarus)							
110	Vulture White Backed-Ben	.... 11 11		 1				... .12 12
	gal (Gyps bengalensis)							
111	Weaver bird	.... 1 1						... ... 1 1
	(Ploceus phillepincus)							
112	Duck Japanese Carolina	nil						nil
113	Lorry Red/Molucan	... 1 ... 01						... 1 ... 01
114	Pheasant Japanese Green	nil						nil
	TOTAL	98 80 1270	 173	... 1 2	62	9 9 ...	20 18	94 81 1254
		1448					77	1429

ANIMAL COLLECTION PLAN
EXISTING
2011-2012

		Opening stock as	During	the Year				Closing stock
		on 1/4/2011	Birth	Acqstn	Sale	Disposal	Death	as on 31/3/12
S.N.	**MAMMALAS**	M F U T	M F U	M F U	M F U	M F U	M F U	M F U T
115	Cat Siamese	nil						nil
116	Deer Barking -Muntjac	nil						nil
	(Muntiacus muntjac)							
117	Deer Fallow	1 01					1	nil
	(Dama dama)							
118	Deer Hog	21 19 2 42	 2				5	17 20 2 39
	(Axis porcinus)							
119	Deer Sambar	4 6 1 11					1 2 ...	3 5 ... 08
	(Cervus unicolar)							
120	Deer Spotted -Chital	24 30 24 78	 15				2	34 42 15 91
	(Axis axis)							
121	Fox Flying	.. ... 04 04						... . 04 04
	(Pteropus gingateus)							
122	Hedge Hog	... ... 1 01						... .. 1 01
	(Hemiechinus auritus)							
123	Hippopotamus	1 2 03						1 2 ... 03
	(Hippopotamus amphibius)							
124	Hyaena Stripped	... 1 ... 01		1 1 ...			... 1 ...	1 1 ... 02
	(Hyaena hyaena)							
125	Lion African	1 01						1 01
	(Panthera leo)							
126	Nilgai-Blue Bull (Boselaph-	9 5 ... 14		1			1	9 5 ... 14
	us tragocamalus)							
127	Pig Wild- Wild Boar	1 01					1	nil
	(Susscrofa)							
128	Porcupine Brush Tailed	nil						nil
	(Atherurus macrourus)							
129	Squirrel Albino Fivestripped	nil						nil
	TOTAL	62 63 32 157	 17	2 1 ...			11 3 ...	66 75 22 163
		Opening stock as	During	the Year				Closing stock
		on 1/4/2011	Birth	Acqstn	Sale	Disposal	Death	as on 31/3/12
S.N.	**REPTILES**	M F U T	M F U	M F U	M F U	M F U	M F U	M F U T
130	Boa John's	... . 3 03						... ... 03 03
131	Boa Russell's	... . 05 05						... . 05 05
132	Caiman Spectacled	nil						nil
133	Gavial False	nil						nil
134	Iguana Green	nil						nil
135	Snake Trinket	... . 1 01					 1	nil
	(Elaphe helena)							
136	Tortoise Giant	nil						nil
	(Galopogus)							
137	Tortoise Indian Star	... ... 79 79						... . 79 79
	(Geochelone elegans)							
138	Turtle	... ... 31 31						.... 31 31
139	Green Anaconda	nil		2 2 ...				2 2 ... 04
	(Eunectus murinus)							
	TOTAL	... ... 119 119		2 2 ...			 1	2 2 118 122
	Grand Total	234 199 1579	 211	6 4 3	... .62	9 9 ...	42 29	234 211 1561
		2012					79	2006

C GENERAL ZOO ADMINISTRATION SECTION

Administration Section

The present administrative setup is hierarchial starting from the zoo director down to the zoo keeper. Out of the sanctioned 156 posts, 40 are lying vacant which amounts to almost 25% vacancy. This is fairly high and needs to be filled.

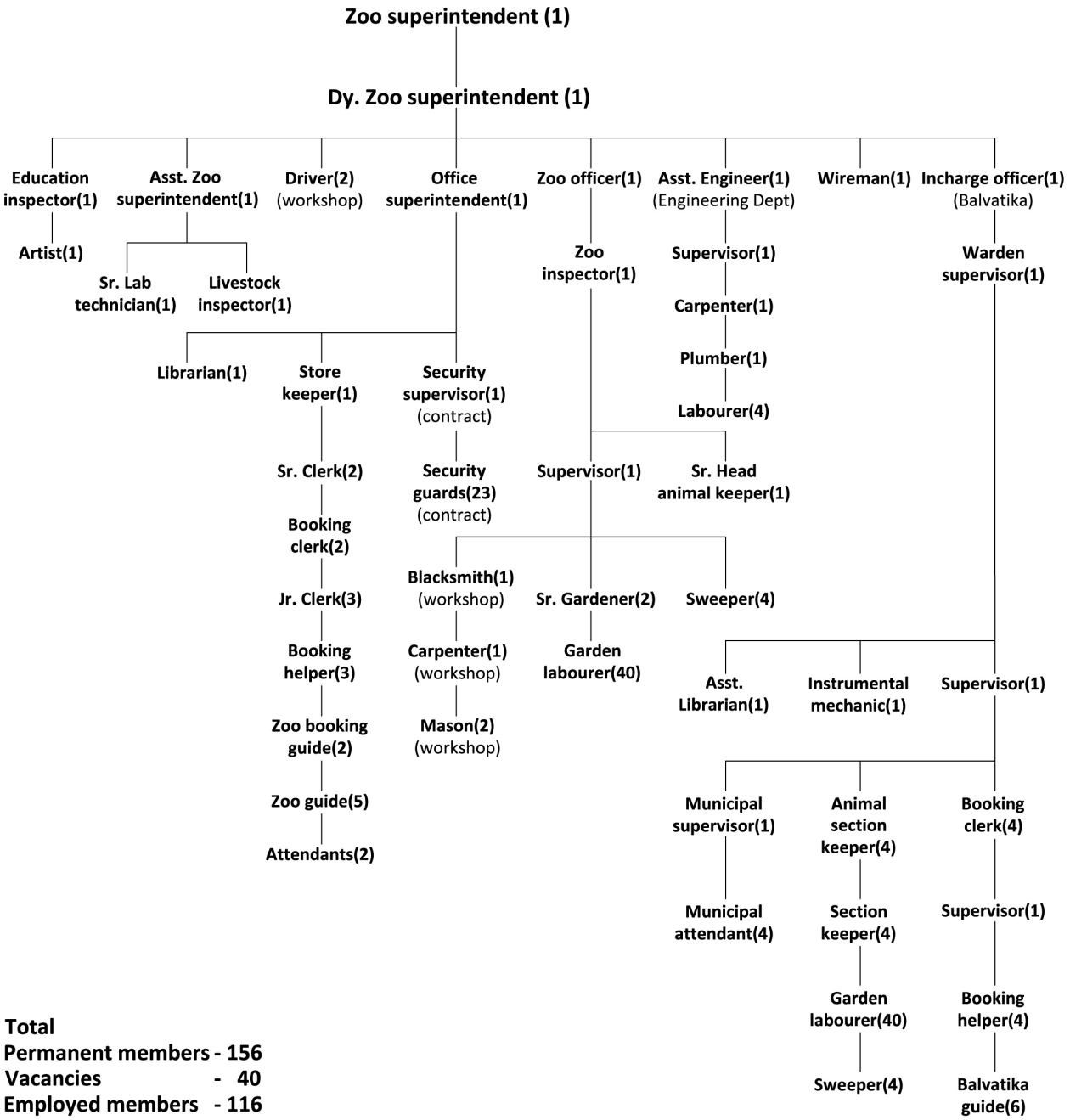
The zoo's current organizational structure is not aligned with its functions. Instead, nearly every unit (department) within the zoo contributes to each function. There are specialized persons like veterinary doctors, technicians, warder, keepers, attendants and clerical staff. However, with the emphasis on awareness and education there would be need of some specialized persons who would make their own team.

Similar to the animals and its care, the zoo essentially operates as a complex, living organism, requiring the integration of its various parts.

Duties of the personnel are detailed out and all the responsibilities are clear. However, due to short staffing there are overlaps, which have to be avoided for better working environment. Currently, the administration staff is inadequate. There is a need of the curator, who can upkeep and maintain animal collection, health and housing. There is also a need of the biologist, to ensure enrichment and welfare of animals in the zoo.

Besides these, the zoo needs to give adequate training to the staff to be sensitive and friendly to various kinds of computer applications.

GENERAL ZOO ADMINISTRATION SECTION



Total
Permanent members - 156
Vacancies - 40
Employed members - 116

d RESEARCH

The Kankaria Zoo is active in various Research studies. There are numbers of International and National level Conferences attended by the members. It organizes and attends conferences for the exchange of ideas between different Zoos. The detail listing of the research work is as listed below:

I. The Kankaria Zoo Superintendent has attended different Conferences and Training Programs at National and International levels. The list is as under:

i. U.K. Jersey for the training in "Breeding and Conservation of Endangered species" from 18-08-1999 to 06-08-1999. Sponsored by Central Zoo Authority New Delhi, Resolution No. 355 of Standing Committee and Sponsorship letter of Member Secretary along with clearance of Home Ministry attached. During this visit the members had also visited Germany, Berlin Zoo, Paris Zoo, Sant Malo Island France and London Zoo.

ii. Nepal, King Mahendra Trust for Nature Conservation Kathmandu, for SAZARC(South Asian Zoo Association for Regional Cooperation), from 03-08-2000 to 12-08-2000, Administrator resolution No. 120 attached.

iii. Malaysia and Singapore, for attending South Asian Zoo Association and South East Asian Zoo Association Meeting (SEAZA and SAZARC) from 07-10-2001 to 11-10-2001, and in return journey the Superintendent also visited Singapore Zoo, Night Safari and Under Water World, Resolution No. 704 of Standing Committee attached.

iv. Bangladesh Dhaka, for attending South Asian Zoo Association (SAZARC) meeting from 05-10-2002 to 10-10-2002, Resolution No.58 of Standing Committee attached.

v. SriLanka Colombo, South Asian Zoo Associating for Regional Cooperation and Conservation Breeding Specialist Group (SAZARC and CBSG) Workshop, from 01-12-2003 to 10-12-2003, Resolution No.973 of Standing Committee attached.

vi. Pakistan Lahore, for attending South Asian Zoo Association (SAZARC) meeting from 29.11.2004 to 07-12-2004, Resolution No. 951 of Standing Committee attached.

vii. Netherland Rotterdam, for attending International Species Information System (ISIS) Workshop, from 14-03-2005 to 18-03-2005, Resolution No. 1414 of Standing Committee attached.

viii. Vietnam, for attending SEAZA and SAZARC Conference, from 11-09-2006 to 13-09-2006, Resolution No. 584 of Standing Committee attached.

II. Other Relevant Information

1. Mayor appreciation letter of 15th August 1996, for rescuing problematic Elephant from Sabarmati River, Certificate attached.

2. Certificate of Appreciation given by Central Zoo Authority (Ministry of Environment and Forest) New Delhi, letter dated 14-09-2006 for providing Non-conventional type of air conditioning system to tigers, Certificate attached.

3. Appreciation Letter for Airports Authority of India, our zoo team rescued blue bull from runway of Ahmedabad Airport on 26th October, 1999 letter attached.

4. We have organized Western Region Zoo Directors Conference at Ahmedabad with the help of CZA in 2005.

5. We have also organized SAZARC Conference at Ahmedabad and total 45 participants attended this conference from nine countries of the World.

6. Lead Speaker for the Exhibit Designing – new approaches in all India Zoo, Letter and programmed attached.

III. List of Memberships of Professional / Academic Institute.

- Member of All India Zoo Directors Association and also worked as a Western Region Coordinator for long time.
- Member of Association of Indian Zoo and Wildlife Veterinarians, Life Member.
- Member of International Zoo Educators Association South Asian Regional Network.
- Member of South Asian Zoo Association for Regional Cooperation (SAZARC), t also President of this organization for three years from 2006 to 2008.
- Member of Conservation specialist group and Reintroduction group (CBSG and RSG).
- Member of World Association of Zoos and Aquariums (WAZA) through SAZARC.

IV. Publication of Papers

A. Earth Tube Heat Exchanger Based Air-Conditioning for Tiger Dwellings: By Girja Sharan, R.K. Shau, Ratan Jadav, Published in ZOO'S PRINT, Vol. XVI, Number 5, May 2001 (RNI 2:8)

B. Closed Circuit T.V. in Ahmedabad Zoo, By : R.K.Sahu

Published in ZOO'S PRINT, Vol. XVI, Number 9, September 2001 (RNI 2:12)

C. Unusual Animal Behavior and Earthquake, By : R.K.Sahu Published in ZOO'S PRINT, Vol. XVI, Number 9, September 2001 (RNI 2:12)

D. Back to basics (An air conditioning system that uses constant subterranean temperatures can become an ecofriendly alternative to conventional system) By: Girja Sharan, R.K.Sahu, Ratan Jadahv. Published in Down to Earth April 30, 2002

E. Threats to Vulture Population, By : R.K.Sahu Published in ZOO'S PRINT, Vol XVII, Number 5, May 2002 (RNI 3:8)

F. Prevalence of Gastro-Intestinal parasites in captive birds at Kamla Nehru Zoological Garden Kankaria Ahmedabad, By: H.R. Parsani, R.R.Mohan, R.K.Sahu and B.G.Patel Published in January 2003 Zoos Print Journal 18 (1): 987-992,

G. Chemotherapy of Nematodiasis in Zoo Pigeons By: H.R.Parsani, R.R.Momin and R.K.Sahu, Published in August 2007 ISSN 0973-2535 (Print edition), 0973-2551 (Online-edition) www.Zoosprint.org.

VI. Professional training undertaken. The list is as under:

1. "Zoo Management training programme" from 16th November to 29th November, 1992 conducted by Wildlife Institute of India (Ministry of Environment and Forest) at Nehru Zoological Park Hyderabad.

2. Summer School Course No. 20 "Breeding and Conservation of Endangered Species" from 19th July to 6th August 1999 at Durrell Wildlife Conservation Trust International Training Centre Jersey U.K.

3. Summer Institute on "Breeding Management and Disease Control of Wild Animals" sponsored by ICAR New Delhi and organized at Bihar Veterinary College Patna from 16-06-1992 to 05-07-1992

VII. Other Training:

1. Course on Master Planning of Zoos Organized and sponsored by Central Zoo Authority at Nandankanan Zoological Park Bhubaneswar Orissa.

2. V Governance training as a Instructor organized by AMC

3. Right to Information Act 2005 organized by AMC at SPIPA.

4. Computer Training Programme organized by AMC.

5. Animal Welfare Training Course sponsored by the Royal Society for the Prevention of Cruelty to Animals and the Animal welfare Board of India at Ahmedabad.

RESEARCH

VIII. List of Research study going on at present in Kamla Nehru Zoological Garden, Kakaria Ahmedabad.

Sr. No.	Name of the Student		Institute Name	Subject
1	Patel Samir .N.	M.Phil.	Dept. of Zoology, School of Science, Gujarat University, Ahmedabad	Behavioral studies on Captive animals of the Kankaria Zoo.
2	Patel Maulik .V.	M.Phil.	Dept. of Zoology, School of Science, Gujarat University, Ahmedabad	Behavioural studies on the Birds around Kankaria Zoo.
3	Patel Madhuri .D.	B.Sc	Dept. of Biology, K.K.Shah Jarodvala, Maninagar Science college, Maninagar, Ahmedabad	Animal Behaviour a Research Project.
4	Trivedi Nidhi . M.	B.Sc	Dept. of Biology, K.K.Shah Jarodvala, Maninagar Science college, Maninagar, Ahmedabad	Animal Behaviour a Research Project.
5	Kurmi Poonam R.	B.Sc	Dept. of Biology, K.K.Shah Jarodvala, Maninagar Science college, Maninagar, Ahmedabad	Animal Behaviour a Research Project.
6	Chauhan Dipesh	M.Sc In Zoology	Dept. of Zoology University School of Science, Gujarat University, Ahmedabad	Study of Different species of Otter and different Behaviour patterns of Eurasian Otters.
7	Trivedi Hiral	M.Sc In Zoology	Dept. of Zoology University School of Science, Gujarat University, Ahmedabad	Study of Different species of Otter and different Behaviour patterns of Eurasian Otters.

e CONSERVATION BREEDING

The zoo holds an international record of having first Water Monitors to be born at any zoo and of having first flamingo born in captivity in India. The zoo was also the first in India to experiment in coexistence, the idea of foster mother feeding the puppies and the cubs and they growing together.

Ahmedabad zoo has also been very successful in breeding a variety of birds, mammals and reptiles. It facilitates the animals with off-display conservation breeding centres and provides them with other requirements – food, nesting material, privacy, comfortable temperature, etc. for the same.

The list of birds, mammals and reptiles, successfully breed at the Ahmedabad zoo is as follows;

CONSERVATION BREEDING OF BIRDS

Endangered species:

1. Pigeon Nicobar – Schedule-I, Wildlife (Protection) Act
2. Spoonbill White – Schedule-I, Wildlife (Protection) Act
3. Pelican Rosy
4. Ibis White
5. Cormorant Little
6. Heron Night
7. Peacock White
8. Peacock Common
9. Pigeon Pied Imperial
10. Dove Rufous Turtle
11. Parakeet Alexandrine
12. Parakeet Blossum Headed
13. Parakeet Rose Breasted
14. Parakeet Rose Ring

Pigeon Nicobar

Spoonbill White

Peacock Common

Exotic species:

1. Parrot Grey
2. Lorry Chattering
3. Lorry Red
4. Connure Patagonian
5. Connure Brown Eared
6. Pheasant Silver
7. Pheasant Green Japanese
8. Pheasant Golden
9. Pheasant Lady Amherset
10. Pigeon Crowned
11. Four species of Love Birds
12. Cockatiel
13. Finches
14. Sparrow Java
15. Emu
16. Cockatoo

Pigeon Crowned

CONSERVATION BREEDING OF MAMMALS

Back Buck

Elephant Indian

Otter Common

Porcupine Bengal

Lion Indian

Endangered species:

1. Black Buck – Schedule-I, Wildlife (Protection) Act
2. Elephant Indian – Schedule-I, Wildlife (Protection) Act
3. Otter Common – Schedule-I, Wildlife (Protection) Ac
4. Jackal – Schedule-I, Wildlife (Protection) Act
5. Porcupine Bengal – Schedule-I, Wildlife (Protection) Act
6. Civet Common Palm – Schedule-I, Wildlife (Protection) Act
7. Sambar – planned breeding
8. Hog Deer – planned breeding
9. Spotted Deer – planned breeding
10. Nilgai – planned breeding

Planned breeding:

The zoo carries out planned breeding of prolific breeders like Sambar, Hog Deer, Spotted Deer and Nilgai as and when required. Otherwise to control these breeders from breeding the zoo often separates the males and the females and at times castrates the males to control their population.

The zoo is also interested in breeding the following mammals to keep them as a part of their collection plan,

11. Lion Indian – Schedule-I, Wildlife (Protection) Act
12. Tiger – Schedule-I, Wildlife (Protection) Act
13. Bear Sloth – Schedule-I, Wildlife (Protection) Act
14. Langur Common – Schedule-I, Wildlife (Protection) Act

CONSERVATION BREEDING OF REPTILES

Endangered species:

1. Snake Keelback Checkered – Schedule-I, Wildlife (Protection) Act
2. Tortoise Indian Star
3. Turtle Fresh Water
4. Crocodile Marsh – planned breeding (only if/when required) – Schedule-I, Wildlife (Protection) Act
5. Crocodile Salt Water – planned breeding (only if/when required) – Schedule-I, Wildlife (Protection) Act
6. Crocodile Long Snouted (Gharial) – planned breeding (only if/when required) – Schedule-I, Wildlife (Protection) Act
7. Monitor Water Lizard – Schedule-I, Wildlife (Protection) Act
8. Monitor Common Indian Lizard – Schedule-I, Wildlife (Protection) Act

Exotic species:

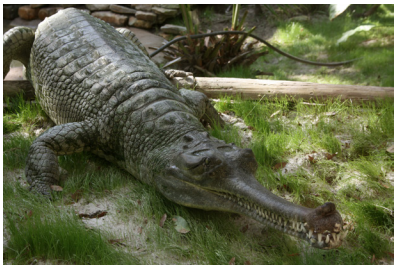
9. Gavial False

Snake Keelback Checkered

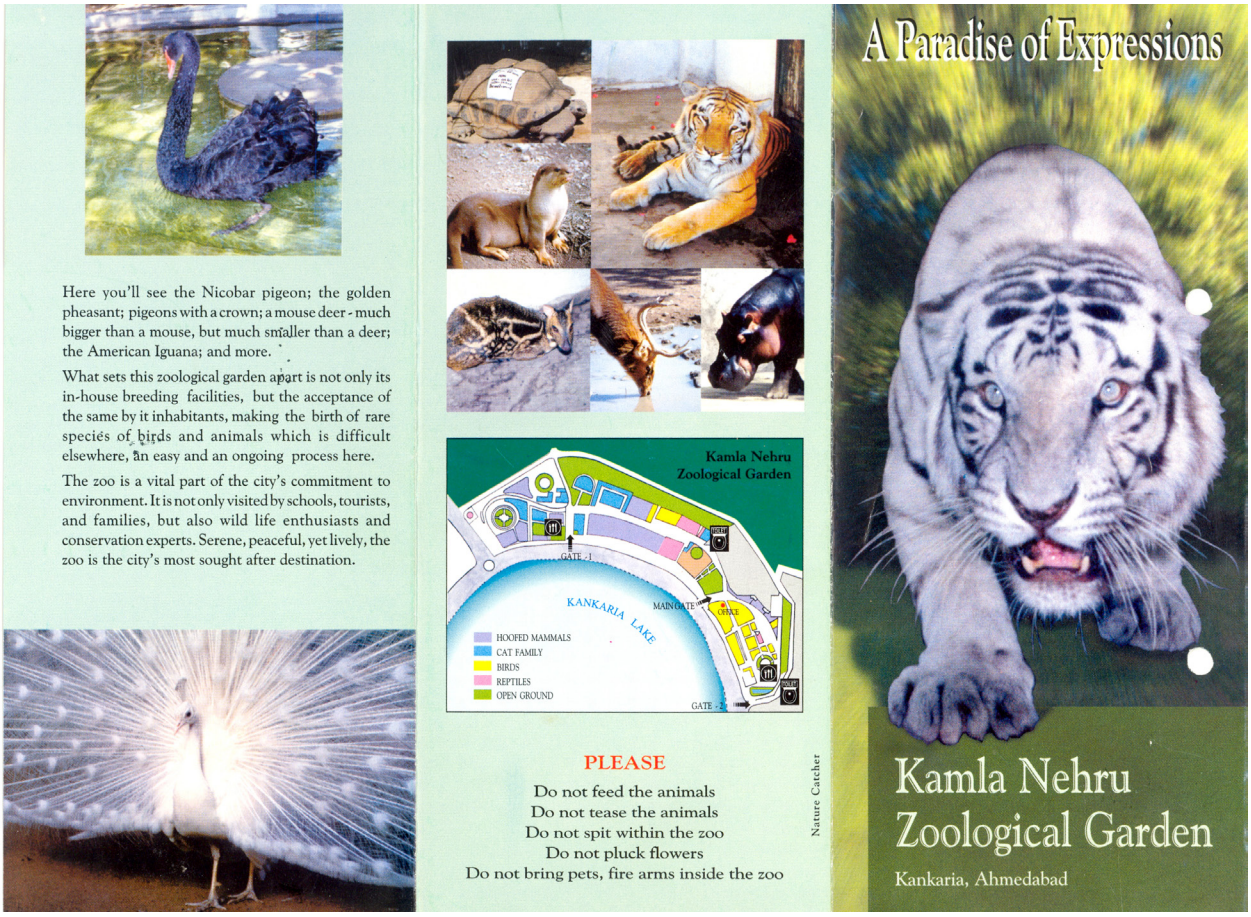
Tortoise Indian Star

Monitor Water Lizard

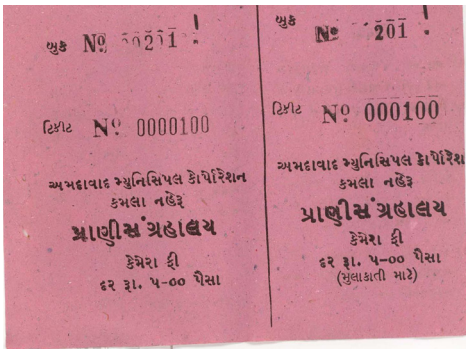
Crocodile Marsh


Crocodile Long Snouted

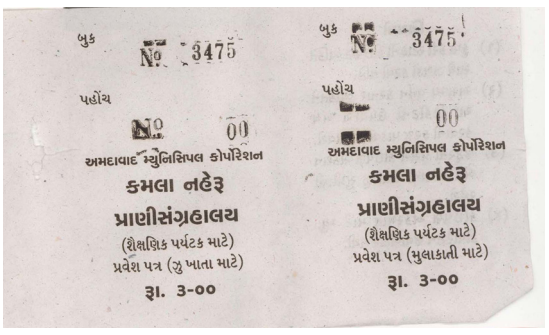
f EDUCATION AND AWARENESS

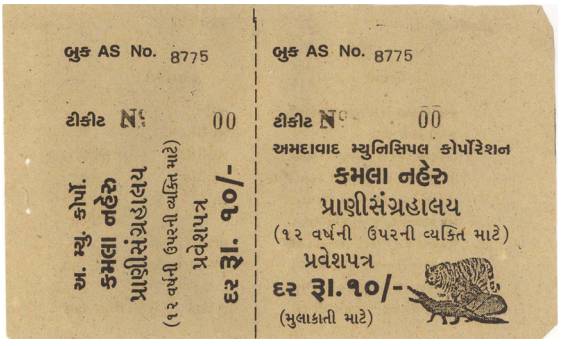


Zoo Brochure



Zoo Tickets





EDUCATION AND AWARENESS

Zoo education

The zoo staff guides and shares their knowledge and experiences with the students – schools, veterinary sciences, zoology, art, design , architecture, management, etc and help them in the best possible ways for their research. Besides encouraging research among students, the zoo celebrates 'Forest animals' week', 'Animal welfare programs' every fortnight. The education room has facilities like T.V., V.C.R., and overhead projector to host film shows. Veterinary college students from Dantivada and Anand regularly come to the zoo for their internships. With 100% grants' aid from the CZA, New Delhi the zoo animal keepers training program is hosted at the zoo, which is an authorized (by CZA) training center for animal keepers in the Western region of India.

Zoo Awareness

The zoo is a host to variety of animals, birds and reptiles from different countries. There are about 2000 of them and about 200 different breeds. All these animals are treated scientifically and are provided with a natural environment. Besides this, the birds are provided with nests in their cages and other facilities to animals to facilitate their breeding. As a result, there is a valuable increase in the number of animals , especially in animals like; crowned pigeon, rosy pelican, nicobar pigeon, grey parrot, chattering lorry, hill myna, spoon bill, white ibis, deer, elephant, hog deer, etc.

EDUCATION
AWARENESS
RESEARCH

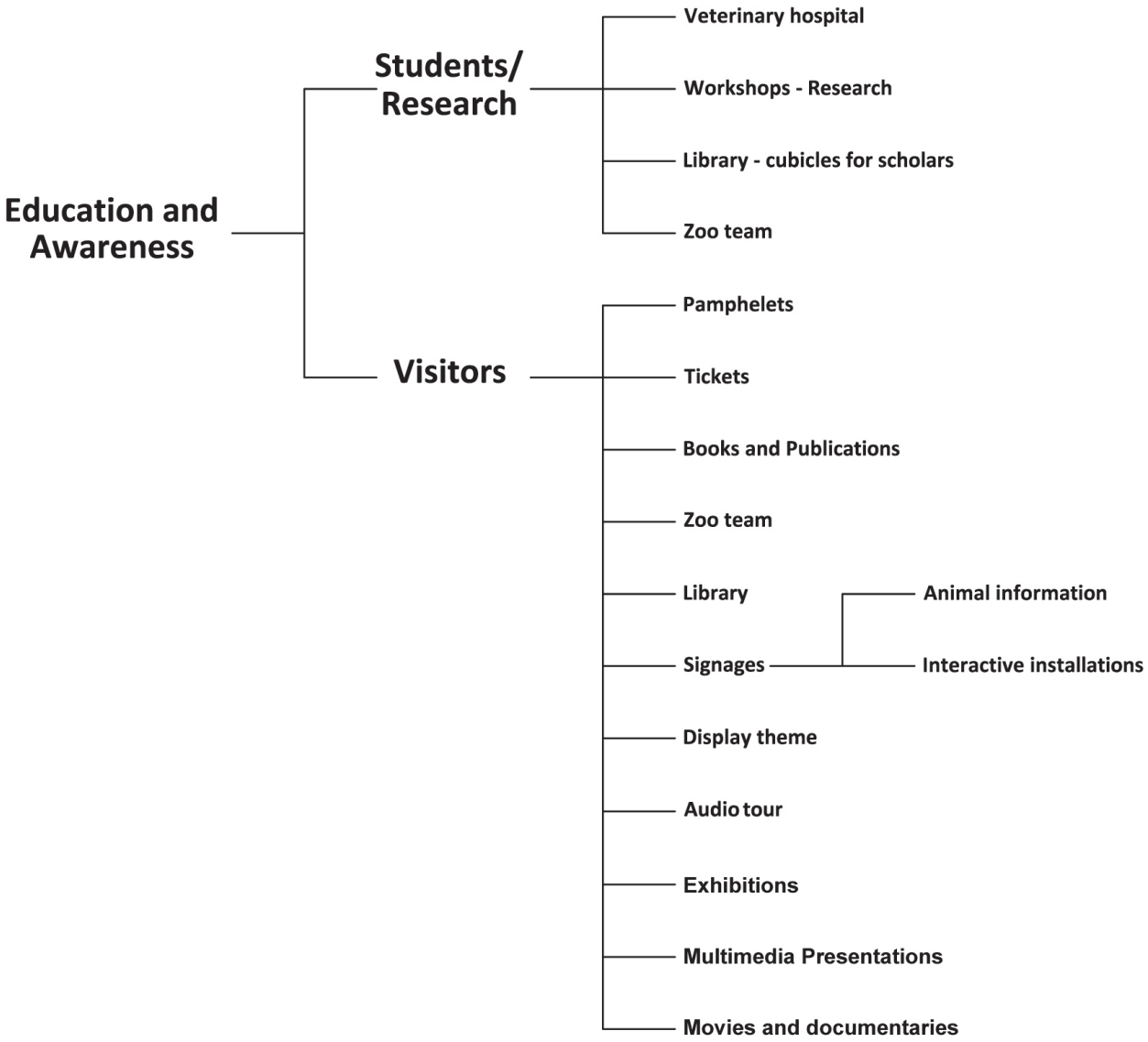
Education is a pivotal theme in the development of the Ahmedabad zoo, particularly since it is an urban zoo, in the midst of a dense urban fabric. A definitive education policy, targeting both, school children as well as researchers and scholars is part of the strategic development of the zoo. Apart from the role of the exhibits, collections and the environment of the zoo, secondary sources supporting these are to be given adequate position in the development. Creating awareness, training and capacity building of primary school teachers, and encouraging children to wonder, appreciate, respect and understand nature will be an important aim of this zoo.

The implementation of this policy will be in multifaceted. On the one hand there will be the display of the exhibits which will follow the immersion theme.On the other hand, several locations and awareness centers will be incorporated within the overall master plan. These will be in the form of a library for scholars and researchers, a permanent exhibition on the species exhibited with information on their natural habitat, and a continuously changing multi-media presentation, as well as movies and documentaries on the natural environment.

The park will procure educational films and documentaries that may be screened occasionally to generate awareness. This will also develop the library by an active collection.

The overall immersive environment is expected.

EDUCATION
AWARENESS
RESEARCH



EDUCATION
AWARENESS
RESEARCH

No Plastic zone – Awareness and Implementation

The zoo will be declared a no plastic zone. A dual approach will mark this awareness creation and enforcement. In awareness creation panels showing harmful effects of plastic on the habitats of the animals and environment will be displayed.

The focus is on creating awareness among visitors through distribution of pamphlets on why plastics are hazardous to the environment. Also panels on what can be done by the people in their daily lives can be displayed.

For implementation, several policies can be worked out. Plastic water bottles may be tagged and received back. No plastic cups to be used in the cafeteria. Fines can be imposed on people littering with plastic.

The Multimedia projections and movies can be shown to create more awareness among the people to create a free plastic zone. The goal is laying emphasis on creating awareness and willing compliance from the public rather than slapping penalty straight away.

Role of children as agents of change can be worked out through children workshops.

Water Management

The purpose of Water Management is simply to manage our water resources while taking into account the needs of present and future users. On average, however, the combination of rainfall, surface and groundwater resources have been sufficient in providing adequate water. Groundwater reserves are becoming more and more depleted as surface water sources become too polluted for human use.

As the part of the movements towards a more ecologically balanced environment, it is proposed that the zoo will have a comprehensive water management system. Water management is proposed at two levels. One is the grey water generated by visitors and staff will be put through the DEWATS system. The tanks and filtration plants constituting the elements of DEWATS system can be merged with the Landscape. This can be done on daily basis and requirement for the water in vegetation and Toilets can be sufficed. The undulating topography of the Zoo provides an opportunity for natural catchment areas. Rainwater will be collected through the topography and directed to the recharge wells. Some part of the rainwater will be harvested for use. The ponds and water bodies will also collect rainwater. Filtration units in these will keep the water usable.

EDUCATION
AWARENESS
RESEARCH

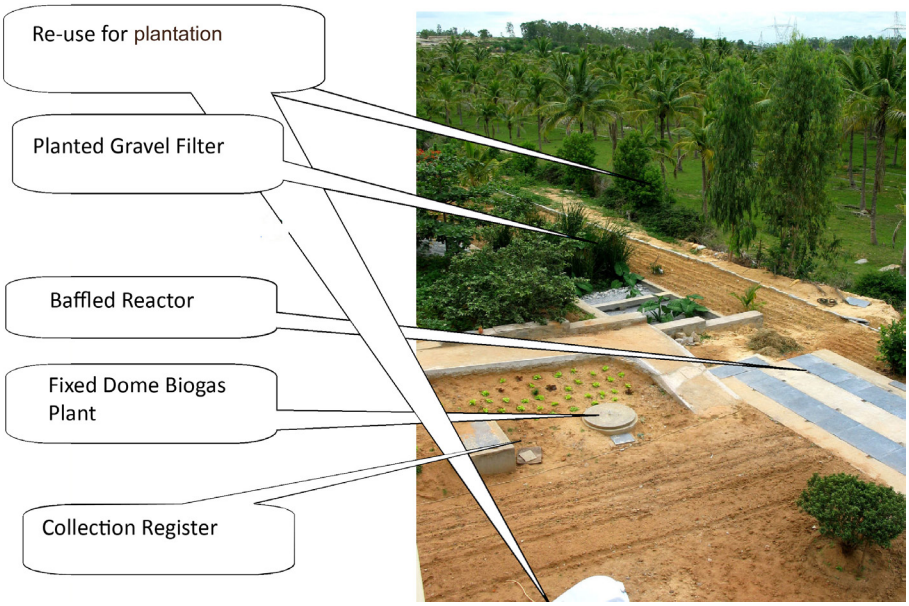
DEWATS system

Decentralized system can be used for the wastewater treatment in the Zoo. The water filled in tanks for Aquatic animals can pass through the wastewater treatment process and can be reused for the vegetation. Especially the proposal for the Aviary and the Elephant and Hippopotamus enclosures house large water bodies, this water can be reused for the vegetation.

DEWATS stands for "Decentralized Wastewater Treatment Systems". DEWATS applications are based on the principle of low-maintenance since most important parts of the system work without technical energy inputs and cannot be switched off intentionally. Its applications are designed and dimensioned in such a way that treated water meets requirements stipulated in environmental laws and regulations.

Benefits:

- Water can be treated to discharge standards and recycled for vegetation.



- It can provide treatment for waste water flows up to 1000 cu.mt. /day.
- It can be easily operable with semi-skilled/unskilled labour.
- It is tolerant towards inflow and load fluctuation.
- There are no mechanical parts involved which might lead to noise pollution disturbing the environment of the zoo.
- It requires little space and is less expensive than comparable conventional treatment systems. Materials inputs used for construction are locally available.
- Minimal maintenance and long de-sludging intervals.
- Resource recovery through wastewater re-use and biogas generation.

EDUCATION
AWARENESS
RESEARCH

Rain Water Harvesting

Rain Water Harvesting is a way to capture the rain water when it rains, store that water above ground or charge the underground and use it later.

The average Rainfall in Ahmedabad varies between 0.0 to 1116 mm/month. There are limited numbers of rainy days in Ahmedabad. Water storage system becomes an important design component to suffice the water requirements around the year. The undulating topography of the Ahmedabad Zoo provides opportunity to create rainwater harvesting system through surface drain. The main advantage in using ground as collecting surface is that water can be collected from a larger area. The harvested rainwater can not only be used to meet water requirements for the Zoo but it can also recharge groundwater aquifers.

The rainwater harvesting system comprises components of various stages - transporting rainwater through pipes or drains, filtration, and storage in tanks for reuse or recharge.

Different sources for the surface drain in the Zoo based on the Proposed Master Plan:

- Green Landscaped, paved, unpaved areas can be effectively used to harvest the runoff.
- The network of storm water drains can be provided along the visitors paths which can be connected to underground storage tank.
- The roof tops of the buildings can also be used for the surface drain.
- Coarse mesh should be used to prevent the passage of debris.

- Underground storage tank based on the capacity of the surface drain can be proposed based on the topography of the land.
- The storage tank should be connected to a filtration plant so that stored water can be treated before use.
- The water stored can be used to recharge the water bodies in the enclosures as well as for vegetation during the year.

Benefits

- To harness good quality water resource now being wasted
- To prevent groundwater depletion
- To augment the expensive piped water supply
- To save expenditure on water
- To prevent soil erosion and urban flooding
- Inexpensive and simple technology
- Aids ecological conservation

Components of Rainwater Harvesting System

- Catchment area
- Conveyance system
- First rain separator
- Filter unit
- Delivery system
- Storage
- Usage
- Recharge

g ACTIVITIES PECULIAR TO THE ZOO

The zoo team has explored various innovative – indigenous solutions and techniques to facilitate the comfort of its residents. It has set up some good methods for providing comfort to the animals and has been awarded the 'Most Innovative Zoo' award for the same.

Some of the most remarkable achievements are,

1. Providing facilities like ETHE (earth tube heat exchanger) - a conventional type of air conditioning system, to provide comfortable temperature to tigers.

અમદાવાદમાં છેલ્લા એક અઠવાડીયાથી પડી રહેલ કાતિલ ઠંડીથી બચવા માટે માણસ અને પ્રાણીઓ બન્ને "હાજર સો હથીયાર"ની જેમ સાધનો શોધી લે છે. શહેરના કાંકરીયા ઝુમાં ૨૦ ફૂટ લાંબો અજગર કાતીલ ઠંડીના મોજાની સામે લાચાર બની ગયો છે. બુધવારે અમદાવાદમાં સૌથી ઠંડો દિવસ હતો. આખો દિવસ લોકો ઠુઠવાયા હતા. ઝુમાં અજગર આખો દિવસ ઈલેક્ટ્રીક સગડી પર બેસી રહે છે અને જરાય હલતો ચાલતો નથી. કુદરતની સામે કોઈનું ય ચાલતુ નથી. અસહ્ય ઠંડીને કારણે સમગ્ર ઝુમાં પશુ પક્ષી અને પ્રાણીઓ માટે ખાસ વ્યવસ્થા ઊભી કરવામાં આવી છે. સિંહ અને વાઘના પાંજરામાં સુકા ઘાંસની પથારીઓ મુકવામાં આવી છે અને સાથે હોટ એર વાળા કેન મુકવામાં આવ્યા છે. આ ઉપરાંત પક્ષીઓ માટે કંતાનના પડદાઓ લગાવી દેવાયા છે અને ખાસ પ્રકારના જુદારો બનાવાયા છે. પક્ષીઓ પર કાતિલ ઠંડીની અસર ના થાય માટે એકશન પ્લાન બનાવાયો છે. (તસ્વીર : ગૌતમ મહેતા)

2. Providing brooders in earthen pots in the enclosures for reptiles – cold blooded animals to provide them heat – comfortable temperature to survive.

3. Providing brooders in birds enclosures – warm blooded animals during winters and incubation period, so that they can sit by the side of the lamp and receive the heat.

4. Providing protection and comfort against harsh weather – summer and winds by using indigenous techniques like spreading khas sheets, green cloth, etc on enclosure surfaces. Also air coolers are installed along the enclosures.

CERTIFICATE

केन्द्रीय चिड़ियाघर प्राधिकरण
Central Zoo Authority
(STATUTORY BODY UNDER THE MINISTRY OF ENVIRONMENT & FORESTS, GOVT. OF INDIA)

Bikaner House, Annexe VI,
Shahjahan Road, New Delhi-110011
website : http://www.cza.nic.in

F. No. 9-6/2005-CZA(M) **DATE: 14.9.2006**

To

The Zoo Superintendent
Kamla Nehru Zoological Garden,
Kankaria,
Ahmedabad – 380 008 (Gujarat)

Sub:- Certificate of Appreciation.

Sir,

Reference is invited to your letter No. 250 dated 18th July, 2006.

The innovative nature of work which has been carried out by the Kamla Nehru Zoological Garden, Ahmedabad for the purpose of providing non-conventional type of air conditioning system inside the tiger house has been highly appreciated by the Central Zoo Authority and is of commendable in nature worth emulating by other Zoos in the country. I congratulate the Zoo Management and staff on behalf of the Central Zoo Authority for the same.

I hope that such innovative activities for the welfare of captive animals are continued in future also.

Yours faithfully,

(B. R. Sharma)
Member Secretary

PUBLICATIONS

Earth Tube Heat Exchanger Based Air-conditioning System for Tiger Dwellings

Girja Sharan[1], R.K. Sahu[2], Ratan Jadhav[3]

Abstract

This paper describes the design of an Earth Tube Heat Exchanger (ETHE) based airconditioning system installed at Kamala Nehru Zoological Garden, Ahmedabad for dwellings of tiger (*Panthera tigris*). The system consists of an earth tube heat exchanger, an industrial blower, supply ducts with baffles, and diffusers. The ETHE is made of two MS tubes, each 30-m long and 20-cm diameter. Tubes are buried at 2-m depth parallel to each other at a spacing of 1.5 m. Blower delivers 1600 cfm of conditioned air and is driven by a motor of 3-hp rating. Cooling load calculations were done by computing the heat gain by the dwelling from exterior walls, partitions, roof and the heat generated by the animal. Air change rate required to remove all that heat was then worked out. Finally, the size of blower and motor were determined. The system is designed to maintain the inside of tiger dwellings at about 24° C in winter nights and 30° C in summer days, with air velocity near animal body not exceeding 0.25 m/s.

ETHE based system was considered especially suited because (a) it does not require the dwelling to be insulated and kept closed as would be the case in refrigeration systems, (b) it does not increase the humidity of the dwellings as would be the case if (evaporative) air cooler is used; and (c) it works as a cooler in summer and heater in winter; a feature not present in any other system

Background

Earth Tube Heat Exchanger (ETHE) is a device that permits transfer of heat from ambient air to deeper strata of soil and vice versa. ETHE is based on the well-known fact that while ambient temperatures are subject to diurnal fluctuations, temperature of the soil beyond a depth of, say, 2 meters remains virtually constant. Though seasonal variation does occur, amplitude of fluctuation in deep soil temperature remains much smaller than that in the ambient. Deeper layer of soil can thus be used both as heat sink (in summer) and heat source (in winter). ETHE is indeed used in Europe and North America to condition (cool and heat) the air for use in livestock buildings and greenhouses [1,2,3]. It is also now being considered a good option to cool human residence [4].

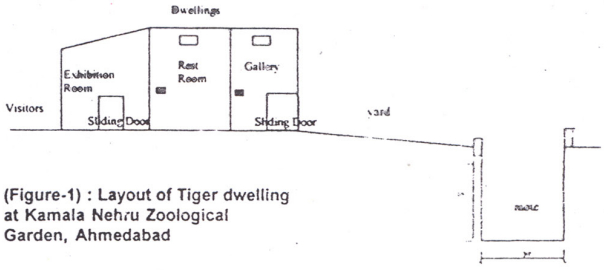
We have been working on ETHE to meet cooling needs of greenhouses in Kutch, which is an extremely arid and hot region. The authorities of Kamala Nehru Zoological Garden, Ahmedabad (RKS) visited one of our ETHE installations and felt that it could be of use in the Zoo. Subsequently we made a visit to the Zoo and agreed that ETHE system not only could be used, but also in fact would be especially suited for Zoo applications.

Animal keepers indicated that high summer temperatures in Ahmedabad cause stress to tigers and other animals, as a result of which, their intake of food is reduced. Further that attempt made to cool the dwellings by hanging wet straw mats and even air coolers were not satisfactory. They also indicated that very low temperatures in winter nights also cause discomfort. But here again no effective solution has been found. They stated that a desirable system would be one, which does not require the dwellings to be closed airtight, does not increase its humidty and is economical to run. They indicated that temperatures between 24° C - 30° C would be desirable inside the tiger dwellings.

Given these requirements, it was considered that ETHE would be most suited. ETHE works as a dual mode air-conditioner-cooling in summers and heating in winters or at nights. ETHE does not use water and thus will not increase humidity. Our measurements of deep soil temperatures over a year indicated that in Ahmedabad region temperature below 2 m depth remains between 25 - 27 C [5]. It appeared quite feasible therefore to design an ETHE system to meet the zoo stipulations of temperature. In response to their request, the system was designed and installed to condition the air in the tiger dwellings.

Tiger Dwelling

Tigers are housed singly. Accordingly, there are four separate dwellings at the Zoo for the four tigers it owns. Each dwelling consists of a covered building of 12 m x 4 m x 4 m. Each dwelling has movable partitions. The front part is the exhibition room, middle part the rest room and the rear part is a gallery from which the tiger can go into an open area bordered with a mote (Figure-1).



(Figure-1) : Layout of Tiger dwelling at Kamala Nehru Zoological Garden, Ahmedabad

Walls are 45 cm thick made of brick. Roofing is a 10-cm thick RCC slab. Each compartment has two vents-one near the ceiling and the other one-meter above the floor. Vents have grills but not shutters. Lower vent is 45 x 45 cm, upper vents 60-x 45 cm. The front section (Exhibition) has floor to ceiling gate, made of MS bars and angles.

Tigers are homeothermic animals like cattle. An adult tiger weighs about 200 kg. As stated earlier, it was considered desirable to keep the dwellings at 24°C to 30°C throughout the year by forced

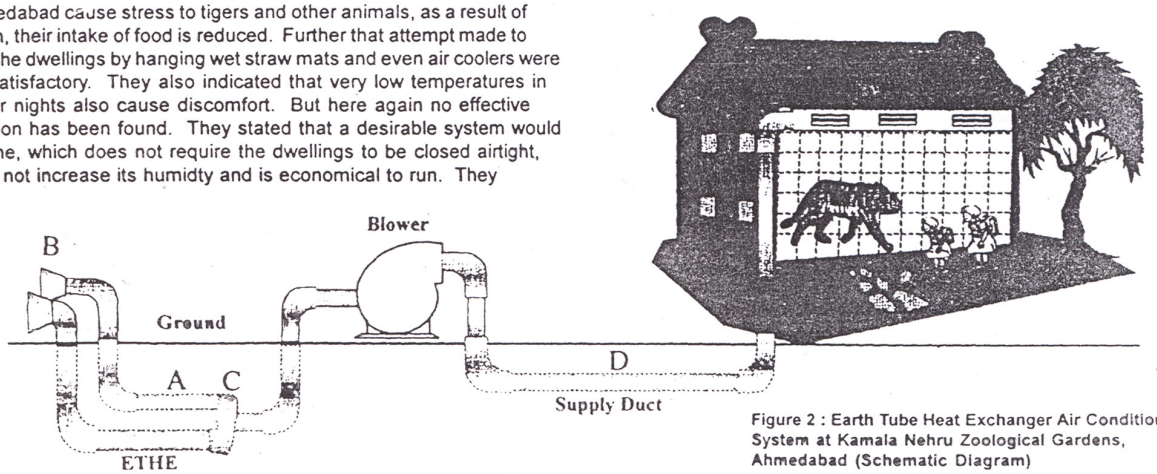


Figure 2 : Earth Tube Heat Exchanger Air Conditioning System at Kamala Nehru Zoological Gardens, Ahmedabad (Schematic Diagram)

ventilation of the dwelling using air conditioned by ETHE. It was also stipulated that air velocity near animal body should not exceed 0.25 m/s so as not to cause discomfort. The system is designed to achieve these goals.

System

The system consists of an earth-tube heat exchanger, a high-pressure industrial blower, supply duct, distribution ducts with baffles, grills and diffusers (Figure-2). Two parallel tube (A) constitute the heart of the system. Tubes are buried in the floor of the mote. each tube is 30 m long and made of 20-cm diameter MS pipes. Thickness of the tube wall is 4 mm. Inlet of the tubes is conical (B) and covered by wire mesh screen to prevent birds, insects, etc. from being sucked in. The tubes run parallel at the same depth separated by 1.5 m from each other. Figs-3 and 4 show ETHE tubes as actually installed in the moat floor.

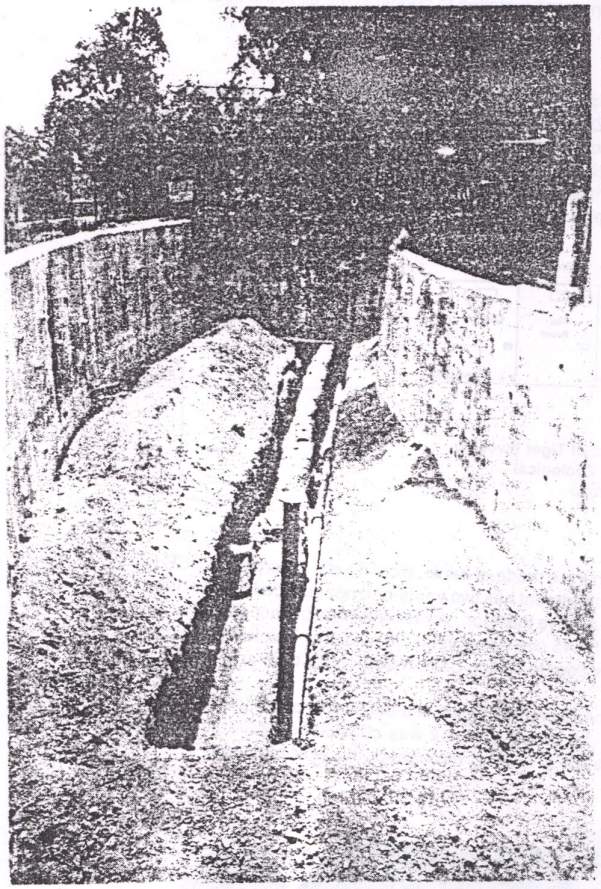


Figure 3 : Pipe installed in trench

Both tubes are connected to a header (C), which in turn is connected to the suction end of the blower. Blower is made of aluminum and has radial blades. A 30 cm diameter HDPE pipe (D) connected to the delivery end of the blower takes the conditioned air to supply duct near the dwellings. Three diffuser inlets supply the air to each of the three compartments of the dwelling. Inlets are fitted with louvered diffuser. Figure-5 shows the air inlet in the fore ground and blower platform in the far end. Figure-6 shows the blower assembly.

The HDPE pipe is buried at 1 m depth. It is not intended to play any role in conditioning the air. It is buried only so as to be out of the way of the tiger and functions only as a conveyor of conditioned air. Had the mote been nearer the dwelling, this would not have been necessary at all. Figure-7 shows the supply ducts leading into the dwelling. Vertical segments of the ETHE tubes that are exposed to

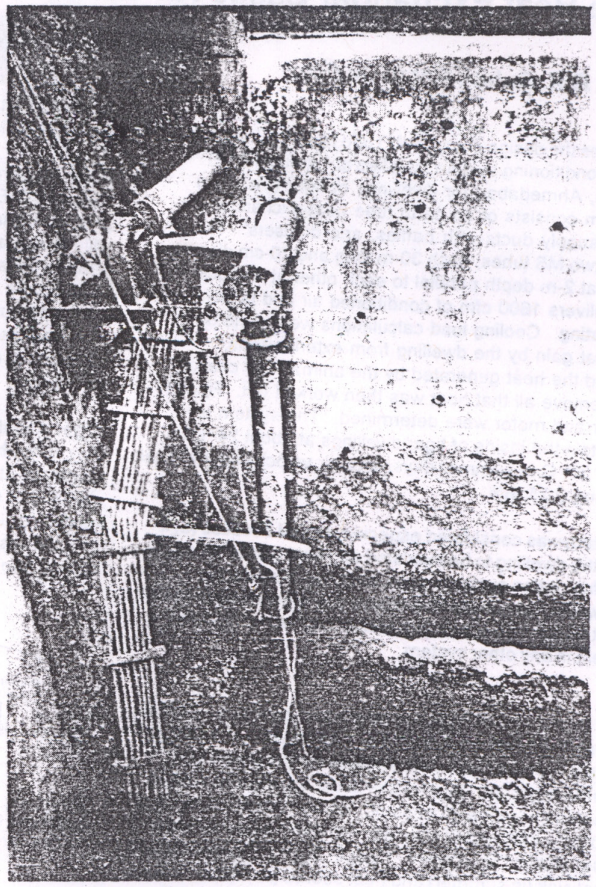


Figure 6 : Blower installation

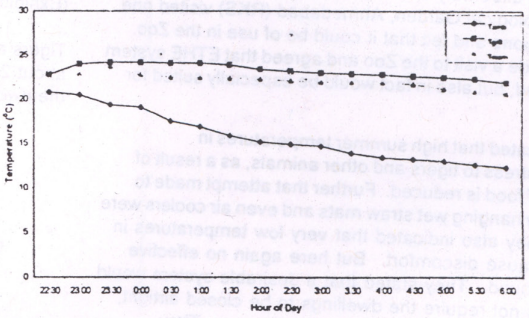


Figure 8 : Performance of ETHE system in heating mode (12-13 January 2001)

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atmosphere, the blower housing and the supply ducting near the dwelling are all insulated with glass wool bonded by tar and coated with plaster-of-paris and bitumin based water proofing compound.

Cooling Load

The month of May is usually the hottest in Ahmedabad, with day temperature rising to about 41° C, which we have used for cooling load calculations. Calculations were done using established procedure as outlined in ASHRAE Handbook 1985 (6). The procedure involves computation of heat gain by the dwelling from exterior walls, roofs, partitions, vents (sensible and latent) and that generated by animal. Soil-air temperatures for Ahmedabad were determined and used in heat gain computations. The other inputs in the computations are the overall heat transfer coefficients for brick walls (taken as 2.15 W/m² °C), overall heat transfer coefficient for RCC roof (3.28 W/m ² ° C). These values are as given in Handbook.

Heat generated by the tiger was taken to be the same as that of cows of identical body weight (200kg), which is 500 W (7). The total cooling load works out to:

Total Cooling Load – 36110 W

Note that most of the cooling load is heat gained by the dwelling from the surrounding. Heat generated by the single animal is rather negligible. The air change rate required to remove this heat is given by following relation.

$Qex = 60(n)\ (V)\ (hi - hm)\ /\ v$ ———— (1)

Where

Q_{ex}	The heat extracted by ventilation (36110 W)
n	Air change rate per min (dimensionless)
V	Volume of Dwellings (142.3 m³)
v	Humid volume of inlet tube air (0.866 m³/kg)
h_m	Enthalpy of tube air (27.5 kCal/kg)
h_i	Enthalpy of air leaving the room (15.1kCal/kg)

n = 0.3

Required
Ventilation rate = 0.3 x 142.3 m³/ min

or = 1500 cfm

Thus the blower needs to deliver 1500 – cfm air into the dwelling. The volume flow rate of the blower actually installed is slightly higher (1600 cfm)

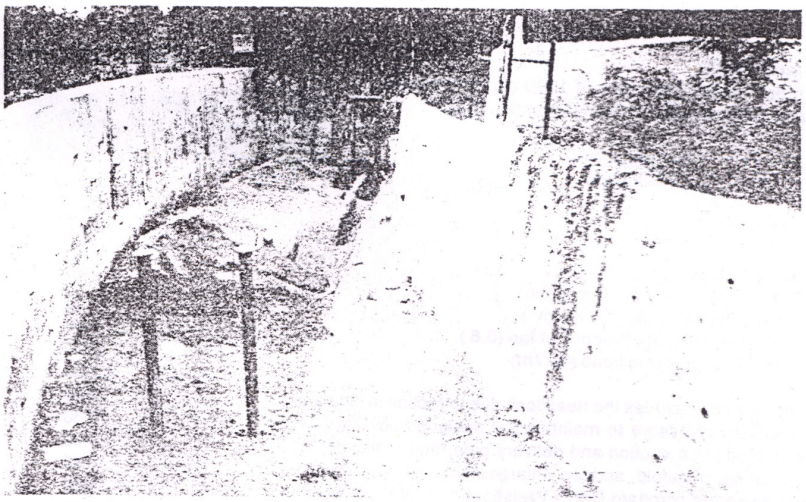


Figure 4 : A view of ETHE installation - Backfilling in Progress

Figure 5: ETHE Showing two inlets (foreground) and blower assembly in far end.

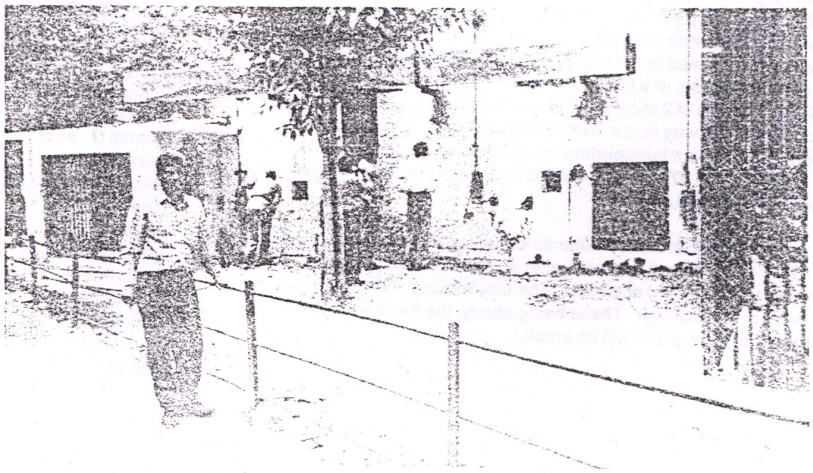


Figure 7 : Supply ducting at tiger dwelling

PUBLICATIONS

Blower and Motor
For the required ventilation rate of 1600 cfm, the blower horsepower were computed using equation 2[6],

$$P = \frac{q \times p \times H_t}{4560 \times n} \quad \text{----------(2)}$$

Where,

P -- Pumping power (HP)
q -- Air flow rate (42.6 m^3/ min)
p -- Density of air (1.2 Kg/m^3)
n -- Mechanical efficiency of fan (0.8)
H_t --Total pumping head (96.7m)

Total pumping head includes the head loss due to friction in pipe and fittings, and static pressure to maintain the designed flow rate. Head loss due to friction on suction and delivery pipe, and in fittings (elbows, plenum, manifold, sudden enlargement and grill) were computed using the standard Darcy Weisbach formula [6]. The values of roughness coefficient for GI (0.15) and plastic (0.015) pipes wer taken from the handbook and that of mechanical efficiency of motor (0.8) from [8]. The motor required to drive the blower works out to be of 1.35 hp. The nearest size of motor available is 3 hp, hence that was selected.

Performance
System was commissioned in October 2000. Its performance was tested in January 2001 at nights. System was turned on at 10.00 P.M. Temperature of ambient air, air emerging from ETHE at the diffuser (grill temperature) and the dwelling temperature at the center at one meter height was noted every half hour. Temperature measurements were made using portable sensors (PTI – 3P, calibrated to a range of 0° C – 70° C, accuracy +/- 0.3 °C). Table – 1 gives the results of a typical night (January 12-13) performance. Figure – 8 shows the data graphically.

For the instance on this night at 10:00 P.M. the ambient air was 20° C and it declined steadily as night progressed. By early morning it was 12.3°C. The grill temperature was constant at 24° C for nearly four hours, thereafter it declined to 23° C and by early morning to 21.9° C. In other words the ETHE could warm the ambient air by as much as 10° C. This indicates that the ETHE functioned satisfactorily in the heating mode. Monitoring of the system performance will be done each month for one whole year.

Summary
On the request of authoritiese of Kamala Nehru zooligical garden, Ahmedabad, an Earth Tube Heat exchanger based air conditioning system was designed and installed to condition the tiger dwellings. The system consists of a heat exchanger, buried in the mote behind the dwellings at depth of 2 meter, an industrial blower drive by the electric motor of 3 hp, delivery ducts, baffles and diffusers. The system is designed to keep the temperature inside the dwellings at 24 ° C in winter nights and 30° C in summer days. Total capital cost of the system was Rs. 128,000/-.

The system works as a dual mode air-conditioner – cooling in summer and heating in winter. It uses no water and does not require the dwelling to be insulated or closed. The only moving parts of the system are motor and the blower. These being sturdy, the maintenance and repair cost of the system will be small.

Table – 1 Performance of ETHE System in Heating Mode (12-13 January , 2001)

Hours	T_{amb} (0° C)	T_{grill} (0° C)	T_{room} (0° C)
22:30	20.8	22.8	22.9
23:00	20.5	24	22.9
23:30	19.4	24.2	23.7
0:00	19.1	24.2	22.8
0:30	17.5	24.1	22.5
1:00	16.9	24.1	22.5
1:30	15.9	23.9	22.4
2:00	15.2	23.4	22.3
2:30	14.9	23.2	22.1
3:00	14.7	23	22
3:30	13.9	22.9	22
4:00	13.4	22.8	21.9
4:30	13.2	22.6	21.7
5:00	13	22.5	21.2
5:30	12.6	22.3	20.9
6:00	12.3	21.9	20.7

T_{amb} Ambient temperature
T_{grill} Grill temperature
T_{room} Temperature inside dwelling at 1 m height from floor.

Note : *The system was tested at night from 10:00 PM to 6:00 AM*

Acknowledgement
Research on Earth Tube Heat Exchanger was funded by Gujarat Energy Development Agency (GEDA), Vadodara. We thank the authorities of Ahmedabad Municipal Corporation for giving us the opportunity to install the system at the Zoo. Fabron Airtech Engineers, especialiy Mr. J.H. Shah and Mr. Sanjay Majumdar fabricated the system and collaborated with us in development of ETHE technology in Gujarat.

References
1. Scott N.R., Parsons R.A., and Kohler T.A. (1965). Analysis and performance of an earth-tube heat exchanger. ASAE Paper No. 65 – 840. St. Joseph, Michigan : ASAE.
2. Spengler R.W., and Stombaugh D.P. (1983). Optimization of earth tube heat exchanger for winter ventilation of swine housing . ***Transaction.*** **Of ASHRAE** Pp. 1186 – 1193.
3. Santamouris M., Mihalakaha G., Balaras C.A., Arigirioua Asimakopoulos D., and Vallinaras M. (1995). Use of Buried pipes for energy conservation in cooling of agricultural greenhouse. ***Solar Energy*** . Vol. 35 Pp 111-124.
4. Sawhnay R.L., Budhi D., and Thanu N.M. (1998). An experimental study of summer performance of a recirculation type underground airpipe air conditioning system, ***Building and Environment,*** 34 Pp. 189 – 196.
5. Sharan G., and Jadhav Ratan (1999). Performance of earth-tube heat exchanger in cooling mode. Paper presented at the 88th Indian Science Congress, IARI, New Delhi, 3-7 *January* 2001 (*Unpublished*)
6. ASHRAE, (1985). *Handbook of Fundamentals.* Atlanta, GA: American Society of Heating and Air Condition Engineers Inc.
7. Esmay Merle L. and Dixon John E. (1986). Environmental control for agricultural buildings. AVI Publications, Westport, Connecticut, USA.
8. Kent W. (1960). *Mechanical Engineers Handbook*, Power Vol., Wiley Handbook.

INDUSTRY & TECHNOLOGY

Back to basics

An air conditioning system that uses constant subterranean temperatures can become an ecofriendly alternative to conventional systems

GIRJA SHARAN, R K SAHU, RATAN JADHAV

SUMMERS are round the corner and so is the scorching heat. Most dread the thought of it. But Mahesh, a 15-year-old white tiger of the Ahmedabad-based Kamala Nehru Zoological Garden, is all set to face the wrath of the Sun in grandeur. In 2000, his dwelling was ameliorated with the installation of the Earth Tube Heat Exchanger (ETHE) — an air conditioning device that permits transfer of heat from ambient air to deeper strata of soil and vice versa. Hence, thanks to ETHE, Mahesh is a cool dude in summers and all cosy in winters.

The device is based on a well-known fact that while ambient air temperatures are subject to daily fluctuations, temperatures of soil beyond a depth of around two metres remain virtually constant. Deeper layers of soil can thus be used as good heat sinks during summers and as heat sources in winters.

The ETHE system consists of an earth tube heat exchanger, a high-pressure blower, distribution ducts with baffles, grills, diffusers and a supply duct. Two parallel tubes (A, in box: *Deep-rooted solutions*) constitute the heart of the system. The tubes are buried near the floor of the place to be heated or cooled. Each tube is 30-m long and made of 20-cm diameter pipes. The inlets of the tubes (B) allow the air to be sucked in. Both the tubes are connected to a header (C), which in turn is connected to the suction end of the blower. A 30-cm diameter pipe (D) connected to the delivery end of the blower takes the conditioned air to the supply duct.

The best

In winters, ETHE can warm up ambient air by as much as 10°C at night. In summers, the system can cool the air by 8-10°C during the day. In many ways, ETHE is much better than the conventionally used system — it leads to conservation of water and electricity, as it uses no water and very less electricity.

Moreover, it is ecofriendly, can be installed anywhere and is cost-effective. It even avoids the problem of excessive humidity, which is not beneficial for both animals and human health. Furthermore, the system can be used for treating animals through the inhaling medication system. For instance, an eucalyptus oil gauge can be placed near the air inlet of ETHE,through which the medicine can be spread to all animal dwellings connected to the system.

Because of its advantages, ETHE is commonly being used in Europe and North America for greenhouses and buildings housing livestock. In these places, it is also being considered as a viable option for conventional air conditioning systems used in residential buildings.

Unfortunately, in India Mahesh is the only one benefiting from the novel device. The installation in his dwelling was the result of initiatives taken by the zoo authorities. Due to ETHE's successful operation, they are now planning to extend the facility to other tiger dwellings.

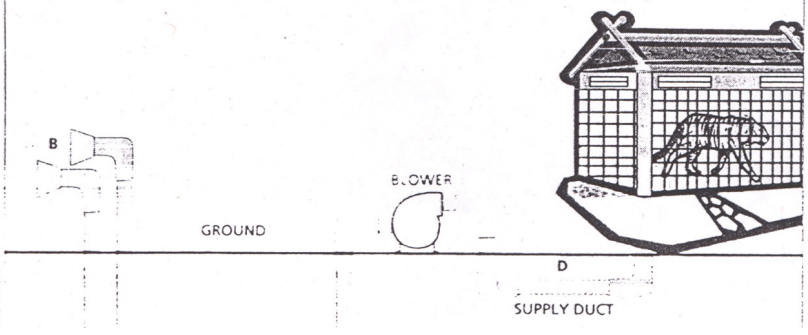
Experts claim that such a system can be very helpful for improving the conditions of animal dwellings in the zoos, especially during the summer season. The animals are usually under considerable stress because of the heat. As a result of this, their food intake reduces. Attempts to cool the dwellings by hanging wet straw mats prove to be futile. Moreover, such efforts make the inside of the animal dwellings very humid, which in turn encourages the growth of bacteria and pathogens.

Along with the summer heat, the chilly cold nights of winters also take their toll on the zoo animals. Their mortality rate increases drastically during this season. In some zoos, electric heaters are used during exceptionally cold spells. But this is not considered very feasible as considerable amount of electricity is consumed.

According to experts, ETHE can be a good solution to all such problems. If installed in zoos across the country, ETHE would also immensely help in improving the plight of the caged animals. The ETHE system can also tremendously help in curbing harmful emissions of conventional air conditioners. ■

Deep-rooted solutions

The Earth Tube Heat Exchanger air conditioning system



Short communication

Encephalitis in pigeons of Kankaria Zoo

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2. Zoo supritendent Kankaria Zoo, Ahmedabad

Abstract

Mortality in pigeon was reported in Kankraia zoo, Gujarat in. Death was preceded by nervous signs viz. incoordination, circling movement torticolis and prostration. On postmortem examination having infestation of *Ascaridia* species and *Raillietina* was observed in the intestine of all the birds examined. Histologically microsections of brain revealed lesions suggestive of encephalitis and in one of five birds a cut section of ascarid larvae and migration tracts along with inflammatory changes were noticed.

Key words: Pigeon, encephalitis, Ascarid larvae

The literature on parasitic encephalitis in pigeons is scanty. However, Helfer and Dickinson (1976) in their observation concluded that possibly the pigeons had ingested the larvae of an ascarid from some other than an avian species, which might have been an aberrant migration to brain.

In Kankaria zoo mortality has been reported in pigeons, which was preceded by nervous symptoms viz., incoordination, circling movement, torticolis, prostration loss of control on flight and equilibrium. Death of ten pigeons were also reported having similar clinical signs out of 100 Khal pigeons five sick pigeons were brought to laboratory for detail investigation. Blood smear were positive for *Haemoproteus columbae* gamonts in RBC and faecal sample positive for ova of *Ascaridia columbae*. On postmortem examination all pigeons revealed acute impaction of intestine due to heavy infestation of *Ascaridia* species

and *Raillietina* species. No significant gross lesions were observed in the intestine, but histopathologically cut section of worms were noticed in the muscosa of intestine along with haemorrhages and leucocytic infiltration (Fig-1). Micro-section of brain revealed varying degree of congestion, haemorrhages, perivascular cuffing composed of large and small mononuclear cells, gliosis, satellitosis, eosinophilic granulocytes, perivascular edema, also several foci of intense inflammation with numerous eosinophilic granulocytes were present in brain stem (Fig-1). In one of the five pigeons examined a cut section of ascarid larvae was observed along with inflammatory changes in the brain (Fig-2). No significant lesions were observed in other tissues.

Migration of ascarid larvae to the brain could be the intimate association of the parasite larvae with the sites of intense inflammation in the brain suggest a cause and effect relationship. Clinical signs of encephalitis were also observed in salmonellas and Paramyxo virus type-I (PMV-1) infection in pigeons and other aviary birds (Biberstein and Zee, 1990). In the present study such possibilities and infection of circovirus (CoCv) may be the explanation for finding the aberrant migration of ascarid larvae to the brain, however, detailed study in this respect needs to be conducted for confirmation. Here, there may be possibility that an aberrant migration of larvae in to the brain, due to ingestion of the ascarid eggs of other avian species. The pigeon cages are open and fenced under large trees on which other species of the bird's peach.

References:

1. Helfer, D.H. and Dickinson, E.O. (1976). Parasitic encephalitis in pigeons. Avian Diseases 20(1): 209-210.
2. Biberstein, E.L. and Zee, Y.C. (1990). Review of Veterinary Microbiology, Blackwell Scientific Publication Ltd., England. Pp 527.

CASE REPORT ZOOS' PRINT JOURNAL 18(1): 987-992

PREVALENCE OF GASTRO-INTESTINAL PARASITES IN CAPTIVE BIRDS AT KAMLA NEHRU ZOOLOGICAL GARDEN, KANKARIA ZOO, AHMEDABAD, GUJARAT

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[3] Zoo Superintendent, [4] Assistant Zoo Superintendent, Kankaria Zoo, Ahmedabad, Gujarat, India.

Abstract

A total of 138 group faecal samples collected cagewise of different wild birds from Kamla Nehru Zoological Garden, Kankaria Zoo, Ahmedabad were examined. Out of this 62 (44.93 %) were found positive for parasitic infection. Eggs of *Ascaris* and *Capillaria* species were observed in 25 (71.43%) and 13 (37.14%) samples respectively, while the oocyst of coccidia (*Eimeria* sp.) were observed in 53 (85.48%) samples. Ova of trematode 8 (12.90%) and cestode segment 3 (4.84%) were also observed.

Keywords

Parasitic infection, zoo birds, Ascaris, Capillaria, Eimeria, *Kamala Nehru Zoological Garden, Gujarat*

Introduction

There are 27 natural orders and 8600 families representing 30,000 species of bird in the world. Out of which, in India to day there are 20 orders and 75 families representing 1200 species of birds (Ali, 1996). Inspite of providing all possible care and facilities, the birds kept in the zoo are under constant stress due to captivity and are prone to infections. Parasitic infections have caused considerable losses to wild life in this country. A number of parasites are responsible for illness and death of captive birds and exercise great influence on the success of bird management in the zoo. Since a systematic study of parasitic infections has not been conducted in Kamla Nehru Zoological Garden, Kankaria Zoo, Ahmedabad that houses 138 species of birds belonging to 24 families and totalling 2068 individuals, a study was undertaken and is communicated in this article.

Materials and Methods

Fresh group faecal samples of birds were collected cage wise in clean sterile containers from Kamla Nehru Zoological Garden, Kankaria Zoo Ahmedabad. A part of the sample was fixed in 10 per cent formalin and brought to the laboratory for direct concentration and centrifugation in saturated salt solution. While the other part of each sample was mixed with 2.5% potassium dichromate solution and kept at room temperature for sporulation of coccidian oocyst. Gross helminth pass in the faeces were identified after staining with borax carmine in case of trematodes and cestodes. Nematodes were studied after clearing them in lactophenol as per standard procedure.

Results and Discussion

The faecal examination of 13814 samples revealed 44.93 per cent parasitic infection with the highest prevalence of nematode eggs (56.45 %) and coccidian oocysts (85.48 %). The infection of trematodes was 12.90% in carnivorous birds while cestode infection was 4.84% in columbid birds (Table 1). Earlier workers have reported parasitic infection varying from 25 to 99% in zoo birds - Baranga Zoo, Orissa (Patnaik & Acharjyo, 1970); Lucknow Zoo, Uttar Pradesh (Pande *et al.*, 1970); Lucknow and Delhi Zoo (Chauhan, *et al.*, 1973); Mysore Zoo (Muraleedharan *et al.*, 1990); Bannerghatta National Park, Bangalore (Reddy *et al.*, 1992), and Ahmedabad and Baroda Zoo, Gujarat (Patel *et al.*, 1998).

Species-wise nematode infection consisted of *Ascaridia* species (71.43%), *Capillaria* species (37.14%) and *Strongyloid* species (8.57%). Patnaik and Acharjyo (1970), Chauhan *et al.*, (1973), Islam (1991), Reddy *et al.*, (1992), and Patel *et al.*, (1998) reported nematode infection mainly with *Ascaridia* species and *Capillaria* species in galliformes and columbiformes birds. In this study also nematode infection mainly with *Ascaridia* species (71.43%) and *Capillaria* species (37.14%) in columbiformes and

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gallifromes birds was recorded. It seems that nematode infection was 56.45% among all parasitic infections, which is high due to their direct life cycle.

Patnaik and Acharjyo (1970), Islam (1991), and Reddy *et al.*, (1992) reported that cestode infection is mostly found in galliformes and columbiformes. In the present investigation 4.84% cestode infection was observed only in columbiformes birds as reported by Patel *et al.*, (1998). Patnaik and Acharjyo (1970) reported trematode infection in ciconiformes and falconiformes birds. During the present study 12.90% trematode infection was observed in ciconiformes and falconiformes birds. Both trematode and cestode infections were found in low numbers which might be due to their indirect life cycle. Trematode infection in ciconiformes and falconiformes may be due to fish which may act as intermediate host.

Conclusion

In the present study nematode and coccidian infection were most commonly observed which might be due to their direct life cycle; whereas the trematode and cestode infection were low due their indirect life cycle. Trematode infection was mainly due to fish given to ciconiformes and falconiformes birds. Infected birds did not show any alarming clinical signs because of regular deworming at three months interval for three days in drinking water. However, some birds were not taking drug due to change of water taste. This might be a reason for parasites especially those that have direct life cycle to remain in the cage and reinfect the birds.

Acknowledgements

The authors are highly grateful to Dr. M.C. Desai, Principal and Dr. D.K. Pethkar, Former Professor of Parasitology, College of Veterinary Science and Animal Husbandry, Gujarat Agricultural University, Sardar Krushinagar for providing laboratory facilities and encouragement.

References

Ali, S. (1996). *The Book of Indian Birds,* 12th edition. Oxford University Press, Oxford, NewYork, 187pp.

Chauhan P.P.S., B.B. Bhatia, G.S. Arora, R.D. Agarwal and S.S. Ahluwalia (1973). A preliminary survey of parasitic infection among mammals and birds at Lucknow and Delhi Zoo. *Indian Journal of Animal Science* 43: 163-168.

Islam, A.M.W. (1991). Incidence of helminth parasites of guinea fowl in Zambia. Abstract of International Seminar on Veterinary Medicine in Wild and Captive Animals Banglore p.28 (unpublished).

Reddy, J.N.R., M.S. Jagannath, P.E. D'souza and A.S. Rahman (1992). Prevalence of gastrointestinal parasites in wild mammals and captive birds at Bannerghatta National Park, Banglore, India. *Indian Journal of Animal Science* 62: 1046-1048.

Muraleedharan, K., V. Iswariah, S.K. Ziauddin and K. Srinivasan (1990). A survey of gastro intestinal parasites of mammals of Zoological Garden at Mysore. *Mysore Journal of Agriculture Science* 24: 250-256.

Pande, B.P., B.B. Bhatia, P.P.S. Chauhan and R.K. Garg (1970). Species composition of coccidia of some of the mammals and birds at the zoological garden, Lucknow. *Indian Journal of Animal Science* 40: 154-163.

Patel P.V., A.I. Patel, R.K. Sahu, and R. Vyas (1998). Helminthic infection in captive wild birds of Gujarat. Abstract of the 10th National Congress of Veterinary Parasitology, Jabalpur, 72pp. (unpublished).

Patnaik M.M. and L.N. Acharjyo (1970). Notes on the helminth parasites of vertebrates in Baranga Zoo (Orissa). *Indian Veterinary Journal* 47: 723-730.

PUBLICATIONS

Threats to Vulture Population

R. K. Sahu*

"Vulture Culture" was a popular name given by Zoo Outreach Organization to a newsletter all about vultures when they tried to develop awareness about vulture conservation. I remember they had sent stickers, t-shirts, etc. for an education programme on vultures many years ago (1990).

Many organizations have tried to develop awareness about the declining populations of vultures but nothing was done to counteract the threats causing this reduction. After some time vulture populations have become seriously reduced and now it is difficult to locate an individual or group of vultures.

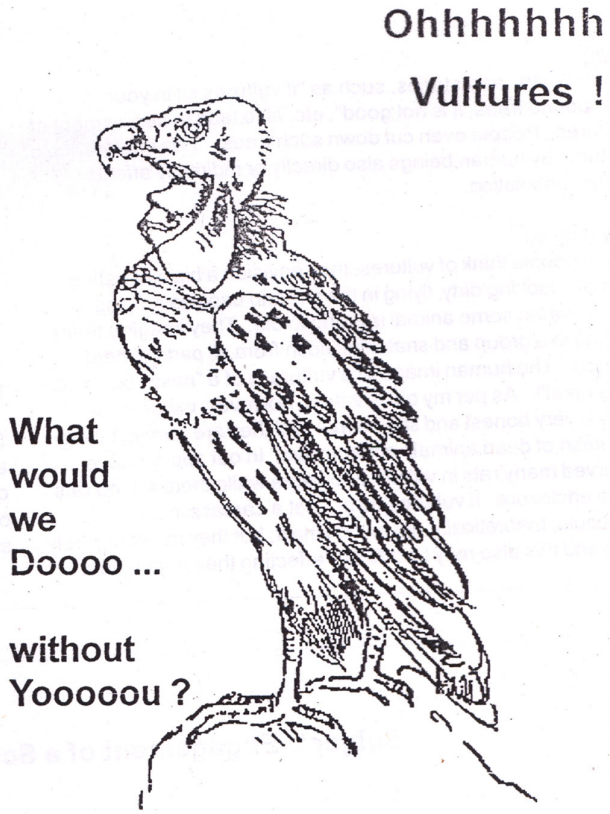
Some time ago you could go outside the city or village and you could see many vultures sitting on dry trees near garbage dumping places. Now you can see only kites and crows, no vultures. How it happened and why suddenly their population reduced requires a great deal of research.

As per my observation only, these are some of the factors which may be responsible for reducing vulture population:

1. Commercialization of animal carcass
2. Use of pesticides and chemicals in carcass to avoid foul odour
3. Dumping and disposal of carcasses by Muncipal/Panchayat authorities
4. Tree cutting and loss of habitat
5. Festivals celebrations
6. Myths
7. Shy nature
8. Diseases
9. Other animals

Commercialization of carcass:
Previously whenever any animal died, the carcass would be given to a particular caste of people with some money or grains, who removed the hide and used it for making shoes or many other leather items. The remaining carcass would be left for the animals who take mortified flesh for their food, including vultures. Now, however, many companies have been set up in all big cities to use different part of carcasses for manufacturing many items. Some of these companies have contracts with city authorities to collect and use all carcasses from city. Otherwise the city authority will collect and give the companies for proper utilization/disposal of dead animals. These disposal methods, while more economical and sanitary in some ways, are directly affecting vultures. It is not economical in the long run, of course, to the environment in general.

Use of pesticides and chemicals in carcasses to avoid foul odour:
This is a general practice done by individuals or city or municipal authority. Whenever any animal dies, phenol, gamaxine, bleaching powder or any other chemicals are sprayed on the carcasses to avoid bad odour. These chemicals may be toxic to some or all of the other animals in the area which may die immediately or after some time. Their life may be otherwise affected by onset of paralysis, infertility, low hatchability, high infant mortality, etc.



Dumping and disposal of carcass by Municipal / Panchayat authorities:
Hygienic methods of carcass disposal may be by an incinerator or dumping of carcass by different authorities are highly detrimental to vulture survival because no carcass is available to vultures for their food and they cannot take other food, such as live animals.

Tree cutting and loss of habitat:
Generally vultures prefer tall trees especially outside the city and village areas near dumping areas. However, they have lost their habitat due to cutting of trees, which combined with the non-availability of carcasses would surely have led to population decline.

Festival celebrations:
Gujarat celebrates Uttarayan on 14th of January (called as Makar sakranti in other states) by flying lot of kites with lone threads, not only during day time but also in the night. This sharp thread is dangerous to all flying birds, and every year I have noted many birds including vultures are seriously injured. Sometimes they die if they are not provided immediate medical help. Even after treatment they are unable to fly due to damaged wings, etc. Such type of damage can, over a period of time, also contribute to the reduction of wild population of vultures.

* Zoo Superintendent, Kamala Nehru Zoological Garden, Kankaria. Ahmedabad 380 008. Gujarat

ZOOS' PRINT, Volume XVII, Number 5, May 2002 (RNI 3:8)

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Myths:
Some myths and stories, such as "if vultures sit in your compound trees, it is not good", etc. also lead to harassment of vultures. People even cut down such trees. This intolerance of vultures by human beings also directly or indirectly affects vulture population.

Shy nature:
When people think of vultures, they envision a big bird eating animals, looking dirty, flying in the sky and especially flying around when some animal is going to die. They imagine them landing in a group and snatching flesh from all parts of dead animals. The human image of a vulture is of a "nasty, bad and evil animal". As per my observation, however, vultures are really a very honest and shy animal and they are always taking only flesh of dead animals not from live. In our zoo we have observed many rats in vulture enclosure while there are no rats in kite enclosure. If vultures do not get a carcass in the wild they could, theoretically, eat live animals; but they never or rarely do so and this also may be a factor affecting their population.

Diseases:
Vultures are generally having higher resistance to disease than other animals due to their exposure to carcasses. However, they are affected by some diseases like worm infestation, external parasites (ticks, mites), coccidiosis, chronic respiratory disease, pneumonia, many bacterial, viral, fungal diseases etc. In the zoo, I have also observed cold and heat stroke in wild vultures and have treated them successfully.

Animals:
Crows and kites destroy vulture eggs and some times kill and eat their chicks. Other animals like dog, cat etc. also create problems to vulture chicks.

Still there may be time to think about the vulture population and try to save them by the way of *in situ* and *ex situ* conservation. Some governmental or non-governmental organizations may again come forward to create awareness to save vultures before it is too late.

Subject: Engagement of a Scientist in Central Zoo Authority

No.3-1/2002-CZA
CENTRAL ZOO AUTHORITY
(Ministry of Environment & Forests)
Annexe-VI, Bikaner House,
Shahjahan Road, New Delhi-110011

Dated: 28.03.2002

Sub: Engagement of a Scientist in Central Zoo Authority on contract basis

Central Zoo Authority requires the services of a Scientist on contract basis for a period of one year, which can be extended for such period as may be decided by the Authority. The qualification of the applicant should be as follows:

Essential: M.Sc in Wildlife Science

Desirable: Training in Zoo Management from a reputed institution

The monthly emolument will be Rs.15,000/- (consolidated) approximately.

Eligible candidates may send their Biodata along with supporting documents to the Member Secretary, Central Zoo Authority, Bikaner House, Annexe-VI, Sahajahan Road, New Delhi-110011 (Fax: 011-3386012 / E-mail- cza@ndf.vsnl.net.in). The closing date for submission of application by post, fax, email or in person is 30-4-2002.

Yours faithfully,
Sd-/-
(P.R. Sinha)
MEMBER SECRETARY

ZOOS' PRINT, Volume XVII, Number 5, May 2002 (RNI 3:8)

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Indian Zoo News

News ! of Kamala Nehru Zoo, Ahmedabad

Kamala Nehru Zoo, categorised as a "Large" Zoo by Central Zoo Authority has developed new facilities beneficial for both animals in the zoo as well as staff and visitors. The closed circuit T.V. reported in this issue is the first time for an Indian zoo. The Earth Tube Heat Exchanger reported in Zoos' Print, Vol. XVI, No.5, May 2001to lower the temperature for animals during summer has inspired a Mechanical Engineer to share his experience for the sake of small and low budget institutions. The zoo, located in Gujarat at the site of the immense earthquake earlier this year and zoo staff. experienced interesting behavioural phenomenon by animals which Superintendent, R. K. Sahu has reported along with other instances around the world.

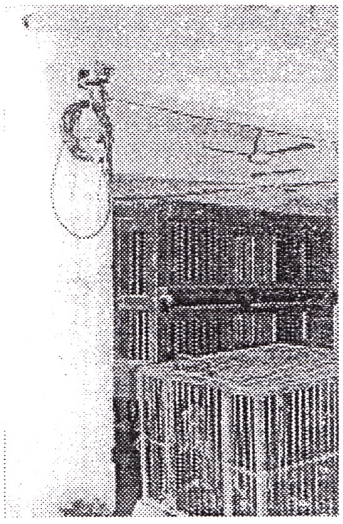
Closed Circuit T.V. in Ahmedabad Zoo

Dr. R.K. Sahu *

Keeping and managing wildlife in the the current context is very difficult. People are very much aware about animal rights, especially when Discovery, Animal Planet, and National Geographic Channel have done such an excellent job of creating wildlife and animal welfare awareness.

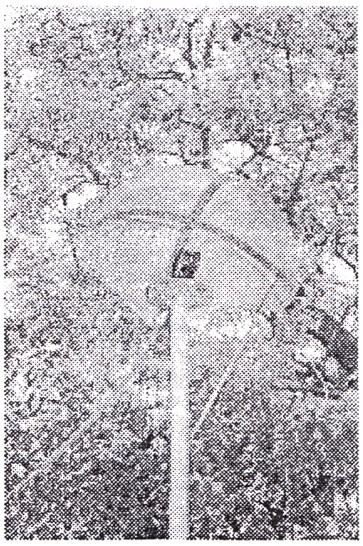
For the first time in Indian zoos, Ahmedabad Zoo has provided closed circuit T.V. system (from 22nd Jan 2001) to observe animals and their behaviour. This system is highly useful for the following purposes:

1. **Animal behaviour:** To understand the animal's behaviour and attempt to modify the enclosure in the animal's interests.



Closed Circuit T.V. in hospital with flexible wires for shifting it as per requirement. Photo by R.K.Sahu.

2. **Sick animals:** This system is highly useful when animals are admitted into the hospital because, whenever anybody goes to observe the animal, the animal will change its behaviour as a result of the observation. It feels disturbed. With these cameras, we can observe the actual behaviour of a sick animal without any distubance



Closed circuit T.V. in Tiger section. Photo by R. K. Sahu.

3. **Visitor management:** Zoo personnel can observe visitors with this device to avoid feeding and teasing of animals, as well as to catch mischief-makers of other kinds in the act.

4. **Education and research:** It is also a very good tool for education and research purposes. Zoo personnel can set up observation of animal behaviour around the clock. This may be particularly useful when trying to understand nocturnal animals biorhythm or breeding behaviour.

5. **Recording behaviour for future study:** We can also record the behaviour of animals when an observer is not available. Special behaviour of animals can be shown to visitors by recording these event.

6. **Visitor education:** This system can be used for showing animals to visitors, providing a monitor near the signage describing the animal. In this way visitors can see the animal in a special situation, such as a mother tiger with cubs, without disturbing the animals in any way.

At present we have provided only two cameras one inside the hospital and the other in the lion-tiger-leopard section with flexible wire, so that we can use our camera in any animal enclosure or section. During the earthquake, in particular, these cameras were extremely useful to us to observe animal behaviour. In the event of severe damage and escape of animals, these monitors could provide an early warning which would facilitate an early, and lifesaving response.

*Zoo Superintendent, Kamala Nehra Zoo, Ahmedabad, Gujarat

ZOOS' PRINT, Volume XVI, Number 9, September 2001(RNI 2:12)

PUBLICATIONS

Unusual Animal Behaviour & Earthquake

Dr. R.K. Sahu *

The zoo staff of Kamala Nehru Zoo, Ahmedabad observed some unusual behaviour by the zoo animals before the infamous Gujarat earthquake a few months back. Elephants, for example, spread their legs as if they were trying to maintain their balance, and made unusual sounds. A Crocodile basking on the ground suddenly moved quickly and jumped into the water. Otters, which were inside their burrows, suddenly came out and also jumped in their water pond; they also were seen running back and forth before earthquake.

Crows and other birds, perching on trees in the zoo, became very noisy. Kites near Kankaria lake were continuously flying in large numbers before and during earthquake. All our cage birds and animals were upset, flying or running inside their enclosure and vocalising.

During and after the earthquake, our greatest worries were the collapse of the enclosures causing injury to the animals as well as escape of carnivores, especially the leopard. Precautions were taken to load tranquilizing guns and close the main gate of the zoo, but fortunately only cracks developed in enclosures and they did not collapse.

After the earthquake, many people wondered whether animals had the ability to detect an earthquake. Since we had observed unusual behaviour before and during the earthquake in our zoo, I contacted many organisations and obtained some interesting information. A scientist by name of Dr. David Jay Brown was engaged in a scientific study in Los Angeles in 1990. He was working in his laboratory on the fifth floor of the University of Southern California Neuroscience building's Learning and Memory lab before an earthquake, with several other students, and three calm rabbits. Suddenly the rabbits became noticeably agitated. They start hopping around in their cages wildly for about five minutes, right before a 5.2 earthquake sent the whole building rolling.

More significantly, on February 4 , 1975 the Chinese successfully evacuated the city of Haicheng several hours before a 7.3 magnitude earthquake primarily based on observations of unusual animal behaviour. Ninty percent of the city's structures were destroyed in this earthquake, but as the entire city had been evacuated before it struck, nearly 90,000 lives were saved.

James Berkland, a retired USGS (United States Geological Survey) geologist from Santa Clara County, California claims to be able to predict earthquakes with greater than 75% accuracy rate simply by counting the number of lost pet ads in the daily newspaper, and correlating this relationship to lunar-tide cycles. This maverick geologist, has been meticulously saving and counting lost pet ads for many years. Berkland says that the number of missing dogs and cats goes up significantly for as long as two weeks prior to an earthquake !

Gravitational variations due to the lunar cycles create "seismic windows" of greater earthquake probability.

Unusual behaviour is difficult to define, and determining if there is a characteristic behaviour is not a simple, clear-cut process, although there are some distinct patterns which have emerged. For example, what appears to be intense fear, seems to be the cause of some animals vocalising for hours before an earthquake, and others to flee in panic. Instances of this type have been reported often. Equally characteristic is the apparent opposite effect of wild animals appearing confused and disoriented, losing their usual fear of people. Some other common observations are that animals appear agitated, excited, nervous, and overly aggressive. Unusual behaviour has been also reported in many species besides mammals as well, including fish, reptiles, and even insects. Deep sea fish, for example, have been caught close to the surface of the ocean on numerous occasions around Japan prior to earthquakes.

Some fish (catfish particularly) are reputed to become agitated before earthquakes, and at times have been reported to actually leap out of the water on to dry land. Snakes have been known to leave their underground places of hibernation in the middle of the winter prior to quakes, only to be found frozen on the surface of the snow. Mice are commonly reported to appear dazed before quakes, and allow themselves to be easily captured by hand.

Bees have been seen evacuating their hive in panic, minutes before an earthquake, and then did not return until fifteen minutes after the quake ended. Even creatures like millipedes, leeches, squid, and ants have been reported to exhibit abnormal prior to earthquakes (Miller, 1996).

A number of theories have been proposed to explain this phenomenon, and what the precursory signals that the animals are picking up on might be. Because many animals possess auditory capacities beyond the human range, it has been suggested that some animals may be reacting to ultrasound emitted as microseisms from fracturing rock.

Another reason may be fluctuations in the earth's magnetic field. Because some animals have a sensitivity to variations in the earth magnetic field, and since variations in the magnetic field occurs near the epicenters of earthquakes animals may pick up on this.

Marsha Adams, an independent earthquake researcher in San Francisco, claims to have developed sensors that measure low frequency electromagnetic signals which allow her to predict earthquakes with over 90% accuracy. Adams suspects that low frequency electromagnetic signals created by the fracturing of crystalline rock deep in the earth along fault lines are "biologically active", and that her instruments are picking up the same signals that sensitive animals do. As a result of this technology (whose details are a corporate secret), she says that her systems makes unusual animal behaviour observations obsolete.

* Zoo Superintendent, Kamala Nehru Zoo, Ahmedabad

Tributsch has suggested that a piezoelectric effect may be at work here. When certain crystals, such as quartz, are arranged in such a way that pressure is applied along certain of the crystal axes, the distribution of positive and negative ions can shift slightly. In this way pressure changes produce electrical charging of the crystals surfaces. On the average the earth crust consists of 15% quartz, and in certain areas it can be as high as 55%.

According to Tributsch, the piezoelectric effect of the quartz is capable of generating enough electrical energy to account for the creation of airborne ions and during an earthquake. This electrostatic charging of aerosol particles may be what the animals are reacting to. Animals, also observed acting unusual in similar ways prior to thunderstorms, may have evolved a sensitivity to electrical changes in their environment.

Some people say that they feel an uncomfortable pressure on their head, or a persistent headache that lasts for weeks which suddenly vanishes moments before an earthquake. Because magnetite has been found in some animal brains, Berkland thinks that it is possible that animals may be reacting to their headaches caused by changes in the earth's electromagnetic field. He said that a dog was observed chewing on willow bark from which aspirin is derived - prior to an earthquake, and he believes that this was an attempt by the dog to self-medicate himself for the headache.

List of authors consulted :
Armstrong, 1969.

Brown, D. J., Etho-Geological Forcasting.

Champman and Bartels, 1940.

Everden, J. F. (ed.), Abnormal Animal Behaviour Prior to Earthquake. U.S. Dept. of Interior Geological Survey.

Hatai S. and Abe N. The Responses of the Catfish, *Parasilurus ascotus*, to Earthquakes.

Miller, Ted, 1996. Earthquake prediction.

Sheldrake, R. Seven Experiments that could change the World

Suyehiro, Y. Unusual Behaviour of Fishes to Earthquakes.

Tributsch, H. When the Snake Awake

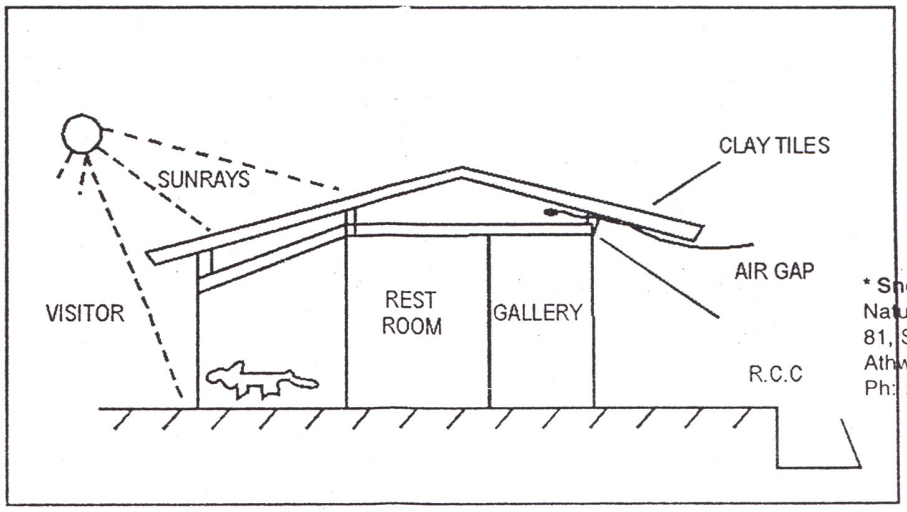
Ulomove, V.I. and Malashev, B.Z. The Tashkent Earthquake of 26 April,1966

Acknowledgement
Thanks to Donna O'Connel, Durrell Wildlife Conservation Trust Jersey U.K.

Suggestion for small changes for heat control in animal enclosure

Snehal Patel *

It was interesting to read about the Earth Tube Heat Exchanger in Zoos' Print, Vol. XVI, No.5, May 2001. I am a Mechanical Engineer and have experimented with alternate source of energy like wind and solar energy Based on my experience, if the tiger enclosure is given a second roof with Mangalore tiles with 40-50 cm gap above R.C.C. roof and also the tile roof is extended 1.5 meter on all sides, direct sunlight will not fall on roof (R.C.C.) and walls, and this will automatically reduce the room temperature by 3-5°C in summer. A similar result can be achieved by growing creepers and making it to cover the walls and roof of the enclosure. These inexpensive alterations can be done even by low-budget zoos to improve conductions for their animals.



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VET BRIEF ZOOS' PRINT JOURNAL 22(8): 2806

CHEMOTHERAPY OF NEMATODIASIS IN ZOO PIGEONS

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Pigeons act as reservoir host or carrier and an important source of infection for other avian hosts, which share the common parasitic fauna (Kumar, 1998). There are quite a large number of problems related to management of parasitic infestations in birds. Clinical or sub clinical form of nematodiasis leads to anaemia as a result of continuous sucking of blood by parasites. Clinically, birds show partial or complete anorexia, diarrhoea, dehydration, loss of weight and alteration in body microelements, which result in immuno suppression. *Ascaridia columbae* and *Capillaria obsignata* are the most common nematodes in pigeons. Kirsch *et al.* (1978), Vindevogel *et al.* (1978), Kirsch & Degenhardt (1979), Luthgen (1979), and Scupin & Nannen (1980) have treated nematodiasis in pigeons with fenbendazole at different dose rates in feed and have found various results form various parts of world. In all the zoos of Gujarat state, anthelmintic treatment is regularly carried out for control of helminthic infection in zoo birds. The present study was undertaken to evaluate chemotherapeutic efficacy of benzimidazole group of drugs, namely, albendazole and fenbendazole against nematode infection in zoo pigeons.

Materials and Methods: Studies were conducted for helminthic infection of pigeons of Kamla Nehru Zoological Garden, Kankaria Zoo, Ahmedabad. Faecal samples were examined for the presence of gravid segments of tapeworms, immature and mature parasites. They were processed for qualitative and quantitative examinations. Qualitative examinations of all randomly collected samples were positive for *Ascaridia columbae* and *Capillaria obsignata* nematode infections. Two groups were selected cage-wise with each cage of 30 pigeons for study. In group-I (pooled faecal sample having 1800 EPG) were treated with albendazole 2.5% *w/v* (Albomar, Glaxo India Ltd., Mumbai) at dose rate of 30 to 45ml/100 birds for three days in drinking water. In group-II (pooled faecal sample having 2000 EPG) were treated with fenbendazole 10% (Panacur suspension, Hoechst India Ltd., Mumbai) at dose rate of 1ml/15 birds for three days in drinking water. Quantitative examination of faecal samples of both groups was carried out at 7, 14, 21 and 30 days post treatment. The results are incorporated in Table 1.

Results and Discussion: In group-I of pigeons have 1800 EPG before treatment, showed 200, 500, 700 and 900 EPG after 7, 14, 21 and 30 days post treatment indicating the efficacy of the drug to be 88.92%, 72.73%, 61.12% and 50%, respectively. In group-II of pigeons have 2000 EPG before treatment drug efficacy was 90%, 75%, 60% and 55%, after 7, 14, 21 and 30 days post treatment, respectively. The egg load reduced to 88.89% in albendazole treated group and 90 percent in fenbendazole treated group after seven days of treatment and egg load reduced to 50% in albendazole and 55% in fenbendazole treated group after 30 days of treatment. Similarly, Kirsch *et al.* (1978), Vindevogel *et al.* (1978), Krisch & Degenhardt (1979), Luthgen (1979), and Scupin & Nannen (1980) have treated pigeons nematodiasis with fenbendazole at different dose rates in feed and found various results from 90 to 100% efficacy. Here in this case seven days after treatment 88.89 and 90% efficacy was observed in albendazole and fenbendazole treated groups, respectively, because some pigeons were observed to not drink water. Infection remained in the cages and pigeons were reinfested with ova and the egg load increased to 50-55% after 30 days of treatment. Both the drugs were equally effective in pigeon nematodiasis. To increase the efficacy of drug a higher dose may not adversely affect pigeons as suggested by Scupin & Nannen (1980).

References

Kirsch, R., K. Petri & H. Degenhardt (1978). The treatment of *Capillaria* and *Ascaridia* infection in pigeons with fenbendazole. *Kleintier Prax.* 23: 291-298.

Kirsch, R. & H. Degenhardt (1979). The efficacy of fenbendazole against in mature and immature stages of *Capillaria obsignata* and *Ascaridia columbae* in pigeons. *Tierztliche Umschau* 34: 767-771.

Kumar, R. (1998). A survey of parasitic fauna of local pigeons and assessment of efficacy of certain drugs in poultry nematodiasis. M.V.Sc Thesis submitted to C.S.Azad University of Agricultural and Technology, Kanpur.

Luthgen, W. (1979). Efficacy of fenbendazole against *Ascaridia* and *Capillaria* in pigeons. *Tierztliche Umschau* 34: 107-112.

Scupin, E. & R. Nannen (1980). Safety and efficacy of fenbendazole in pigeons. *Blauen Heftefirden Tierurget* 62: 73-76.

Vindevogel, H., IP. Duchatel & L. Fieveg (1978). Treatment of capillariasis in pigeons with fenbendazole. *Annales de medicine veterinaire* 122: 109-115.

Acknowledgement

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Table 1. Effect of albendazole and fenbendazole anthelmintic drugs on natural nematode infection in zoo pigeons

Name of the drug	Dose rate	EPG days after the treatment				
		0	7	14	21	30
Albendazole 2.5 w/v (Albamore suspension)	30-45ml/100 birds for three days in drinking water	1800	200 (88.89%)	500 (72.73%)	700 (61.62%)	900 (50.00%)
Fenbendazole 10% (Panacur suspension)	1ml/15 birds for three days in drinking water	2000	200 (90.00%)	500 (75.00%)	800 (60.00%)	900 (55.00%)

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PROMOTIONAL ZOO ACTIVITIES

" Only what people know, can they love, and only what they love, will they protect "

- Hanover Zoo

TIMES CITY

Little friends of the zoo

Not just elephants, even cobras and pheasants have found admirers in children. These new-found attractions have rekindled kids' interest in animals, reports Paul John

Raivat Shah

They may not be celebrities in the Kamala Nehru Zoological Park, unlike Ashok, the elephant, Devi, the hippo, and Raja, the tiger, but these ubiquitous creatures sure do elicit the curiosity of kids who visit them. Meet the cobra, pheasants, emus, lovebirds, badgers, pythons and Nicobar pigeons who are now the new-found attractions for adoption among kids.

Nine-year-old Raivat Shah comes to the zoo often to visit his two new friends, whom he calls, 'Chinese peacocks' — commonly known as pheasants. "I told my father that I wanted to adopt the birds. I loved their colours. We can see them every time we go to the zoo. They are beautiful and I am proud to have them as my friends," says Raivat.

Eight-year-old Yashvee Nimbark insists on visiting her friend 'Bittoo' often. Bittoo is an acelate cobra. Following her demands, her father Deepak Nimbark adopted another acelate cobra.

"I love Bittoo very much. Though I don't get to see him much when my classes are on, I plan to be a regular visitor during my vacations. I am excited each time I visit him. I wish he could talk," says Yashvee.

One-and-half-year-old Aditya Jain became the first child to adopt a peacock under the 'Friends of Zoo' initiative on April 1. Aditya adopted the national bird at the zoo by paying Rs 4,260.

Deputy municipal commissioner ZA Sancha accepts, "It's true that kids are leading the front in adoptions and, in most cases, are forcing their parents to adopt an animal, bird or a reptile. Kids show a very unconditional bonding with these animals and this is what makes these adoptions special."

"Unlike their glamorous neighbours, whose costs cross Rs 2 lakh, these exotic birds, animals and reptiles can be adopted at a price anywhere between Rs 1,400 and Rs 25,000 per annum, which is affordable," says a senior zoo official.

Raivat's mom Dhaitri Shah believes that the zoo authorities should go beyond the adoption scheme. "Children should be given information about the animals they have adopted. Besides, it's vacation time and the zoo should be active enough to design programs to attract young children. Today Raivat, for instance, is passionate about the pheasant."

Till now, zoo authorities have given 30 mammals, birds and reptiles for adoption. These include two elephants, a Nicobar pigeon, acelate cobra, python, golden and silver pheasant, an emu, two freshwater and salt water crocodiles, two leopards, a lion and a tiger. Among reptiles, at least five snakes have been adopted.

"Our first preference has been families and individuals who come to adopt these animals, followed by corporate houses. The zoo superintendent can be approached for adoption purposes," says a senior AMC official.

AMC authorities are expecting to collect more than Rs 50 lakh from the adoption scheme that will be spent on the maintenance and the make-over of the zoo. Already, zoos in Mysore, Hyderabad and Lucknow have similar schemes.

CITY OF ANGELS

Yashvee Nimbark

> I like the cobra very much. We have a lot to learn about these wild reptiles. They hiss a lot. I am curious to know more about them. I love Bittoo.
>
> **Yashvee Nimbark** | 8

> It's good to know birds other than the pigeons, crows, mynas. I have adopted two pheasants — a golden and a silver one. I can now say I have exotic friends. It's fun watching them as they don't behave like normal birds. The birds are pretty curious like me.
>
> **Raivat Shah** | 9
>
> Adopted: A golden and a silver pheasant

WHAT THE ZOO PLANS TO DO WITH THE MONEY

With the adoption money, the authorities plan to create infrastructure for the animals in the zoo. Coolers during summers, clean drinking water facility, modern cages, food for the animals and birds as well as medical facilities are among the things planned for these creatures. The zoo also plans to organize seminars and even prepare and distribute information on the animals, birds or reptiles who are being adopted, to the donors. Authorities are also planning a special club of donors who can meet up on scheduled dates to discuss and participate in the

WANT A COMRADE?

(HERE'S WHAT YOU NEED TO PAY PER ANNUM)

Animals

Rs 10,000-25,000
Bear, wolf, hyena, fox, nilgai, sambhar, leopard cat

Rs 1,000-10,000
Deer, otter, siamese cat, bat, porcupine

Birds

Rs 10,000-20,000
Emu, casavari, pelican, storks vulture swan

Rs 1,000-10,000
Military mackau, crown pigeon, duck, shallow waterfowl, peacock, pheasant, lorikeet, African crown crane, love bird, parakeet, cocktail, java sparrow, finch, dove

Reptiles

Rs 1,000-5,000
Crocodiles, alligator, python

Times of India,Ahmedabad

PROMOTIONAL ZOO ACTIVITIES

AGAINST WILDLIFE TRADE . . . Important Theme and Successful Education Programme for Animal Welfare Fortnightly ... REPORTS

Animal Welfare Fornightly, (a project of the Animal Welfare Board of India) has become practically an insitution in India among zoos, welfare organisations, and others interested in the welfare of animals.

The Zoo Outreach Organisation has helped zoos celebrate Animal Welfare Fortnightly for years. Normally the theme for these programmes would be visitor behaviour -- "do not tease and feed animals" -- because this is a big problem in Indian zoos.

This year we decided to do something different, to expand both the education function of zoos, of the event and of the subject "animal welfare" itself.

The conservation function of zoos is being questioned in a different way in the world today, not because zoos can't breed and release animals, but because the saving of habitat for release has become so very difficult. The role of conservation education in zoos has taken on a greater importance : if zoos can influence people to change their careless and destructive behaviour with respect to natural resources, then perhaps more habitat could be saved.

Previously, zoo education had one function : to convey information. Today, there is a different objective. Zoo education today should alter behaviour, create a caring attitude towards wildlife, and provide inspiration and information to help people make informed decisions which would protect natural resources. Today's zoo education should help visitors understand how their activities directly impact the environment.

With that in mind, Zoo Outreach Organisation is embarking on a series of education programmes featuring wildlife species, habitats and issues. For Wildlife Week last year, we featured Bears. This coming year we will be making educational materials and programme kits for the taxon groups for which we conduct Conservation Assessment and Management Plan workshops : bats, primates, amphibians, rodents and insectivores. We are expanding the Trade education programme kit with more materials and will add other issues from time to time, such as sustainable utilisation, development, and legislation.

In our "mini-report" on 2002 Animal Welfare Fortnightly we listed the zoos which participated by ordering kits. In this issue we are sharing some of the wonderful Reports of what these zoos, museums and NGOs did with the materials.

The programme for Animal Welfare Fortnightly was sponsored by the Universities Federation for Animal Welfare, UFAW, and Columbus Zoo. Columbus Zoo has sent sufficient funds to make additional materials for zoos which would like to run the Trade Programme again or for those who could not avail the opportunity.

If you are interested write to us for a form, or send an email to <zooreach@vsnl.com>.

Kamala Nehru Zoo, Ahmedabad

The Kamala Nehru Zoo in Ahmedabad entertained 6097 children giving free entry. Children were also treated with a film show on wildlife at their Education Hall. The Municipal Corporation offered free entry to children below 12 years and those visiting Ahmedabad on educational tours.

Educational materials including packets and masks, etc. were given out. There was a t-shirt contest to point out the agony of animals in trade stuffed into a small compartment (left). This was followed by a rally through the zoo premises (right).

Submitted by R. K. Sahu, Superintendent

ZOOS' PRINT, Volume XVII, Number 5, May 2002 (RNI 3:8)

h SUMMARY

SWOT Analysis

Strengths:

- The zoo has a large and varied collection of animals.
- It is an urban-oasis, attracting a huge number of visitors of all categories and types.
- It is well shaded with large mature trees,abutting a major landmark in the city- the Kankaria Lake which contributes to the naturalistic environment.
- It has a committed and dedicated staff.
- Many path breaking activities to enhance the quality of life of the exhibits are being carried out.
- Innovative methods for display of zoo animals congenial to their welfare are being utilized.
- Adequate health care is provided to the animals.
- The site is high and therefore, does not experience much in terms of water logging.
- It receives a large number of visitors more than 20 lakhs annually,a testimony to its popularity.

Weaknesses:

- In many enclosures, the number of animals far exceeds the CZA norms.
- There are areas in the zoo which remain ignored whereas some areas gather too many visitors.
- Being part of an urban context brings the issue of noise pollution and human impact on animals.
- Has not evolved to create an identity of a naturalistic zoo with empathy towards the animal.
- Enclosures belong to the traditional ‘cage’ type.
- Exhibits are randomly placed as it developed in bits and pieces.
- Unorganized visitor path leading to criss crossing.

SUMMARY

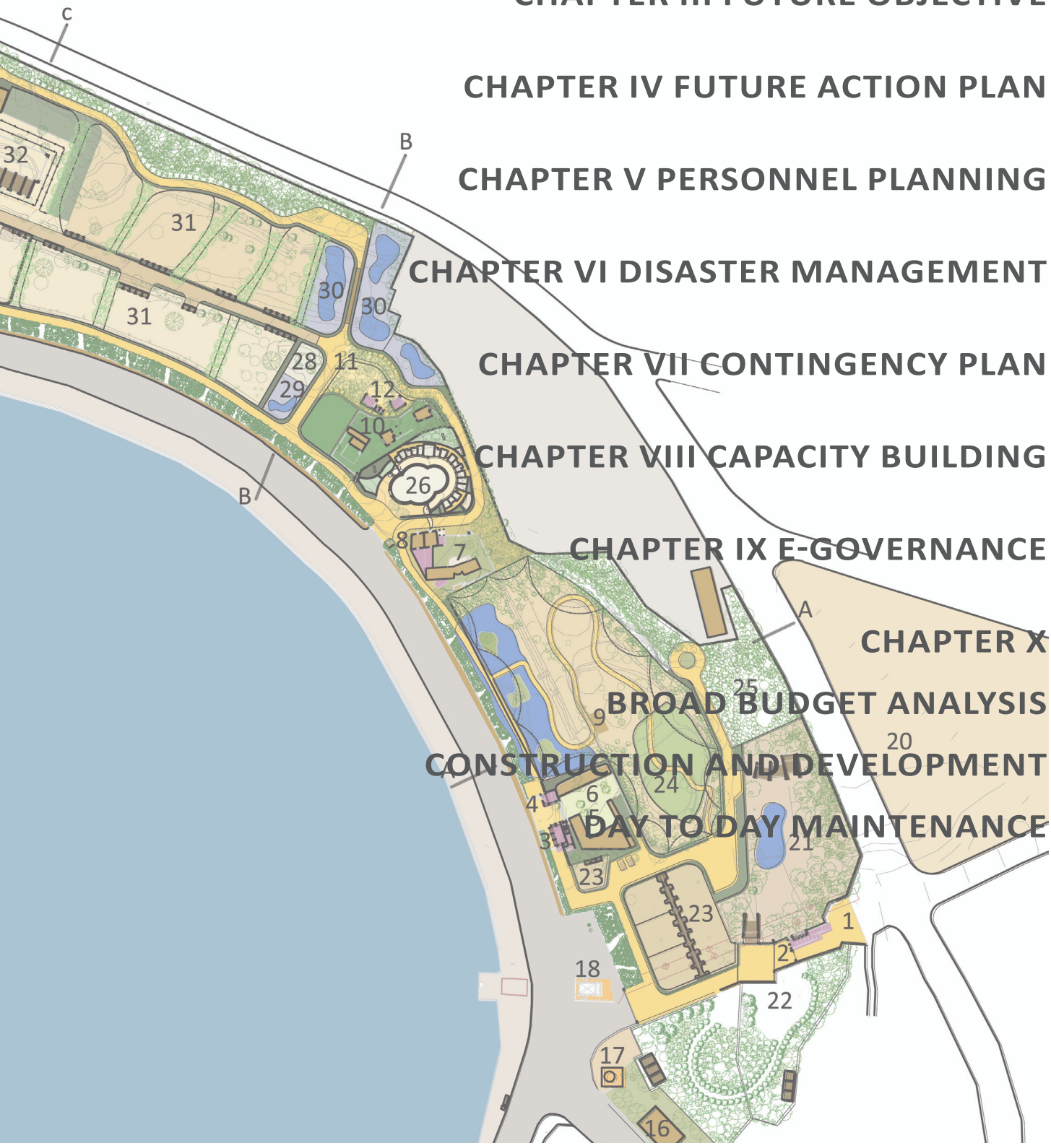
Opportunities:

- It has the Kankaria Lake and the development around the lake is pedestrian. Thus combined, the total precinct is of peace, quiet and can thus encourage a connection to nature.
- Since the zoo is abutting the lake and is adjoining larger land, it can be expanded further.
- As more land becomes available, specialized areas can be planned like butterfly park, night safari etc.
- The large number of people it attracts makes it a fantastic place for learning and sensitizing the citizens.
- It can be the generator of an awareness campaign.
- The animals can have better, enriched enclosures.
- An urban area makes possibility of linking with other institutions, thus expanding the educational possibilities.
- An urban area makes available a variety of experts whose inputs can be taken to create a better environment.

Threats:

- Being a prime urban land, it is under a continuous development threat.
- Noise pollution will have to be constantly monitored.
- Animal escapes can cause concern, though there have not been any specific such instances.

Part II



CHAPTER III FUTURE OBJECTIVE

CHAPTER IV FUTURE ACTION PLAN

CHAPTER V PERSONNEL PLANNING

CHAPTER VI DISASTER MANAGEMENT

CHAPTER VII CONTINGENCY PLAN

CHAPTER VIII CAPACITY BUILDING

CHAPTER IX E-GOVERNANCE

CHAPTER X

BROAD BUDGET ANALYSIS

CONSTRUCTION AND DEVELOPMENT

DAY TO DAY MAINTENANCE

chapter III

FUTURE OBJECTIVE

The zoo's objectives are;

1. Educating people, particularly children of the natural ecosystem and spreading awareness
2. To create empathy for animal behavior and habitats
3. To conserve wildlife, especially the endangered species and where possible multiply their population
4. To provide good living conditions identical to their naturalistic environment, hygiene, food and enrichment
5. To provide better facilities to encourage research for the betterment of animal life in the zoo and conserve wildlife
6. To provide an impressive environment to the visitor with adequate facilities for relaxation

MISSION STATEMENT

"The Kamala Nehru Zoological Park, by virtue of its location, will be urban oasis. The Park will bring into an urban centre, experiences of natural habitat, generating respect for the animals, their environment and their characteristic behavior. Keeping the welfare of animals as the primary concern, the park will engage in the promotion of a naturalistic environment thus complementing the global effort of sustaining the rich biodiversity of the earth through an empathy for the different species."

10 YEAR VISION

The zoo endeavours to express the ecological interdependence in nature and create an environment that simulates the natural habitat of the species exhibited. The impact of the zoo is to be provocative and sustained. The management should inspire, train and empower each generation to care for animals and conserve wildlife.

Long term goals should be set up such that visitors to enter the urban oasis of a zoo, will be inspired by state-of-the-art, innovative animal exhibits that reflect commitment to animal care, science and public engagement. Exhibits will connect visitors with the natural world.

Realizing the vision

The strategy contains three major elements: short term goals arranged by goal category, performance measures and strategies that will propel the zoo towards its long-term destination.

Goal categories

The plan's goal categories reflect the major functional areas of the zoo:

1. Animal conservation and care
2. Education and awareness
3. Research
4. Organization and strength
5. Facilities and interaction
6. Financial strength

10 YEAR VISION

Performance measures

The plan's performance measures are to be designed to drive change and track the zoo's progress towards achieving its short-term goals and ultimately, its long-term vision. These are the benchmarks that will be used during the first year of the plan's implementation and they reflect the 1-year goals. As the plan is revised each year with new 1-year goals, the performance measures will also be updated. The zoo's managers will use these benchmarks to create a 'scorecard' for their department or unit to help monitor performance.

Short-term goals

The plan's 1-year goals are to be the zoo's highest priorities. They are to be accomplished, regardless of current resource limitations. If necessary, government and discretionary funds and staff will be redirected to support these goals.

These goals include increasing awareness by changing signage, adding some exhibits in the new space available. In animal conservation and care, the otters and nicobar pigeons are the priorities. Towards organization, the zoo will fill up the vacancies as far as possible. New toilets and public amenities are to be built as facilities.

The 5-year goals represent the actions of the zoo needs to take advance towards realizing its 20-year vision. These goals will be updated annually, with new 1 and 5-year goals established and fine-tuned.

10 YEAR VISION

Existing zoo

Zoo extension - 1 year

10 YEAR VISION

Zoo extension - 5 years

10 YEAR VISION

Long-term goals

The role of zoo as a tool to provide exposure and understanding of wildlife has to be necessarily enhanced and concentrated efforts have to be made to change the popular perception that zoo are like confinements where animals are incarcerated for life. Hence efforts have to be made both at the program level and physical planning level.

Program

1. Induction of new animals
2. Introduction of
   a. Night zoo
   b. Butterfly/ insect park
   c. Rodent park
   d. Aquarium
3. Introduction of Safari park
4. Introduction of specially guided tours to spread awareness and sensitivity towards animals
5. Special introduction of the zoo, as an important part of education in schools,
6. Employment of new media of information dispersal – by use of audiovisuals, special brochures, introduction of audio tours, etc.
7. Augment the existing facilities for visitors – better resting areas, information centers, cafeterias, toilets, etc.
8. Strengthen the awareness and training programs
9. Improvement in the parking capacity

10 YEAR VISION

Long-term goals

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9. Improvement in the parking capacity

Physical planning

1. Better habitat for animals in terms of space and protection – both against visitors and climate
2. Providing the most natural living conditions, conductive for the habitat of the animals
3. Provision of the withdrawal area and areas of isolation for the animals which allow for physical well-being and

THEME AND STRATEGY

In the long history of the zoological parks, there have been great strides in the manner in which animals are kept. While captivity is the basic premise of the zoo, the idea of the cages have undergone a sea change. From cage to a naturalistic enclosure, the current practise now emphasizes the display of the animal in its natural habitat.

The KNZP will henceforth undertake all development with the theme of immersion,where both the animal and guests are part of the same re-created theme, habitat or landscape area. Along with this , there will be insertions of story lines and activity based design.

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

- Mark Akeley, 1936

chapter IV

FUTURE ACTION PLAN

a **Proposed animal collection plan**

Conservation breeding

b Proposed Layout

Proposed Sections

Visitor and Services circulation

Visitor's Amenities

Electrical services

Solid and Liquid waste disposal/drainage

Water distribution

Sewerage lines

c Proposed Zoning

Proposed Education, Awareness and Research

DEWATS system and Rain Water harvesting system

Proposed Enclosures

Proposed landscape

Existing animal enclosures and enclosures to be modified

Enclosures to be built on the old structure

Proposed enclosures

d Night Zoo

Future Parks

FUTURE ACTION PLAN FOR ZOO PRECINCT

a

PROPOSED COLLECTION PLAN

INTRODUCTION

The zoo today is a house to more than 2000 animals of around 150 species. In future it plans to include various other species both exotic and indigenous in its collection plan, while reducing some animals which are too many in number. Through this, the plan is to expand the scope of education to a more wholistic and global context.

The zoo proposes to enhance its present inventory by adding exotic and endangered species towards the vision of education.

In today's fast developing world, natural habitats of many wild animals are under threat of destruction and hence many animals have no parallel refuge left. This situation has resulted in extinction of many animals and if not tackled practically, might result into the extinction of many in future.

Zoo as a concept presents a very promising scenario for safety and conservation of such animals. Captive breeding has been a very successful option for preserving the genetic diversity in such animals which has drastically increased the survival opportunities of some of the endangered species around the world. Along with conservation breeding of endangered species zoo's also serve as the platform to educate people and spread the awareness about the responsibility we as a human species bear towards our fellow living beings.

Ahmedabad zoo being one of the oldest zoo in India has all the infrastructure and expertise to take up this responsibility and contribute to this cause.

BIRDS

Endangered species:

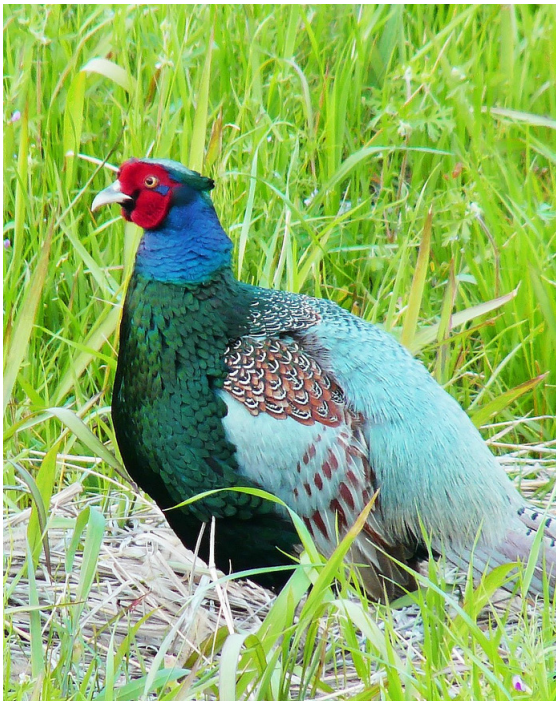
NAME OF THE SPECIES	EXISITING NO.		PROPOSED NO.	
	M	F	M	F
Sarus Crane	-	-	2	2

Exotic species:

NAME OF THE SPECIES	EXISITING NO.		PROPOSED NO.	
	M	F	M	F
Rhea	-	-	2	2
Ostrich	-	-	2	2
Pheasant Japanese Green	-	-	2	2

Others:

NAME OF THE SPECIES	EXISITING NO.			PROPOSED NO.	
	M	F	U	M	F
Nicobar Pigeon	-	-	21	4	4
Flamingo	-	-	9	10	10



REPTILES

Endangered species:

NAME OF THE SPECIES	EXISITING NO.			PROPOSED NO.	
	M	F	U	M	F
King Cobra	-	-	-	2	2
Snake Russels's Viper	-	-	4	3	3
Snake Saw Scaled Viper	-	-	-	4	4
Krait	-	-	2	4	4
Boa Sand	-	-		4	4

Exotic species:

NAME OF THE SPECIES	EXISITING NO.		PROPOSED NO.	
	M	F	M	F
Iguana Green	-	-	3	3
Tortoise Giant	-	-	2	2
Python Malaysian	-	-	3	3

MAMMALS

Endangered species:

NAME OF THE SPECIES	EXISITING NO.		PROPOSED NO.	
	M	F	M	F
Chinkara	-	-	3	3
Chowsinga	-	-	3	3
Wild Ass	-	-	2	3

Exotic species:

NAME OF THE SPECIES	EXISITING NO.		PROPOSED NO.	
	M	F	M	F
Giraffe	-	-	2	2
Zebra	-	-	3	3
Chimpanzee	-	-	2	3
Orangutan	-	-	2	3
Gorilla	-	-	1	3
Kangaroo	-	-	3	3
Cheetah	-	-	2	3
Tapir	-	-	2	2
Pygmy Hippo	-	-	2	2
Hamadryas Baboon	-	-	3	3

CONSERVATION BREEDING

Ecosystems of the world are precariously placed with the natural environment coming under severe pressure of development and expansion of human habitats and activities .Starting from requirement for pasture land and agriculture to industry and settlement, the human endeavour is taking its toll. In this process, the species in wilderness are threatened with loss of habitat leading to them becoming endangered or extinct.

What started as a cage for amusement now represents itself as the last frontier for many of these animals - the zoo in the present context is often the only safe environment for many species of our world. Exhibits provide the educational background required for developing a long term understanding of people and thus the empathy for the natural world. However, to further the cause of the fast diminishing world, it is imperative for zoos to take up a more active role in their conservation through targeted breeding programs. It is only through sustained conservation breeding that the endangered.

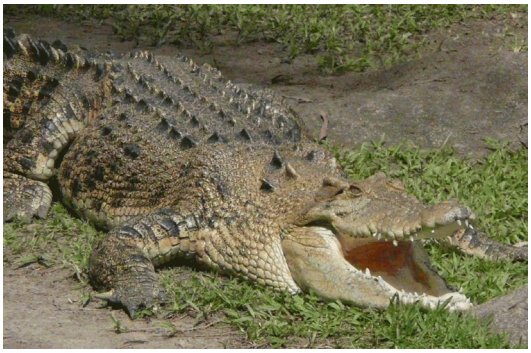
The zoo has been successfully breeding various animals as mentioned in the earlier chapter. It also plans to breed some of the species listed under its future collection plan and also provide them with proper breeding facilities at the breeding centre like – food, nesting material, privacy, comfortable temperature, etc. To facilitate the same.

BIRDS

1. Pigeon Nicobar
2. Spoon BIll White
3. Pelican Rosy
4. Ibis white
5. Cormorant White
6. Peacock White
7. Peacock Common
8. Pigeon Pied Imperial

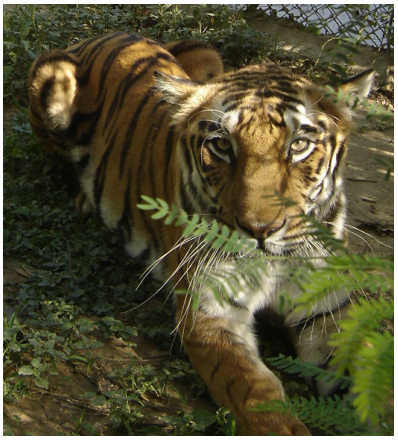
REPTILES

1. Snake Keelback Checkered
2. Indian Star Tortoise
3. Fresh Water Turtle
4. Crocodiles
5. Monitor Lizards
6. King Cobra
7. Russel's Viper
8. Anaconda

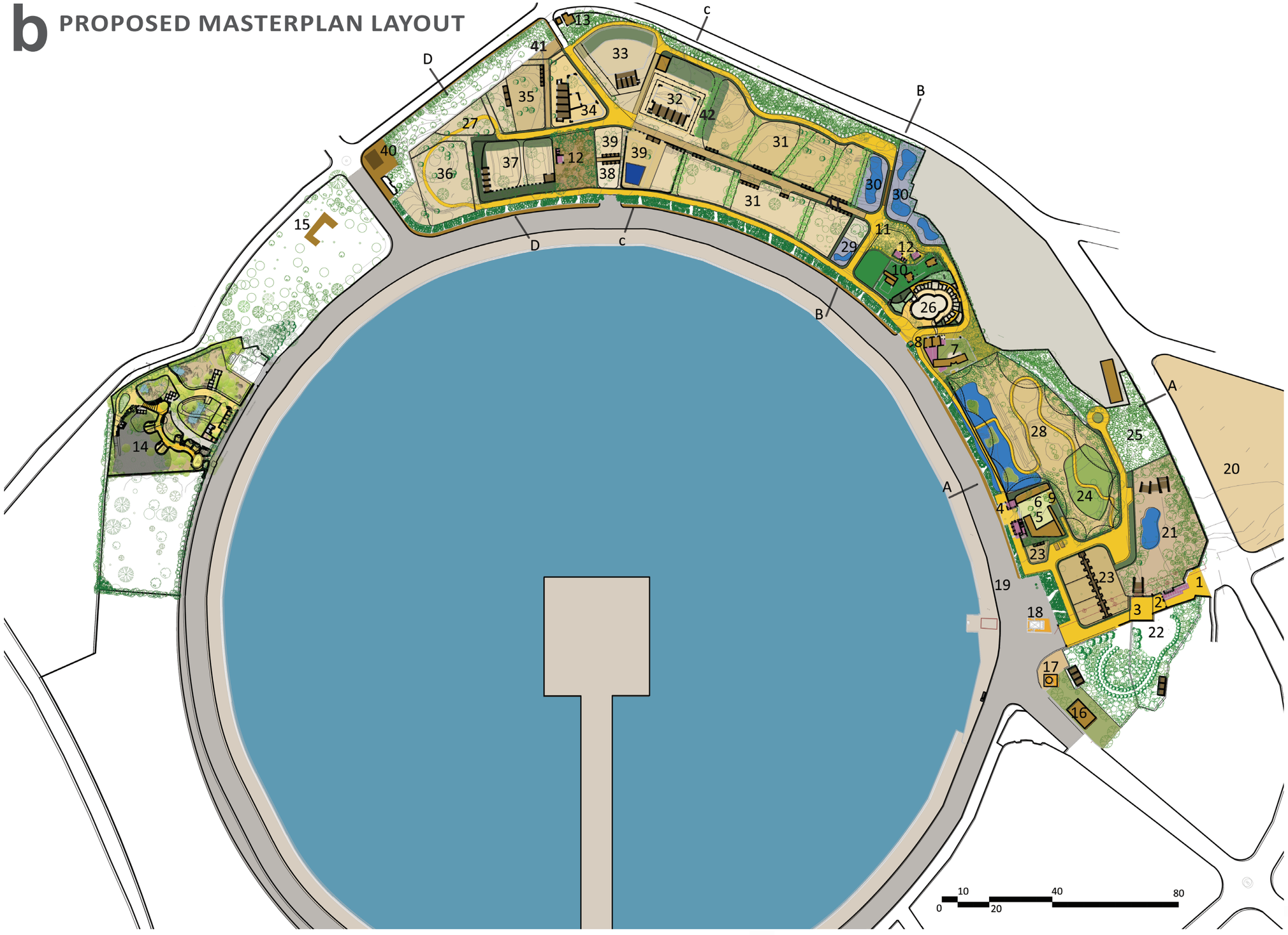


MAMMALS

1. Chinkara
2. Chowsinga
3. BlackBuck
4. Otter Common
5. Jackal Indian
6. Porcupine Bengal
7. Common Palm Civet
8. Lion Indian
9. Tiger
10. Bear Sloth
11. Langur Common



b PROPOSED MASTERPLAN LAYOUT



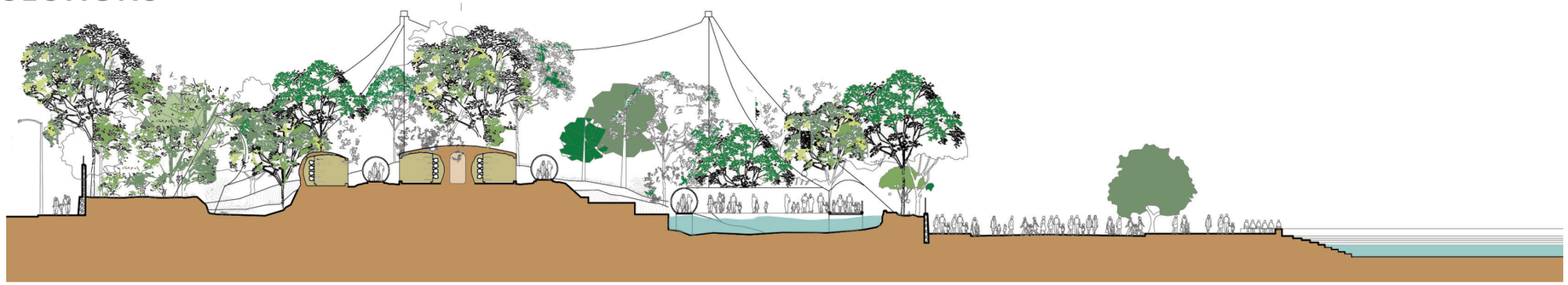
LEGEND

1. Entrance
2. Ticket Window
3. Interpretation Center
4. Multimedia Room
5.Hospital
6. Rescue Center
7. Office
8. Store
9. Kitchen
10.Workshops
11.Rainforest
12.Visitor's Amenities
13.Security Cabin
14.Nocturnal House
15.Vyayam Shala
16.Museum
17.Historical Building
18.Stepwell
19.Pedestrian Walkway
20.Parking

ANIMAL ENCLOSURES

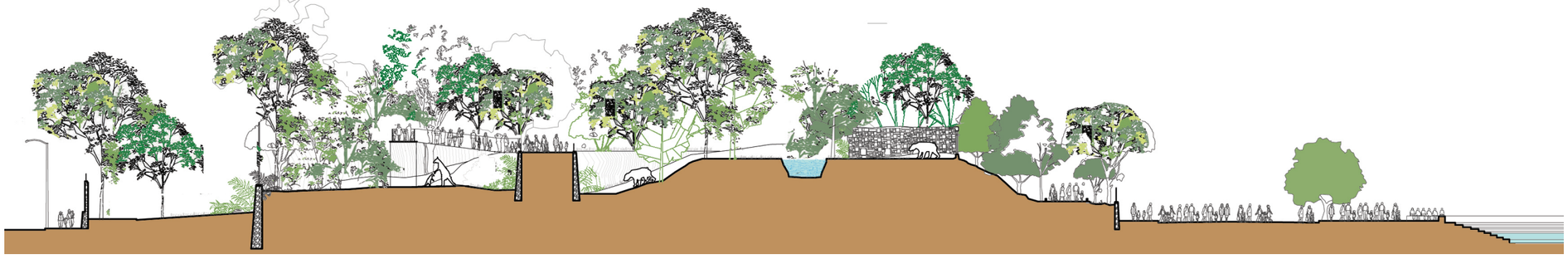
21.Future Planning
22.Giraffe+Zebra
23.Primates
24.Aviary
25.Breeding Zone
26.Reptiles Zone
27.Rodents Zone
28.Tortoise and Turtle
29.Otters
30.Crocodiles
31.Antlers and Antelopes
32.Asiatic Lions
33.Tigers
34.African Lions
35.BlackBucks
36.Kangaroo
37.Bear
38.Wild Pig
39.Hippopotamus
40.Incinerator
41.Disposal of Carcass
42.Buffer Zone

PROPOSED SECTIONS



Section AA

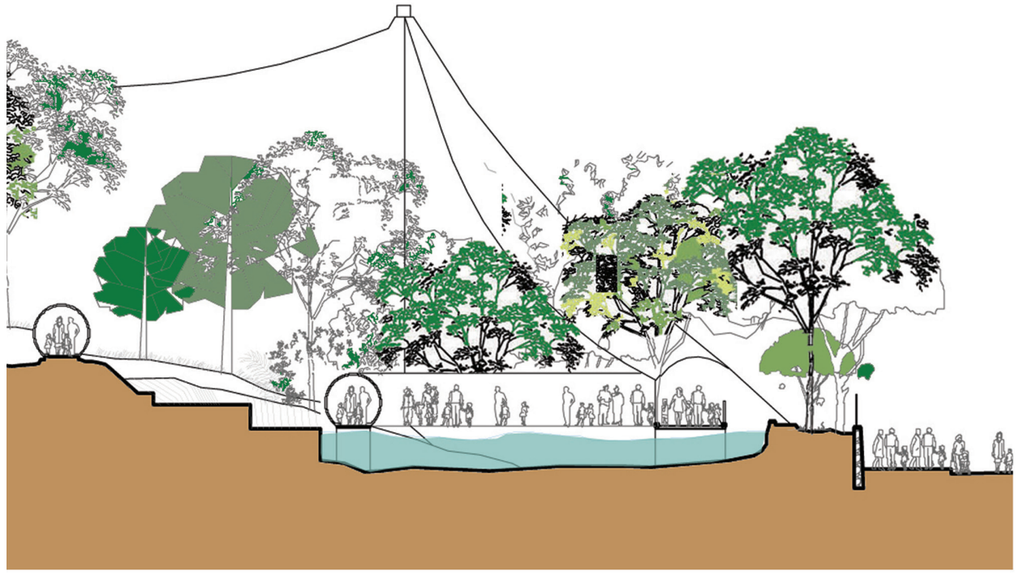
Section BB



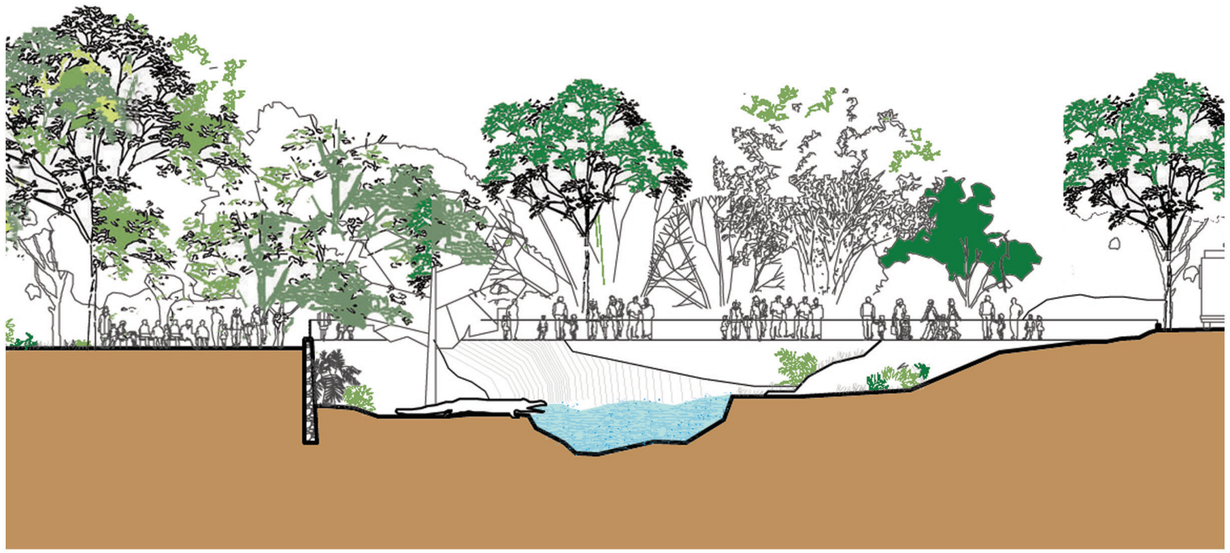
Section CC

Section DD

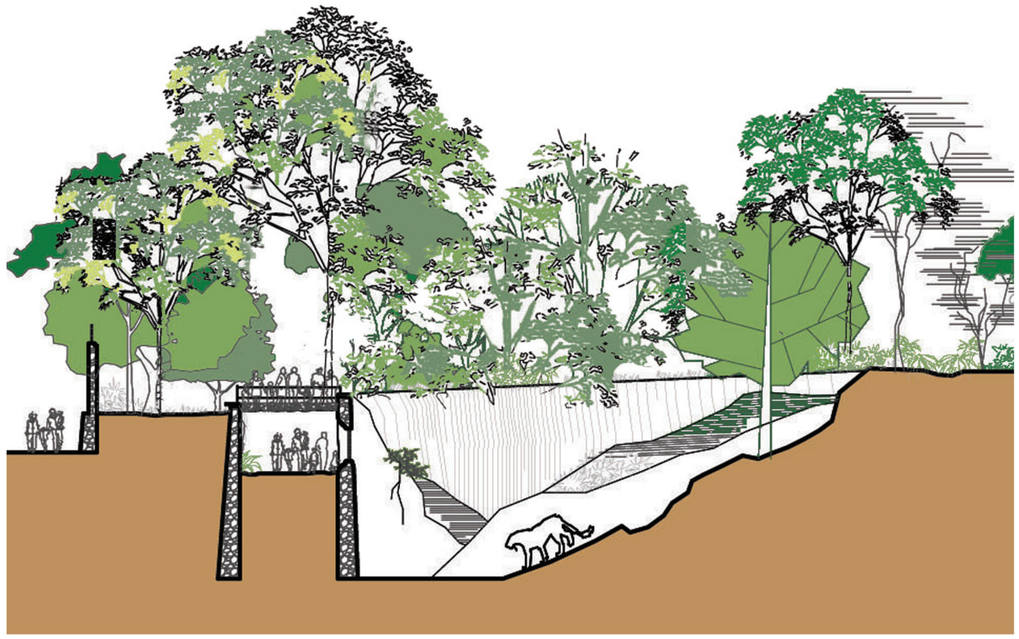
PROPOSED DETAIL SECTIONS



Section through the Aviary, with the visitors movement through the closed pathway allowing the free movement of the Birds

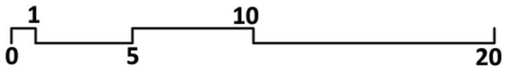


Section through the Crocodile enclosure, bridge is provided to offer a closer view of sthe Crocodiles

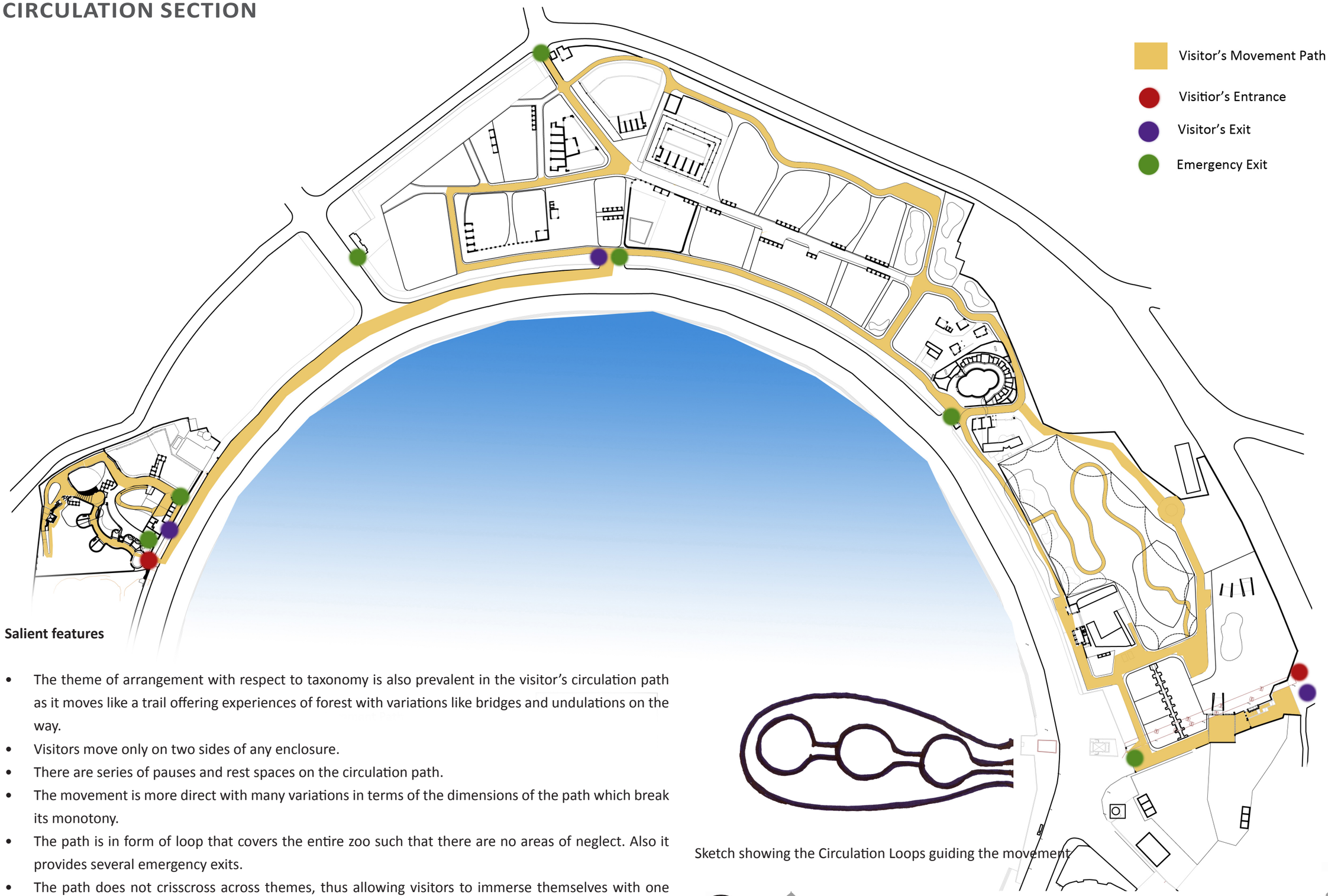


Section through the Lion Enclosure with the pathway passing through the Moat

Section from the Kangaroo Enclosure.



CIRCULATION SECTION

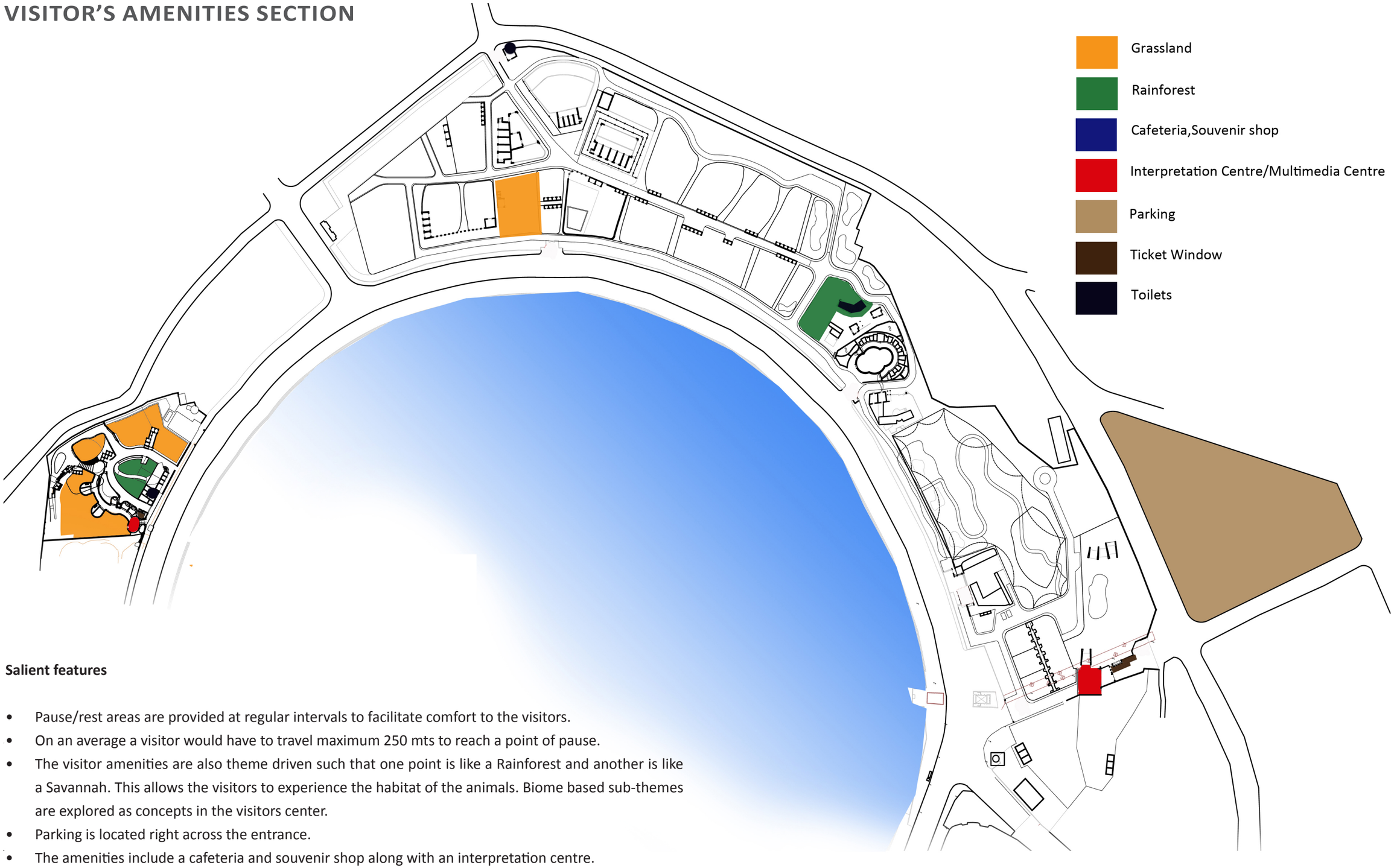


Salient features

- The theme of arrangement with respect to taxonomy is also prevalent in the visitor's circulation path as it moves like a trail offering experiences of forest with variations like bridges and undulations on the way.
- Visitors move only on two sides of any enclosure.
- There are series of pauses and rest spaces on the circulation path.
- The movement is more direct with many variations in terms of the dimensions of the path which break its monotony.
- The path is in form of loop that covers the entire zoo such that there are no areas of neglect. Also it provides several emergency exits.
- The path does not crisscross across themes, thus allowing visitors to immerse themselves with one theme at a time
- There are adequate emergency exist for visitors.

Sketch showing the Circulation Loops guiding the movement

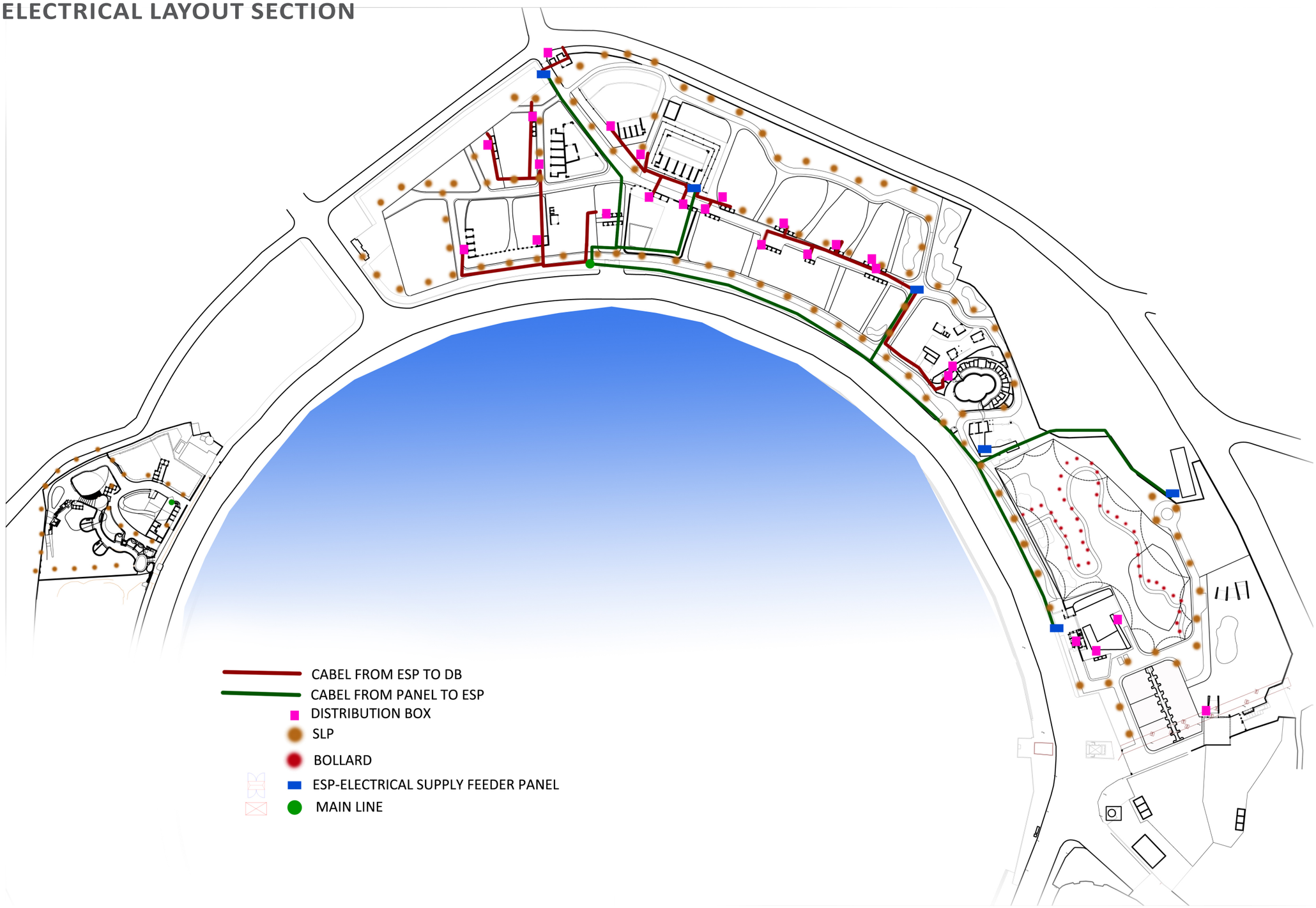
VISITOR'S AMENITIES SECTION



Salient features

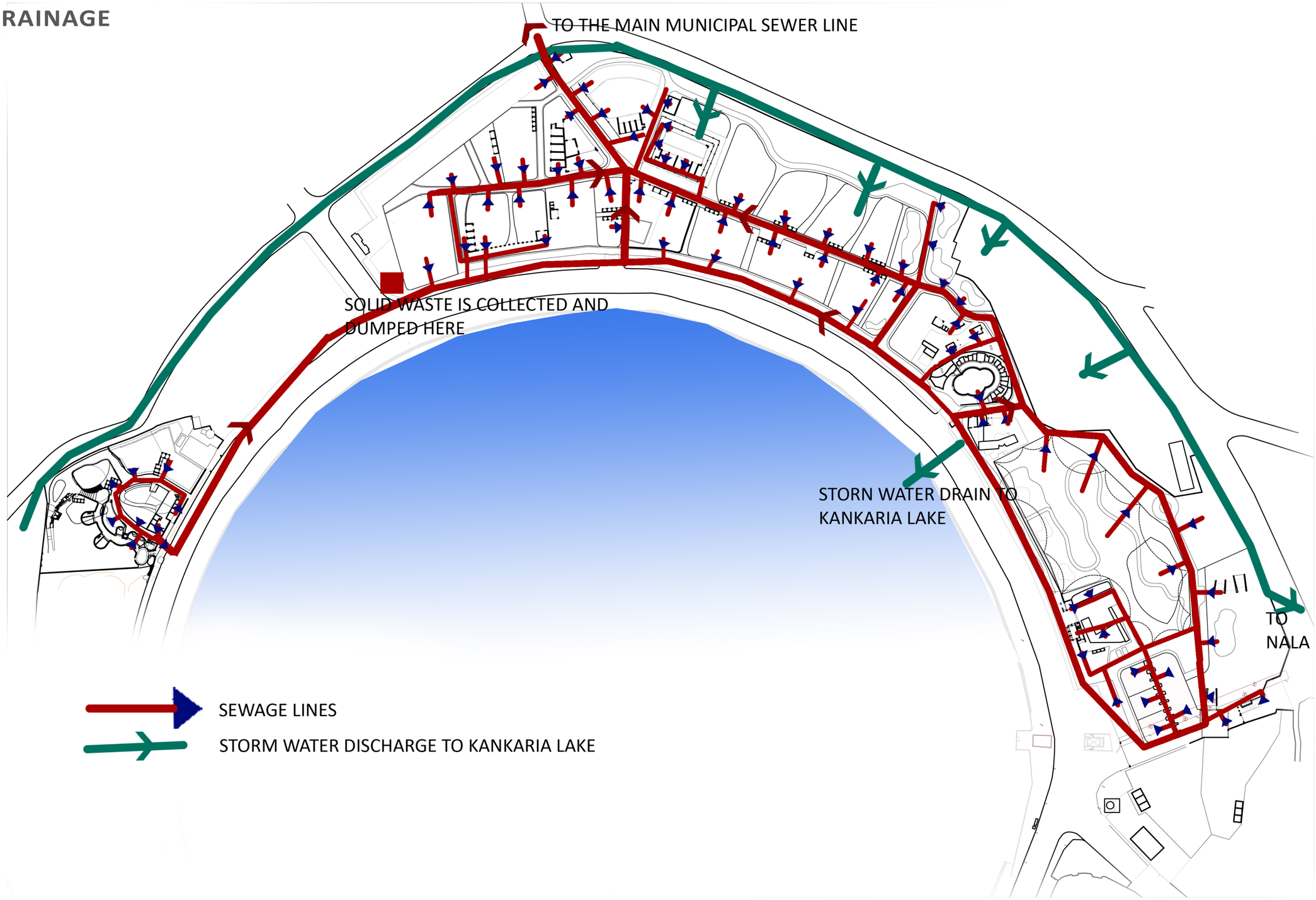
- Pause/rest areas are provided at regular intervals to facilitate comfort to the visitors.
- On an average a visitor would have to travel maximum 250 mts to reach a point of pause.
- The visitor amenities are also theme driven such that one point is like a Rainforest and another is like a Savannah. This allows the visitors to experience the habitat of the animals. Biome based sub-themes are explored as concepts in the visitors center.
- Parking is located right across the entrance.
- The amenities include a cafeteria and souvenir shop along with an interpretation centre.
- Exploring the vernacular nature of the architecture where rainforest region would be Timber based and Savannah would be Earth based.

ELECTRICAL LAYOUT SECTION



CABEL FROM ESP TO DB
CABEL FROM PANEL TO ESP
DISTRIBUTION BOX
SLP
BOLLARD
ESP-ELECTRICAL SUPPLY FEEDER PANEL
MAIN LINE

SOLID AND LIQUID WASTE DISPOSAL
DRAINAGE

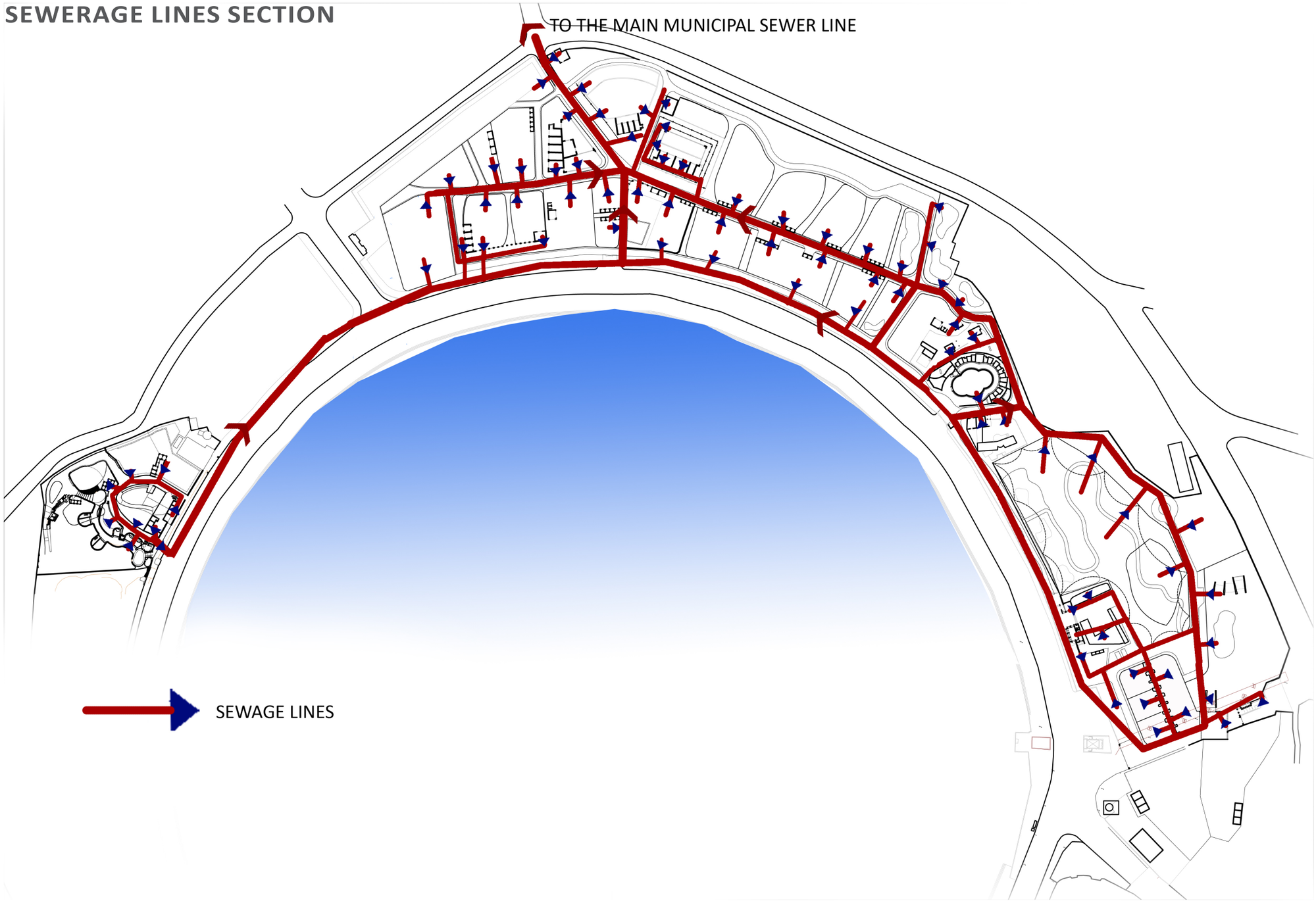


WATER DISTRIBUTION SECTION

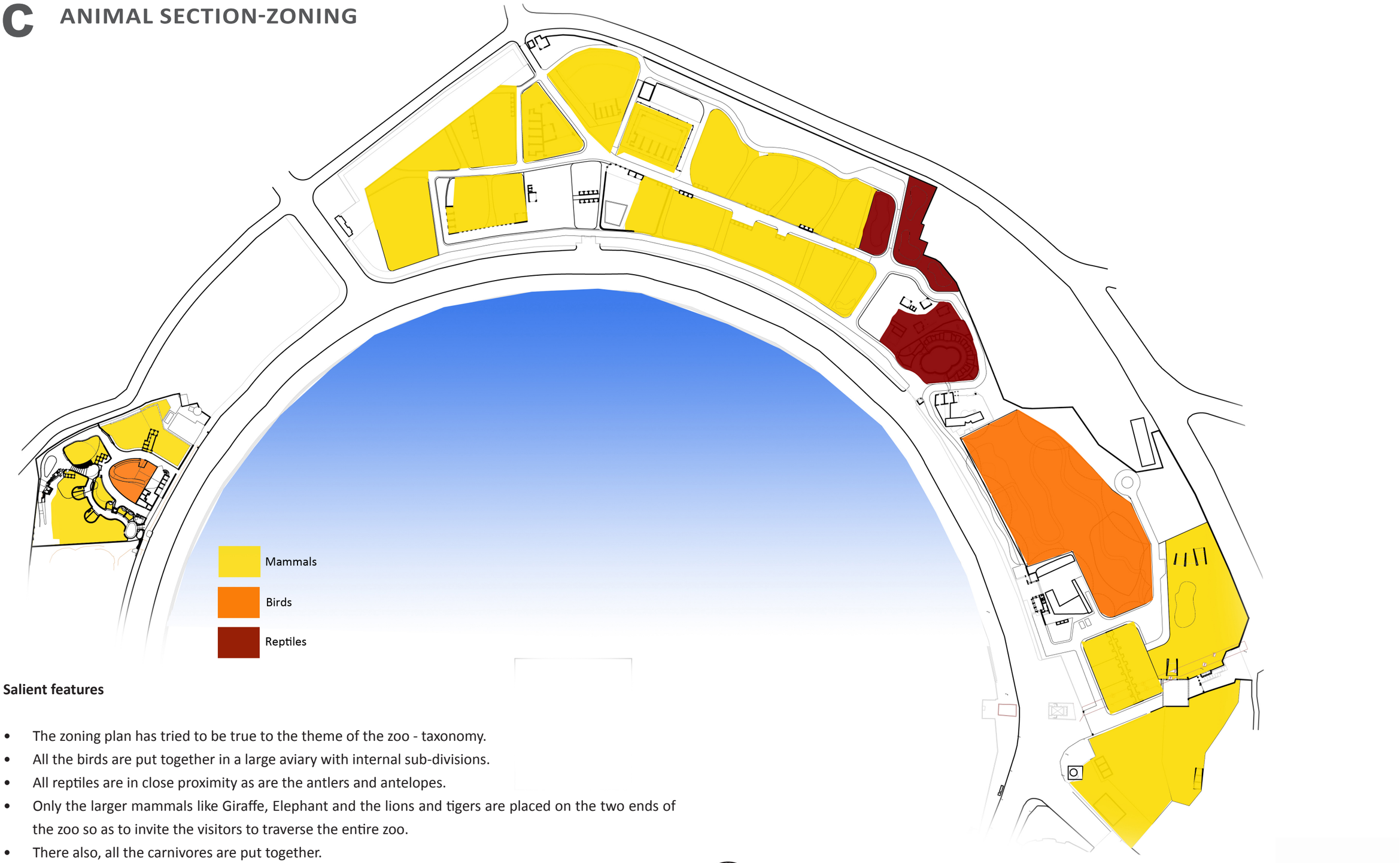
WATER SUPPLY LINES

UNDERGROUND WATER TANK

SEWERAGE LINES SECTION



C ANIMAL SECTION-ZONING

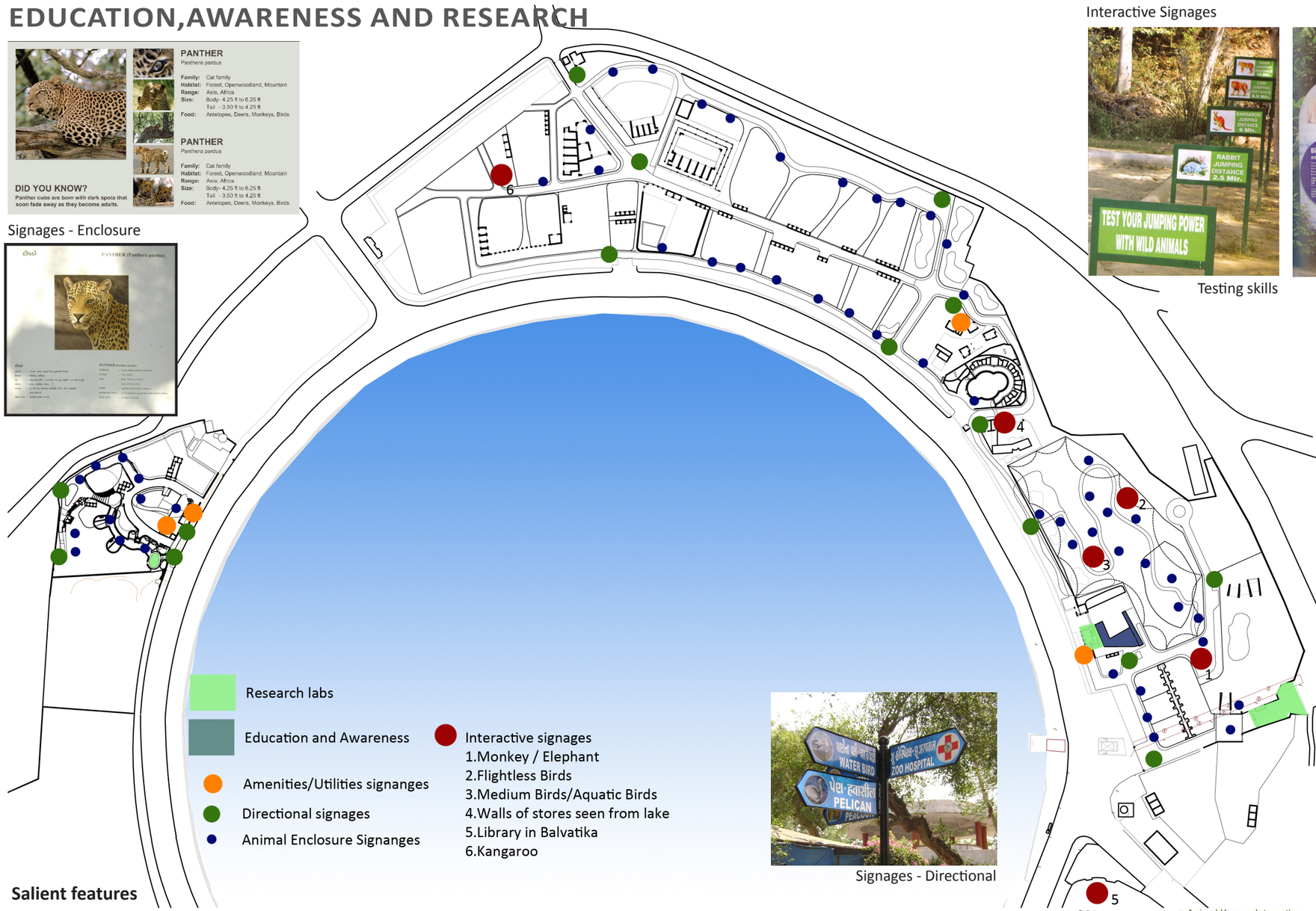


Salient features

- The zoning plan has tried to be true to the theme of the zoo - taxonomy.
- All the birds are put together in a large aviary with internal sub-divisions.
- All reptiles are in close proximity as are the antlers and antelopes.
- Only the larger mammals like Giraffe, Elephant and the lions and tigers are placed on the two ends of the zoo so as to invite the visitors to traverse the entire zoo.
- There also, all the carnivores are put together.

EDUCATION,AWARENESS AND RESEARCH

Signages - Enclosure



Signages - Directional

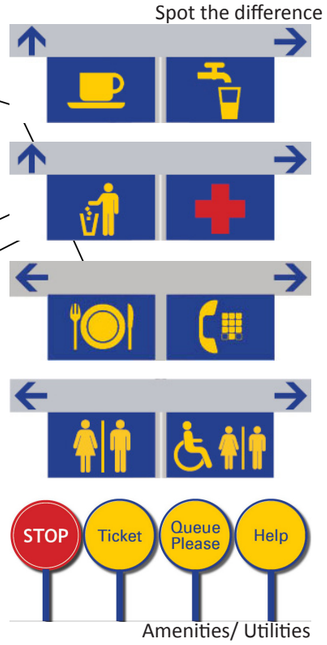
Interactive Signages

Testing skills

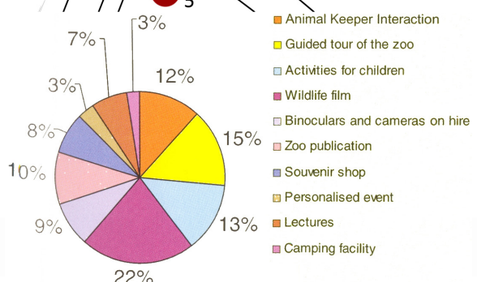
Comparing scales

How an animal works

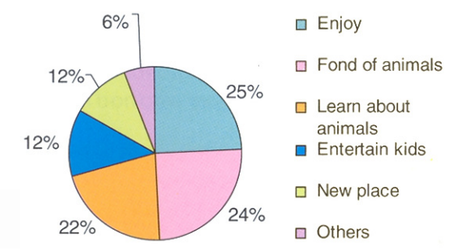
Spot the difference



Amenities/ Utilities



Preferences of activities

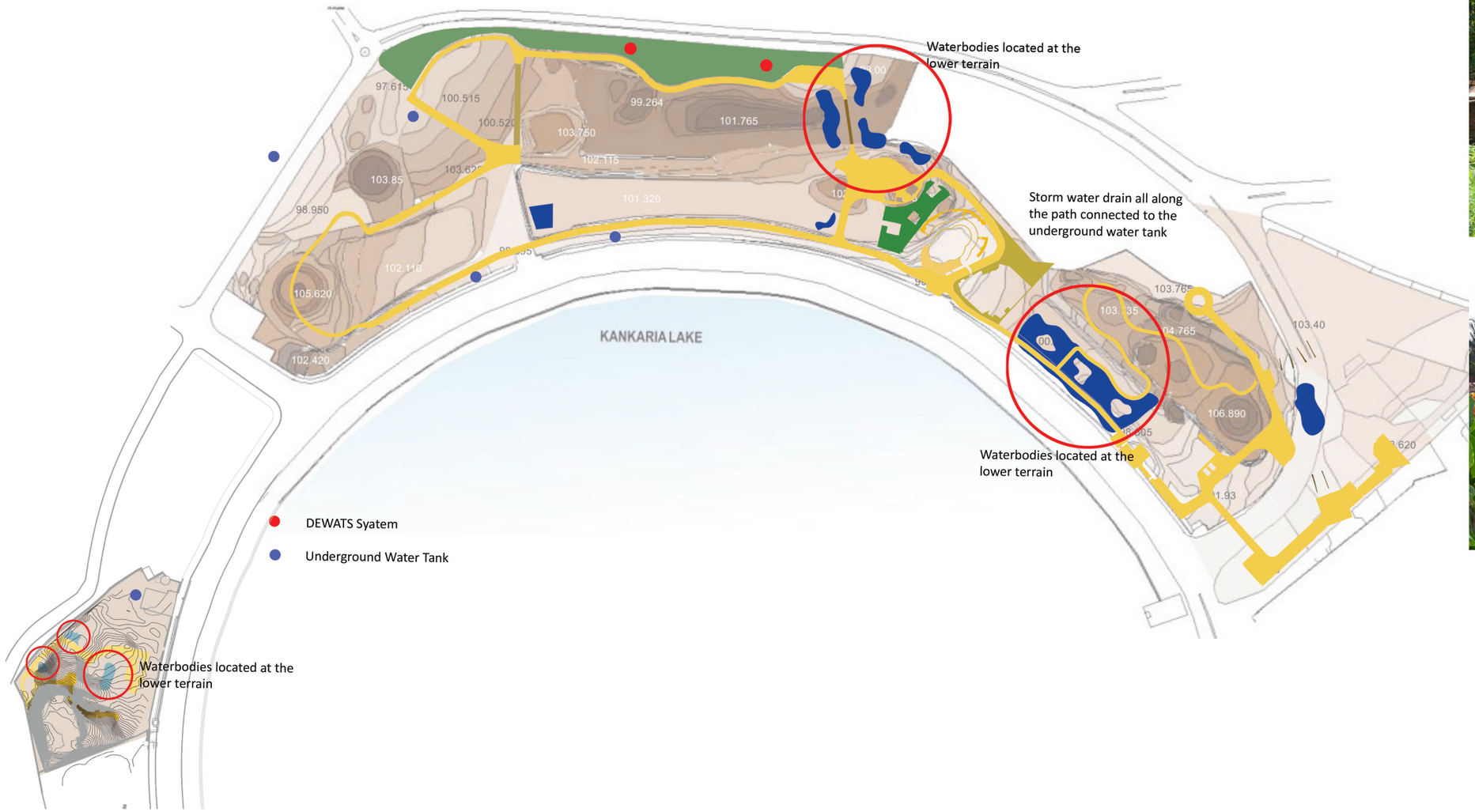


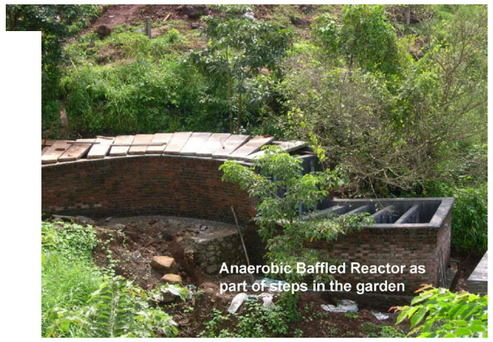
Purpose of visit

Salient features

- The awareness and educative part of the zoo's aims are enhanced by putting interactive signage which attracts the visitor while giving information. The visitor's interaction with the zoo is enriched by placing clear, legible and visually appealing signage with all enclosures.
- There will be consistency in all the information signage placed in front of enclosures in terms of data, typology, photos and other information and would be placed such that they are easily readable.
- Signages will aim to target most visitors.
- There would be adequate directional signages.
- The zoo map will be placed at strategic locations.
- Audio tour will be introduced.
- Interpretation centre will house exhibitions and multimedia presentations.

DEWATS-RAIN WATER HARVESTING SYSTEM



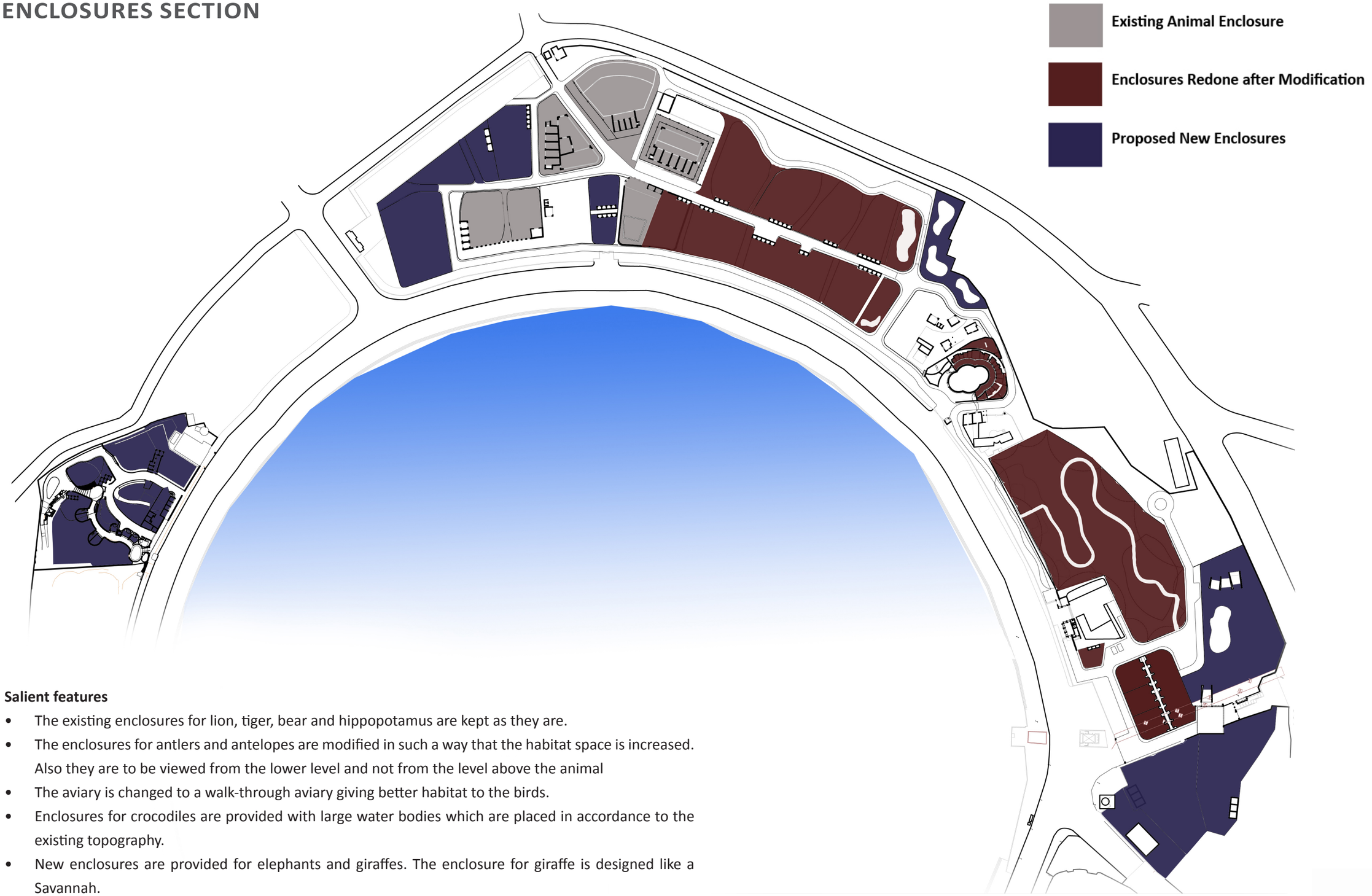


Salient features

As part of the movements towards a more ecologically balanced environment, it is proposed that the zoo will have a comprehensive water management system.

- The grey water generated by visitors and staff amenities will be put through the DEWATS system.
- Rainwater will be collected through the topography and directed to the recharge wells.
- Some part of the rainwater will be harvested for further use.
- The ponds and water bodies will also collect rainwater. Filtration units in these will keep the water usable.

ENCLOSURES SECTION



Salient features

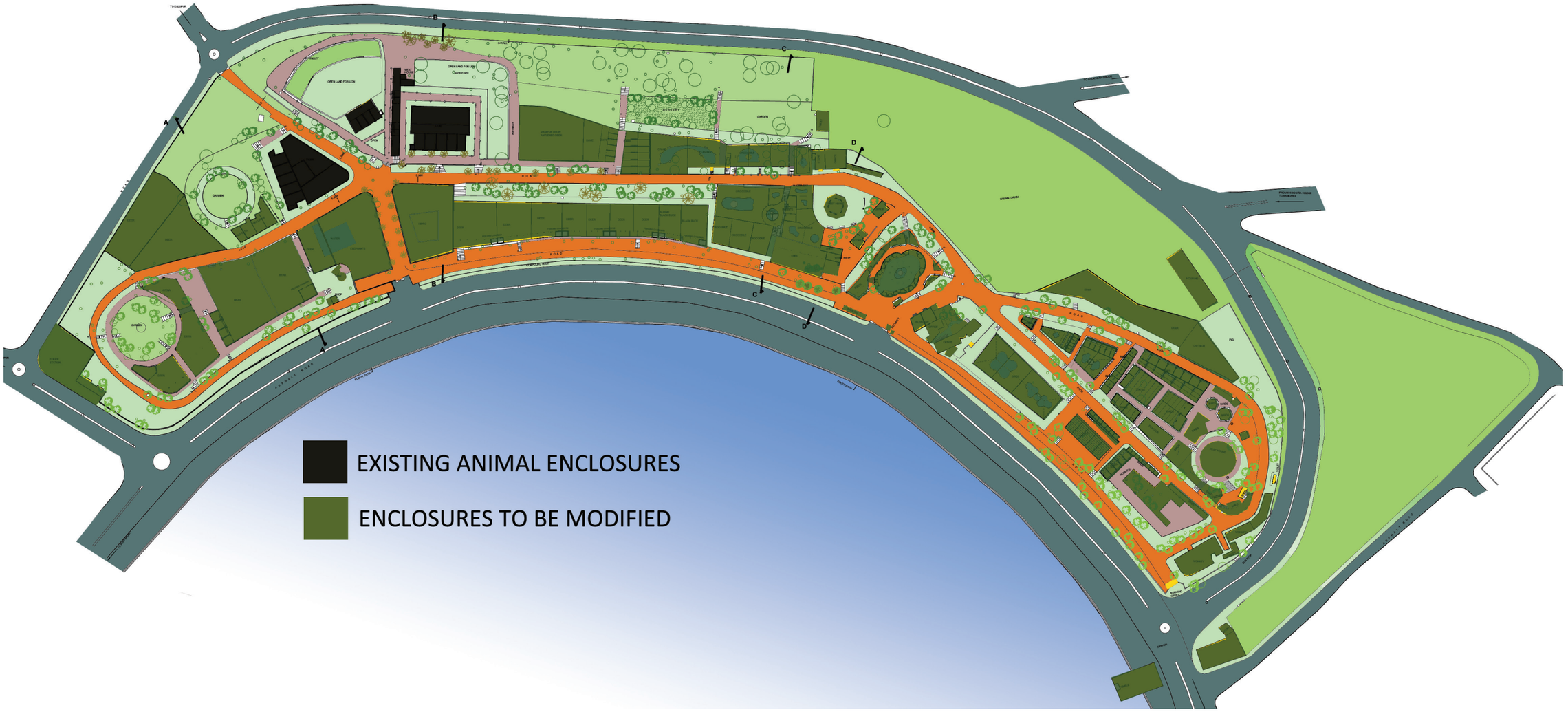
- The existing enclosures for lion, tiger, bear and hippopotamus are kept as they are.
- The enclosures for antlers and antelopes are modified in such a way that the habitat space is increased. Also they are to be viewed from the lower level and not from the level above the animal
- The aviary is changed to a walk-through aviary giving better habitat to the birds.
- Enclosures for crocodiles are provided with large water bodies which are placed in accordance to the existing topography.
- New enclosures are provided for elephants and giraffes. The enclosure for giraffe is designed like a Savannah.
- New enclosures are proposed for the other animals like Primates, Rodents to give more space and an enriched space.

LANDSCAPE SECTION

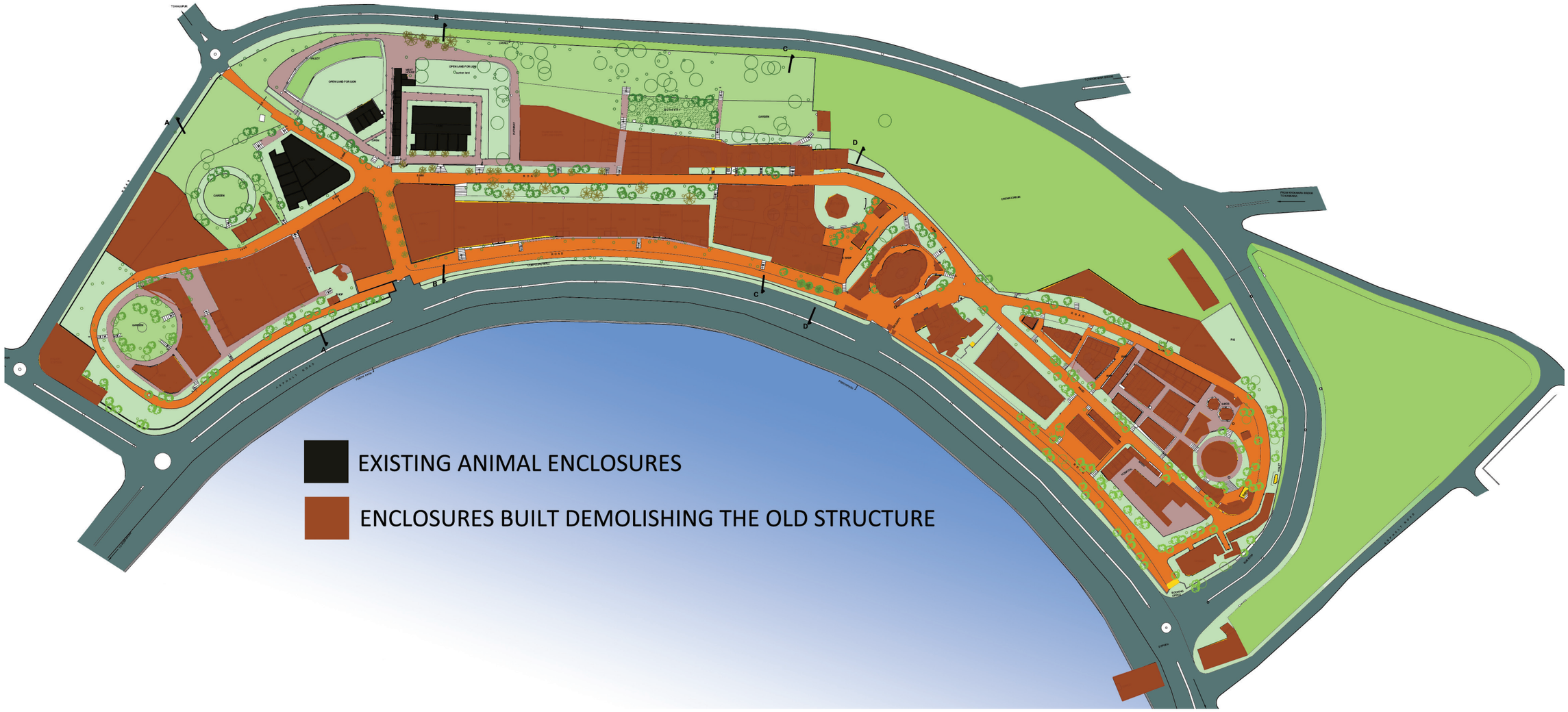
Salient features

- The present area has a large number of shady trees and an experience of closeness to nature is generated. However, this experience remains limited in quality and variety. To enhance the present experience of the zoo, landscape has an important dual role to play.
- On the one hand, landscape in an enclosure will be identified more as a habitat congenial to the exhibit. The other aspect of landscape would be the non exhibit areas. These would constitute the circulation areas, in-between zones, buffer zones, visitor amenities etc. These would distinctly be Biome based and could also have herbs and small agricultural nature to it.
- One distinct position to be taken regarding this is the idea of creating a view.
- As a concept, the landscape in the zoo will move away from the traditional notion of creating a view and thus favoring the visual, to a more tactile, sensorial experience, emphasizing on the other senses while the animals would be the focus of the visual sense. Thus flora and fauna with medicinal value, olfactory and audio value can become part of the zoo.
- Secondly there would be random mixing of the plants to create a collage rather than an ordered 'planned' landscape. Overall, thus the landscape would emphasize on the ecological relationship between humans, animals and the habitat.
- Dense plantation on the north-east as a buffer against sound pollution.

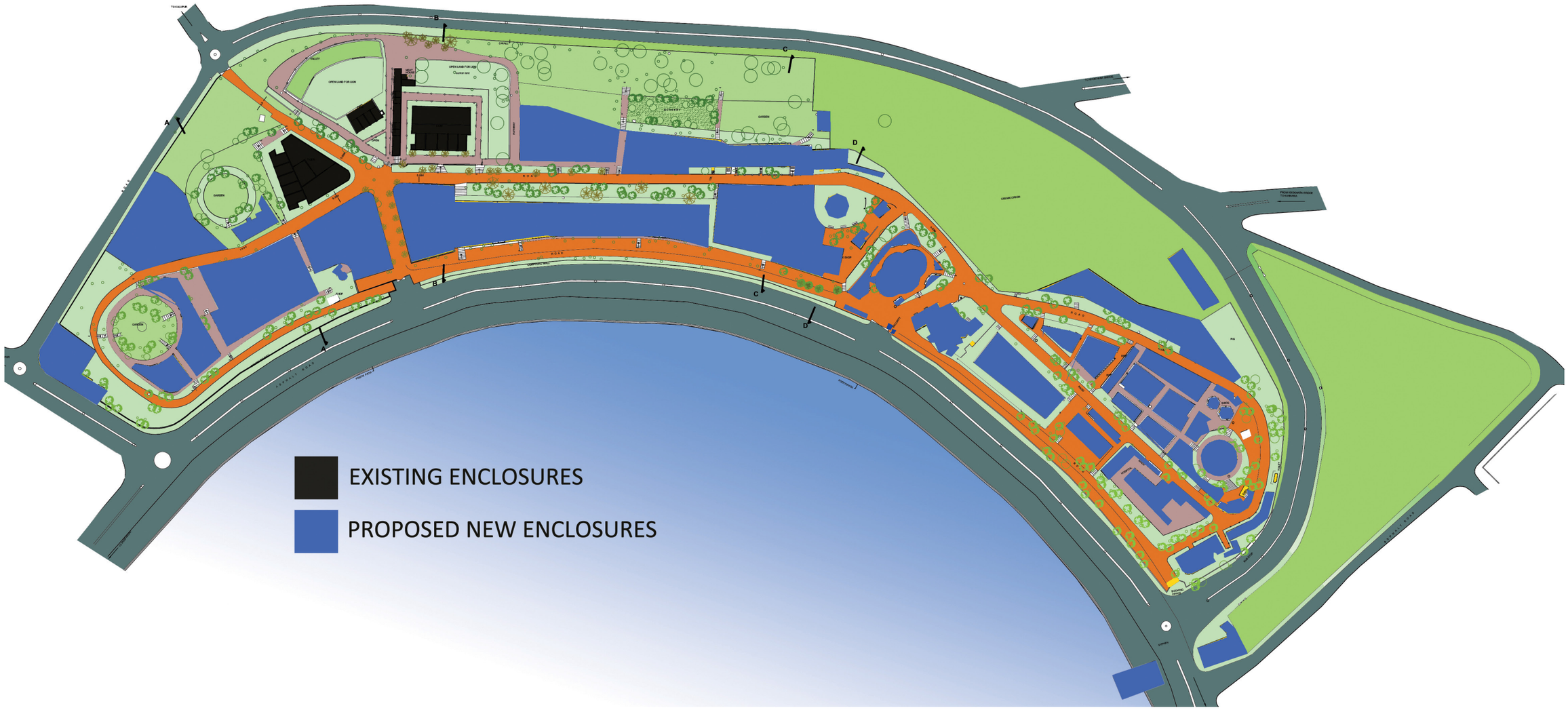
EXISTING ENCLOSURES AND ENCLOSURES TO BE MODIFIED



EXISTING ENCLOSURES AND
ENCLOSURES TO BE BUILT ON DEMOLISHED STRUCTURES



EXISITING ENCLOSURES AND PROPOSED ENCLOSURES



d NIGHT ZOO

Concept of Night Zoo:

Night Zoo is not like any ordinary zoo illuminated by the night or a modern version of nocturnal houses found in many zoos around the globe but something that will offer an unique experience of exploring wildlife at night.

The Kamla Nehru zoological garden is abutting the Kankaria Lake which is a landmark in the city. It is the hub of much social and cultural activity and remains active into the late hours of the evening. Plugging into the catchment, it can become a potential to display nocturnal animals with their natural characteristic behavior. Also since many of the tropical mammals are nocturnal, the safari is a natural extension of the zoo.

Location of the park:

This has led the zoo to acquire the 6 acres property adjoining the present zoo at the One-Tree Hill compound. In 1992 CZA gave a grant to construct a boundary wall around the same. Further funds are awaited to develop the property into an enriched Night Zoo.

Collection Plan:

The need to observe certain animal species (nocturnal animals) during night hours led the zoo to acquire land of about 6 acres from across the existing zoo at the One-Tree Hill garden compound.

Nocturnal animals exhibited would include:

Small Cats, Tody Cats, Bats, Porcupines, Leopard, Reptiles (Water Monitor, Common Monitor, Crates), Jackal, Wolf, Hyena and other nocturnal animals.

NIGHT ZOO

Management Plan:

The Safari will be independently ticketed. It will have a curator and a person in charge along with a separate team of keepers, handlers, and staff.

This night zoo shall operate from 7:00pm to 11:00pm in co-ordinance with the Kankaria Lake. It shall have soft blue color light (giving a moonlight effect). Through the use of subtle lighting technique, visitors would be able to view nocturnal animals in vast naturalistic habitats.

The program for Night Zoo consists of:

Enclosures with toughened glass surface

Feeding cubicles

Lighting including special night lighting

Pathways

Gallery

Administration / storage

Toilets, rest rooms, seating drinking water, etc

Signages

Landscaping and nursery

Parking

FUTURE PARKS

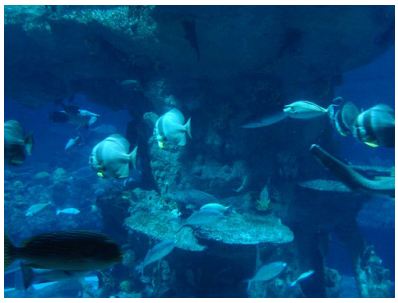
Butterfly / Insect Park:

Butterflies have stirred the imagination of people for ages by their grace and beauty. The exuberance of colours has been a fascination. As children, we grow up with stories of butterfly and the metamorphosis of a caterpillar. However, not much attention is paid to the habitat and behavior of the butterfly and variety of its species. The butterfly park will thus generate awareness and compassion for these creatures. It will also be an important place for the conservation of this quickly depleting species.

Insects have been the target of human disrespect. They have evoked emotions of fear and disgust. However, they are crucial part of the ecosystem. This park will fulfill its role as an educative park and will endeavour to change the mind set of the visitors.

Aquarium:

There is an existing aquarium with the Ahmedabad Municipal Corporation. By procuring this aquarium, enhancing it and upgrading it, the zoo can have a complete experience.



It is hence, proposed that as a long - term plan, there would be an aquarium as a part of the zoo.

Rodent park:

The significance of rodents in the eco system is often misunderstood. As an awareness towards their characteristic behavior, it is proposed that a part of the existing zoo is to be dedicated to rodents. The enclosures are to be designed such that across section of the earth is visible and thus, their burrowing activity can be easily seen and understood.

chapter V

PERSONNEL PLANNING

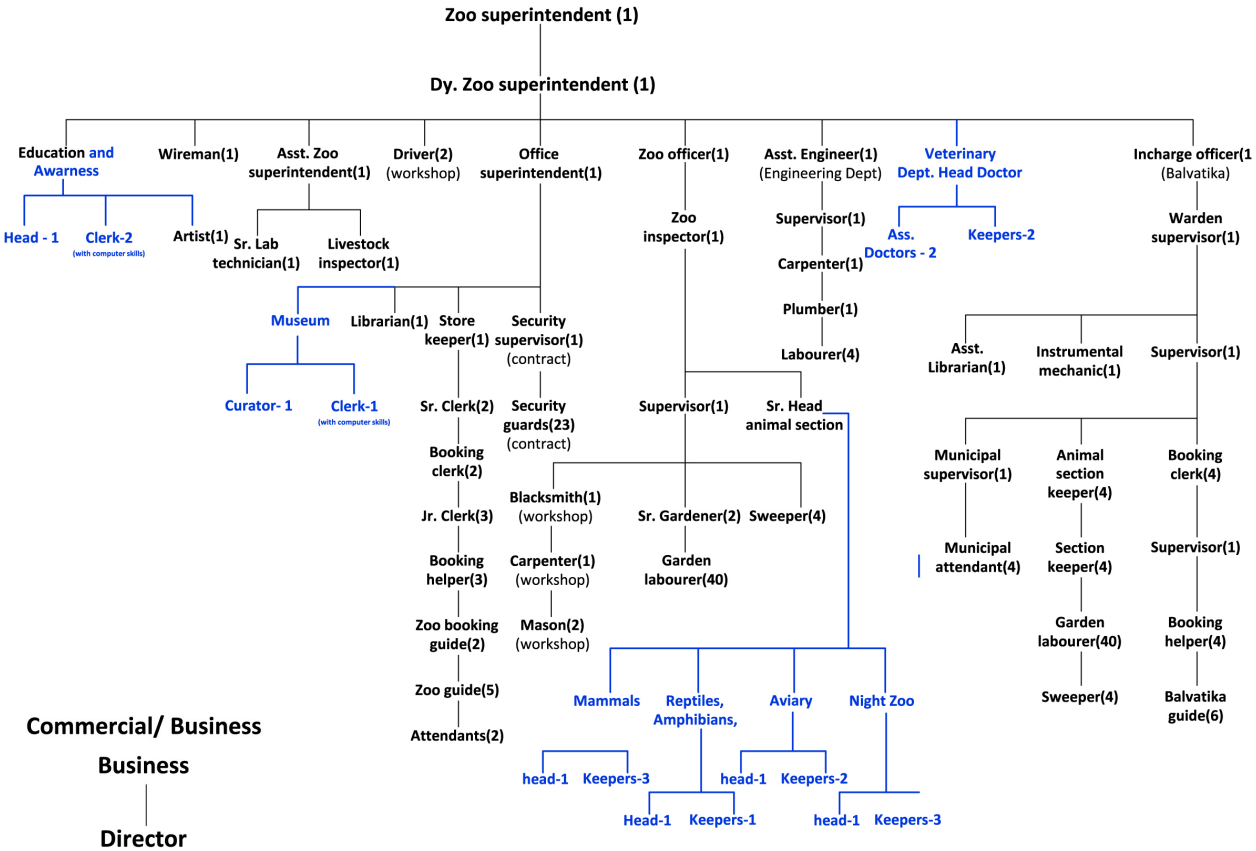
a Personnel planning

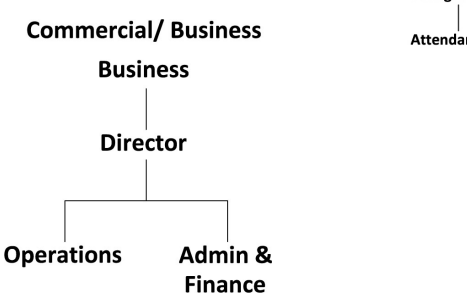
b Administration Section

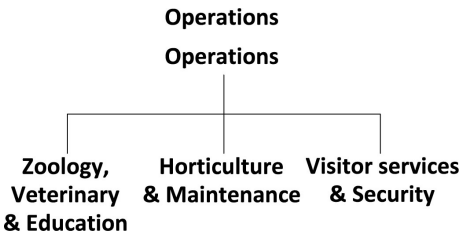
a PERSONNEL PLANNING

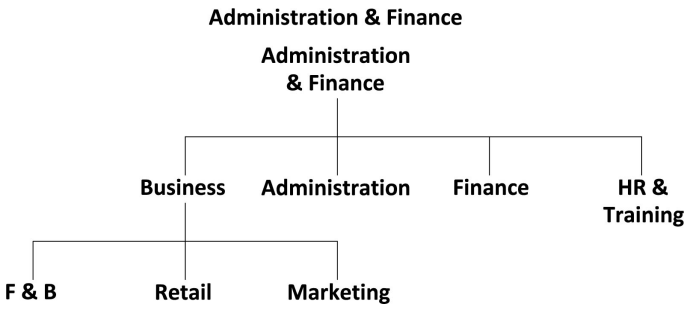
The proposed administrative structure of the zoo complex requires a hierarchical setup – a specific team allotted to every department. This would facilitate a more organized management of individual departments and thus zoo complex as a whole.

All the existing vacancies are to be filled.





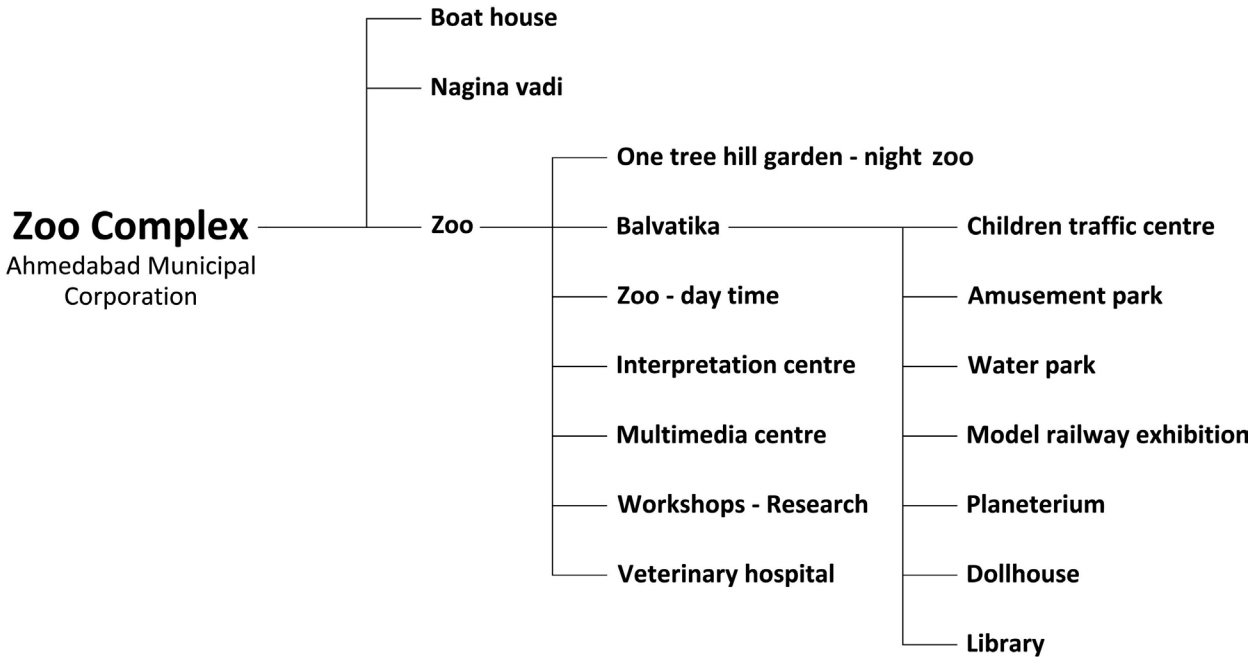




b ADMINISTRATION SECTION

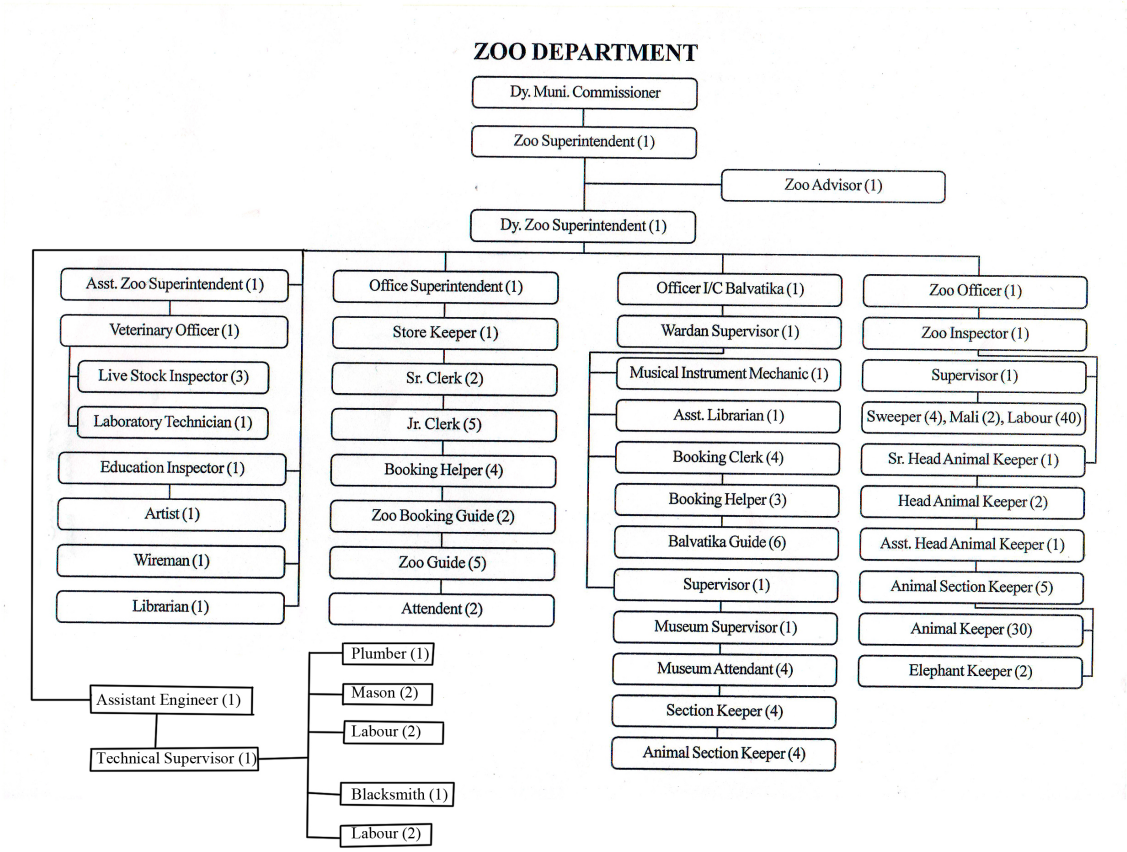
The administrative setup of the zoo will be hierarchical starting from zoo director to the zoo keeper. Considering the number of visitors, its future collection plan and further expansion the staff needs to be increased considerably. Also since the zoo is actively spreading awareness, educating people and doing research activities, it needs to have the following authorities as a part of its team – its manpower.

1. At least Group 'A' level full time officer in charge as Director
2. At least Group 'B.' level full time curator (Animals) – 1 no.
3. Vet. Officers – 2 nos.
4. Education officers – 1 no
5. Biologist – 1 no
6. Support staff as per needs



Proposed administrative structure for the Zoo complex

EXISTING STAFF



chapter VI

DISASTER MANAGEMENT

a Preface

b Disaster management plan

c Natural Disasters

d Fire or Explosion procedures

e Civil disturbance procedures

f Animal Disease procedures

a PREFACE

Thousands of people visit the Zoological Parks in India every day. The zoos host a large number of animals with sizable staff working in them.Some of the emergency situations that the zoo may have to face are;

a.Escape of Zoo animals
b.Natural disasters like fire, flooding, earthquakes
c.Outbreak of Epidemic diseases
d.Curfew etc situations

Meticulous prior planning with adequate finance is needed for preparedness to face such exigencies in the interest of the Zoo animals, its property, as well as the public safety. Invariably such contingency plan comes into action only in the aftermath of emergency situations; however preparedness shall help in successful control and mitigation of the emergency situations. Though occurrence of such natural and man made emergencies is certain, they don't occur frequently, and that can help in dealing with them. The zoo must have a very clear protocol in case of emergencies so that there is no confusion regarding the course of action to be taken. For that, the following need to be in place.

1. Chain of command in the team.
2. Members of the team.
3. Clearly written instructions that come into force during a disaster. Every employee must be conversant with these instructions.
4. Each employee should know exactly what his/her role is during a disaster. He should be clear about the issues like whom to report and how to report.
5. The possibility of disaster should alert the emergency team to come into operation in orderly and planned manner. This may include evacuation of visitors or animals either prior or after a disaster has occurred.
6. The new constructions should be resistant to the disasters that are likely to be experienced.
7. Alternative power and water supply should be well planned. This is necessary for disaster mitigation.
8. The items of diet should be maintained in stock for at least 15 days. This for dealing

with situations like curfew, other items of personal use and animal needs should also be kept in stock including equipment and emergency tools. [**Personal needs** – water, food, first aid, lantern, battery, torches, rain/ winter clothing, stoves. And **animal needs** – generator, chain saws, plastic sheets, nets, nylons, strapping, sandbags, capturing equipment, tranquilizing drugs and veterinary supplies.]

9. Attempts should be made to develop voluntary teams to support during emergency and to work with the emergency team. Such volunteers should have an instruction handbook to function and report.

10. Voluntary Organizations should also be involved in such contingency plan operations. Close link should be established with district as well as state disaster management authorities.

The Zoological Park would thus, be a better and secure place for the visitors as well as the inmates of the zoo, by organizing the staff and resources in a better manner. The staff needs to be continually appraised of the significance of such an exercise and their cooperation is crucial to the success of any disaster management plan

1. Disasters and Disaster management: Terminology and understanding

Definition

The meaning of the word disaster obviously changes with person, culture, and time. The following definition of natural disaster is from the "International Agreed Glossary of Basic Terms Related to Disaster Management (1992), UN-DHA, IDNDR, Geneva: "Situation or event, which overwhelms local capacity, necessitating a request to national or international level for external assistance."

"A disaster is an occurrence such as hurricane, tornado, storm, flood, high water, wind-driven water, tidal wave, earthquake, drought, blizzard, pestilence, famine, fire, explosion, volcanic eruption, building collapse, transportation wreck, or other situation that causes human suffering or creates human needs that the victims cannot alleviate without assistance" – American Red Cross

An emergency event occurs with little or no warning, causing more destruction or disruption of operations than any organization can correct by application of its own ordinary resources. It is an extreme event, which results in widespread social disruption, trauma, property damage and loss of life.

“Disaster” means a catastrophe, mishap, calamity or grave occurrence affecting any area, arising from natural or man made causes, by accident or by negligence which results in substantial loss of life or human suffering or damage to, and destruction of, property, or damage to, or degradation of, environment, and is of such a nature or magnitude as to be beyond the coping capacity of the community of the affected area.

Thus, two critical elements of a disaster are:

a. It causes great human suffering and therefore would likely cause similar trauma to the animals resident in the zoo.

b. It happens suddenly and without much warning, thereby taking the persons or animals by surprise.

Disasters cannot be averted but their impact can be minimized through presence of mind, preparedness and alertness to the smallest signals of warning.

“Disaster management” means a continuous and integrated process of planning, organizing, coordinating and implementing measures, which are necessary or expedient for—

(*i*) Prevention of danger or threat of those disasters, which can be averted

(*ii*) Mitigation or reduction of risk of any Disaster or its severity or consequences;

(*iii*) Capacity-building;

(*iv*) Preparedness to deal with any Disaster

(*v*) Prompt response to any threatening Disaster situation or Disaster,

(*vi*) Assessing the severity or magnitude of effects of any Disaster;

(*vii*) Evacuation, rescue and relief

(*viii*) Rehabilitation and reconstruction

Disaster management definitions

Preparedness means being ready to handle disasters and emergencies. Risk assessments, disaster planning, adequate supplies, trained staff, and community partnerships all contribute to disaster preparedness.

Mitigation is the process of preventing or minimizing the losses and damages that emergencies can cause.

Response involves actions taken to deal with a disaster or emergency. Response is about the emergency itself, as well as the problems it creates.

Recovery means restoring services, facilities, programs, collections, and infrastructure.

b DISASTER MANAGEMENT PLAN

The disaster management plan describes, in detail, the policy and procedures for coping with exigencies. These policies and procedures define how the people, animals and property would be protected. Developing the plan is the process of assigning emergency related tasks to individuals in the management, and outlining protective actions to be taken.

Why Should Zoos Plan For Emergencies?

Time and again history has shown that a well thought out, coordinated response helps prevent personal injury, property damage, and lessen the resulting confusion. When the zoo plans on how it will respond to an emergency threatening its operations, it is more likely to survive the incident. During a large-scale disaster, local response agencies may be overwhelmed and unable to immediately respond to the zoo's requirements. Employees and zoo visitors alike will need to know what to do to protect themselves during an emergency.

Basic Emergency Planning Concepts

Listed below are the basic concepts involved in emergency management planning.

- There has to be a overall in-charge in the zoo for giving direction and getting the plan prepared, and implemented
- The members of the team are to be identified meticulously
- Control room and media centers will help in coordinated approach to the disaster and in the dissemination of information

- Establish adequate communication and warning capabilities
- Establish adequate evacuation procedures
- Establish damage assessment capabilities

Some of the emergency situations that the zoo may face are

- Natural/ Manmade Disorders like fire, floods, earthquakes
- Escape of Zoo animals
- Animal diseases
- Civil disturbances etc

A brief introductory note on the preparation of Disaster management plan

Zoological parks of India are susceptible to a number of hazards like floods, cyclones, earthquakes, landslides, fires etc of natural origin and fire, epidemics, animal escapes, civil disturbances etc of man made origin. These hazards are bound to take place and every zoo is vulnerable for these hazards. But if the institution has capability/ capacity to deal with these hazards the consequences of the disaster will be minimized. Hazard takes the turn of a disaster if the institution lacks capacity/ capability. Capacity/ capability is the resources or ability to cope with a threat or resist the adverse impact of a disaster. The interrelation between hazard, vulnerability and capability is shown as under

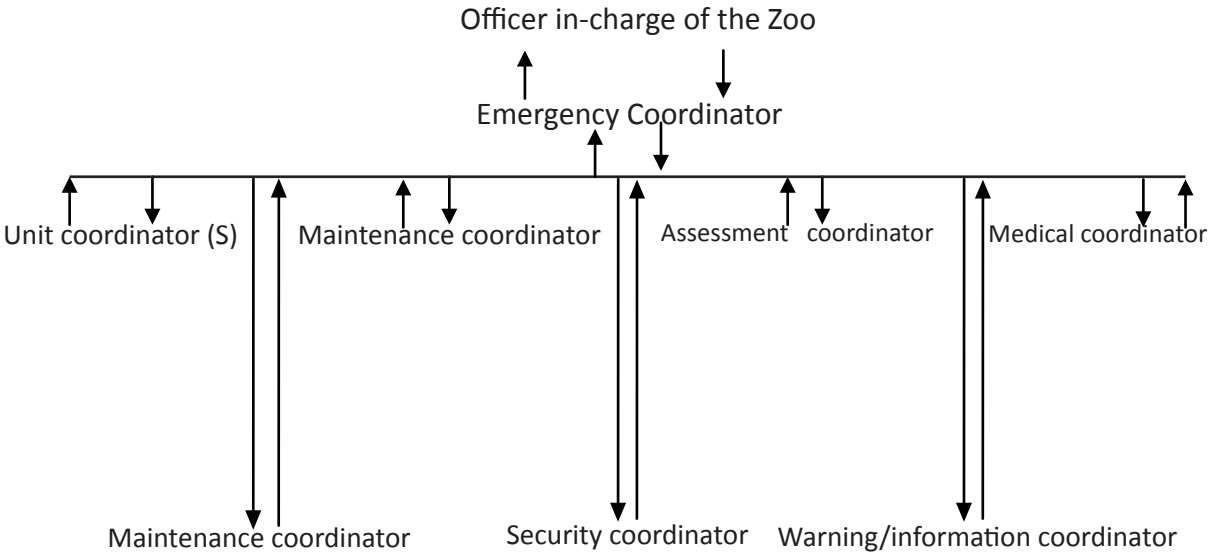
Hazard x Vulnerability- Capability = Disaster

Therefore hazard, vulnerability and capability analysis is the most important part as the entire planning process will be based on its outcome. Any error in identifying magnitude and projected impact would lead to an erroneous plan.

Pre-disaster planning should be an integral part of the preparedness that leads towards a holistic approach to disaster management. A disaster management plan focusing on hazard, risk, vulnerability, and resource assessment improves the level of response following an exigency. With this background; the zoological parks of India employ hundreds of people with

varied experiences. It's the duty of the in-charge of the zoo to get best out of them, and to use the human, material, and natural resources in a most effective manner during emergencies. Involving the staff right from the planning process stage to implementation stage to disaster assessment stage will be important for success.

The issues considered while preparing the DMP were the team, their capabilities, the facilities that are available, and what are the possible disasters/ hazards that they may have to face.



The Team

The size of an organization's emergency team will depend upon the size of the organization, what resources are available, and what tasks are required. Team members are to be actively involved in planning and implementation stages. There are several reasons why a team concept is best for achieving the best results.

Teamwork:

- Ensures all necessary issues are presented;
- Reinforces staff acceptance of the plan;
- Decreases the work load for team participants;

- Increases staff awareness of the plan.

The members of the team

(A) In-charge/ Director of the zoo

The role of in-charge/ director of the Zoo is very vital before and during exigencies. He will be the one who is responsible for imparting training to people in the different protective actions before actual emergency occurs. He has to make decisions on protective actions, operations and expenditures. He will be receiving information and recommendations from the emergency coordinators and will be taking appropriate decisions

The in-charge/ director's primary responsibilities are:

- Getting the plan prepared and approving it
- Identifying the people and assigning tasks to them.
- Deciding and implementing protective actions so that the consequences of the disaster are minimized
- Allowing the use of internal resources of the zoo when ever it is required to do
- arranging necessary logistics
- Arranging the finances for implementing the plan

(B) Emergency Coordinator

The role of emergency coordinator will ensure the smooth implementation of the emergency preparedness plan. The person who has been identified will

- Possess a thorough knowledge and understanding of the zoo's layout and its functioning
- Hold a responsible position within the organization with an authority to summon resources and personnel during exigencies.
- Possess leadership qualities and have the ability to operate under stressful conditions.

The main responsibilities of the emergency coordinator are

- Maintaining a current disaster management plan and testing it on regular basis.
- Ensuring that all members of different teams are well trained in dealing with exigencies
- Coordinating the functioning of different teams that are involved in crisis management
- Notifying local authorities of an emergency or disaster situation.
- Ensuring that vital records are identified and protected
- Making arrangements for logistics, emergency housing and feeding for personnel involved in emergency operations
- Making provisions for food and water requirements of Zoo animals
- Organizing and maintaining control room with adequate communication facilities
- Implementing decisions and directives from the In charge of the zoo/ Director
- The Emergency Coordinator for the Zoo can be Assistant conservator of forests and he can be assisted by chowkidars, office staff, Gardners etc.

(C) Unit Coordinator(s)

For administrative convenience, the zoo will be divided into different units (sections) for dealing with the exigencies. The persons in charge of these sections will act as the unit coordinators and they will be responsible for

- Participating in the plan review meetings and giving their inputs
- Training the people working under them
- Conducting mock drills
- Taking in protective actions within their jurisdiction before an actual emergency occurs
- Identifying and ensuring protection of vital things under their jurisdiction
- Mobilizing resources and personnel
- Ensuring that stranded zoo visitors are taken safely to the designated shelter/

evacuation areas

- Ensuring that the electricity points are shut down during emergencies
- Helping in the proper movement of people and vehicles.

The people selected to be unit coordinators will have the following qualifications:

- Possess knowledge and understanding of the operation of their work unit.
- Hold a responsible position within the organization with an authority to summon resources and personnel during exigencies in their respective units.
- Possess leadership qualities and have the ability to operate under stressful conditions.
- The Unit Coordinators for the Zoo can be foresters and will be assisted by chowkidars, Gardeners, Animal Keepers, labourers working in their sections.

(D) Warning/ Information Coordinator

Whenever a disaster occurs with in the zoological park the first and foremost thing to be done is intimating different coordinators of the zoo about the occurrence of disaster (can be done-through blustering of an alarm/ making public announcements/ wireless messages/ cell phones etc), communicating about the disaster with the local authorities like police/ fire departments and providing information about the disaster to the print/ electronic media etc

Warning/ Information Coordinator's Primary responsibilities are:

- Ensuring that protective actions are publicized for all employees
- Participating in emergency plan review meetings
- Training the people working under them
- Establishing a media and control centre and making arrangements for logging the messages
- Maintaining communication equipment like wireless sets, fax machines, telephone lines etc
- Receiving and disseminating information about the disaster
- Communicating with the local police/fire departments for assistance
- Requesting the district administration for vehicles/ personnel
- Preparing press notes after consulting assessment coordinator and submitting

them to the officer in charge of the zoo for press release

- Conducting media tours whenever possible

The information coordinator is responsible for developing news releases, answering media questions, ensuring that protective actions are publicized for all employees, etc. He should be comfortable working with the media and have a clear understanding of management's priorities.

Warning/ Information coordinator for the Zoo can be Forest Range officer, who can understand the priorities of the zoo and will be assisted by Stenographer, Head Clerk, and orderly etc.

(E) Assessment Coordinator

Assessing of the extent of losses due to disaster is very important for sharing the information with Government, departmental officers, local authorities, press etc. For it every zoological park must have a mechanism for collecting and verifying information about the disaster.

The information thus collected can be used for

- Preparing press releases,
- Evaluating response efforts and preparedness of the zoo personnel in dealing with disasters,
- Assessing further training needs of the personnel,
- Knowing about the lacunae in the plan prepared,
- Future better crisis management efforts etc.

Assessment Coordinator's Primary responsibilities are:

- Participating in emergency plan review meetings.
- Training the people working under him
- Collecting and compiling information on disaster situation.
- Maintaining a written record of all events that occur including actions taken, decisions made and by whom, personnel involved, costs incurred, etc.
- Reporting verified damage information to the officer in charge of the zoo.
- Assisting with the preparation of reports like after-action report.
- Assessment Coordinator for the Zoo can be Forest range officer and he can be

assisted by L.D.C and an orderly.

(G) Maintenance Coordinator

Crisis deepens when the men are ready but not the materials and mechanical systems, hence the maintenance of these systems is very important.

The maintenance coordinator will be responsible for smooth functioning of all mechanical and utility systems of the zoo and in shutting down of the electrical systems during exigencies. He will also be responsible for maintaining adequate spares, removing of fallen trees, debris etc and in erecting of barricades etc.

Maintenance Coordinator's Primary responsibilities are:

- Participating in emergency plan review meetings.
- Proper maintenance of cages, squeeze cages, fire extinguishers, tube wells, electrical supply points, Tractor, Trolleys, welding machines, earth moving equipment, shovels, axes, cutters, blades, ropes, ladders and spare parts of different mechanical devices etc
- Training the people working under them
- Putting up of barricades for the control of traffic.
- Getting the fallen trees, poles, debris of the buildings etc cleared off
- Inspecting the damaged areas with his team and giving recommendations for entry/ reuse etc

Maintenance Coordinator for the Zoo can be Curator and he will be assisted by carpenter, massion, electrician, tube well operator, ticket checkers etc.

(H) Medical Coordinator

The medical coordinator is responsible for providing immediate care to injured persons/ injured Zoo animals, as well as the collecting and compiling of health and medical-related disaster information.

Emergency Medical Coordinator's Primary responsibilities are:

- Participating in site emergency plan review meetings.
- Ensuring that emergency medical care/ first aid is provided to injured persons and animals
- Maintaining adequate quantities of medicines
- Collecting and compiling health/medical disaster information for the

Assessment Coordinator.

- Coordinating ambulance calling and pick-up, medical assistance etc.

Medical Coordinator for the Zoo can be Veterinary doctor

(I) Security Coordinator

He will be responsible for coordinating safe removal of stranded people, controlling the movement of vehicles, checking the unauthorized entry of people, catching/ caging/ netting / tranquilizing of animals that have escaped their houses as early as possible.

Security Coordinator's Primary responsibilities are:

- Participating in emergency plan meetings
- Providing training and conducting of mock drills
- Ensuring that all wire meshes, chain link fences, walls, double doors, shutters etc are in good condition and getting them repaired immediately
- Ensuring that the trapping materials are in good working condition and are available as per requirement
- Periodic checking for breached boundary walls
- Lopping and cutting of trees that might pose danger
- Controlling the movement of people and vehicles
- Preventing unauthorized entry
- Assisting with the care and handling of injured persons.
- Assisting with fire suppression, if necessary etc

Security Coordinator for the Zoo can be Head keeper

Step-2 Conducting a Hazard Analysis

Purpose

The purpose of conducting hazard analysis is to determine the hazards that the zoo is most vulnerable. The disaster management plan becomes more realistic if we can determine the possible hazards that the zoo might have to face.

For example, if the zoo is not in a flood plain, why should time be spent on developing procedures for a flood?

Starting Point

Researching the old news papers, gathering information from the old records of the zoo, and speaking to the zoo personnel gives insights to the zoo in charge. Occurrence of disasters

increases if the zoo is in flood plains/ earthquake zones/ fault zones/ coastal regions/ fire prone areas etc. For dealing with such particular situations one must be well prepared.

Considerations

Look at emergencies that have occurred or may occur in the zoo. Consider the geographic location of the zoo (it is important for preparing for exigencies like floods, mud slides etc). Consider the construction of buildings esp. if the zoo is in earthquake zone. Also look at the problems like Trees, which are dangerously placed, which may cause serious damage, to the animal enclosures there by increase the chances of escape of animals, and to the property and lives of the visitors and that of Zoo staff.

Hazards	**Possibility**	**Employee Impact**	**Property Impact**	**Economic Impact**	**Total Impact**
Fire	3	1	3	3	10
Bomb Threat	1	3	3	3	10
Civil Unrest	1	1	3	3	8
Escape of Animals from enclosures	1	3	1	3	8
Animal diseases	3	3	3	3	12

Hazard Analysis Worksheet

List any other possible hazards that the Zoo might face under the first column labeled “Hazards”. Cross off any hazards that are not possible. Using a scale of 1 to 3 estimate the possibility of each listed hazard

1. Unlikely or low possibility
2. Maybe or average possibility
3. Likely or high possibility

In the next three columns labeled, “Employee Impact,” “Property Impact,” and “Economic Impact” use a 1 to 3 scale. Using the 1 to 3-scale estimate the possible impact of each hazard on the employees, property and business. Use a worse case scenario to estimate the probable impact.

1. Low impact
2. Moderate impact
3. High impact

After factoring each impact area, total the row for each hazard. Using the totals, prioritize the hazards to determine which hazards to plan for first. Depending on the needs and resources of the organization, complete the low priorities as possible, or not at all.

Upon prioritizing the possible impacts, the major threats to the Zoo are in the following order

1. Animal diseases -- (12 points)
2. Fire -- (10 points)
3. Bomb Threat -- (10 points)
4. Civil Unrest -- (08 points)
5. Escape of Animals from enclosures -- (08 points)

Step 3: Performing a Capability Assessment

Purpose

By assessing an organization's ability to respond to an emergency situation, the planning team can determine what resources are already available with them and what resources may be needed.

There are four areas that should be assessed: Employee skills, Equipment, Local response capability and Facilities.

Employee Skills

The Zoo management should identify skills possessed by its employees that can be used during emergency situations. Once the employees are identified it is better that they are asked for their participation in the emergency operations.

The zoo in-charge should have knowledge about the skills of his employees and he must have their contact numbers. The information about the skills of employees can be in the form of a table as given

Employee Name	Skill	Phone number
	Animal handler (carnivore)	
	Animal Handler (herbivores)	
	Animal Handler (Birds)	
	Animal Handler (Crocodile)	
	Animal Handler (monkeys)	
	Snake Catcher	
	Good climber of the trees	
	Who can make good knots	
	Good swimmer	
	Good at public relations	
	Good at communication	
	Trained in first-aid	
	Good fire fighter	

And the list goes on……

In order to tone up the skills of the employees the management should organize workshops/ trainings etc on continuous basis

Equipment

Survey the zoo for equipment resources that may be needed to respond to the hazards and make a list of the equipment that the zoo possesses. Once the list is prepared the zoo management can make budgetary provision for replacing of the old, worn out equipment, and can obtain non-existent equipment

The zoo in- charge has to prepare the basis equipment needed by the zoo for dealing with different kinds of emergencies. It will be much useful if different lists are prepared for different emergency situations. Two such examples are given below

For dealing with animal escapes:

Captive animals	**Minimal requirement**	**Highly recommended but not required**	**What your zoo has**
Large carnivores	Nets, pole syringes, snare, Projectile guns and darts, blow dart equipment, crates, squeeze cages etc		
Small carnivores	Nets, gloves, pole syringes, snare, crates, blow dart equipment, crates, squeeze cage etc		
Hoofed stock	Projectile guns and darts, blow dart equipment, crates etc	Custom designed squeeze cages	
Elephants	Elephant hook, projectile guns and darts, chains	Elephant crush	
Small mammals (e.g. primates).	Nets, gloves, pole syringe, snares, plastic tubes, blow dart equipment, crates, squeeze cage		

Large primates like chimps, orangutans etc	Nets, gloves, pole syringe, projectile guns and darts, blow dart equipment		
Birds	Nets, gloves, towels, pole syringe		
Reptiles	Nets, gloves, snares, plastic shield, bags, plastic tubes, snake tong, snake hook etc	Squeeze cages	
Reptiles	Nets, gloves, snares, bags, plastic tubes, snake tongs, snake hooks etc		

For warning people about the emergencies

Minimal requirement	Highly recommended but not required	What your zoo has
Alarm systems		
Public address system		
Radio communications (walkie talkie)		

Similarly the equipment list can be prepared for floods, fire, earthquakes, animal diseases, explosion in the zoo etc situations

Local Response Capability

The zoo emergency team should identify what resources the local response agencies have with them and how they can help the zoo in controlling of crisis. In order to respond effectively, the team should work with the local fire, police, and emergency medical services, and district administration

While formulating the plan, think about the following issues:

- Familiarity of the police/fire departments with the geography, location and facilities of the zoo
- How much they can help the zoo administration in the control of exigencies
- List of the hospitals with their phone numbers that are providing ambulance services
- Information about the availability of vehicles etc with different departments etc

The zoos must have information on different local response capabilities so that the

Zoo can contact them during emergencies. The information can be in the form as described below

Equipment and vehicles

Equipment/ Vehicle Type and its number	Department	Address	Telephone Number
Gypsy	---Department		
Zeep	---Department		
Zeep	---Department		
Zeep	---Department		
Gypsy	---Department		
Car	---Department		
Car	---Department		
Mini Bus	---Department		
Mini Bus	---Department	.	
Water Tanker	---Department		
Tractor Trolley	---Department		
Earth moving equipment	---Department		
Ambulance services			

And the list goes on….

Expertise and services

Specialty Service	Address	Contact Person	Telephone Number
Volunteers			
First aid			

And the list goes on….

Local Response Capabilities

Name of the department	Name of the officer in-charge	Contact number		
		Office	Fax	Cell
Closest Police station				
Closest Fire Station				
Closest government hospital				

And the list goes on….

Facilities

The zoos must have the basis facilities like control room, media centre and evacuation areas for effectively dealing with the emergency situations in the zoo. A brief description on these facilities is given below

(A) Control Center

For effectively dealing with the exigencies the zoos must have a mechanism for good internal and external communication links. Good internal communication links help in ensuring that the orders are passed on to the emergency teams working with in the zoo and getting feed backs

from them; where as good external communication links help in getting necessary help from the police, fire, medical, home guards etc.

For it the zoo must have a control room with adequate space, supplies, communication equipment like phone, fax, computer, walkie-talkies etc. The in-charge of the zoo coordinates from this location.

(B) Media Center

Decision for establishment of the media centre depends upon the severity of the exigency, if the intensity of the crisis is less no need for establishment of media centre. The queries of the media in such case can be addressed through telephone/ press releases. But if the intensity of damage is very high then media centre must be established. In such conditions as discussed earlier information coordinator is responsible for- establishing the media center and preparing news releases.

The media centre thus established should have adequate workplace for the information coordinator (and his team) and for media. The media centre must have telephone/ fax numbers of the print and electronic media with it. The information can be maintained in the following tables

Media contact list

Radio

Address	Contact Person	Telephone/ Fax Number
All India radio		
F.M Channels		
• Radio Mirchi etc		

Television

Name of The channel	Contact Person	Telephone Number

Newspaper

Name of The Paper	Frequency of Publication (daily/ weekly/ fortnightly/ monthly)	Contact Person	Telephone Number

(C) Evacuation Assembly Areas

To account for the well being of all employees and zoo visitors, an area must be designated for people to meet when evacuation is necessary. It may be necessary to have two evacuation assembly areas: one on site, and the second off site. At the evacuation assembly area(s), unit coordinators should determine whether everyone has evacuated the zoo safely or not. Unit coordinators should then report to the control room with any information regarding individuals who were not accounted for at the assembly area, etc.

Step 4: Creating a Vital Records Preservation Program

Purpose

Every organization possesses records containing information, which is valuable to the organization. The type of information differs depending upon the function of the organization and its size and complexity. For some organizations, the information contained in their records is its single most valuable asset for example records pertaining to Accounts, Animal Records etc. Some records may be valuable due to legal requirements, historic value, or operational value. Possible vital records include personnel records, fiscal records, animal records, etc.

The purpose of a vital records preservation program is to protect the essential information contained in the organization's records from loss or destruction. By identifying these records and protecting them, the organization will be better able to survive an event. This activity is usually considered a pre-disaster function; that is, once an emergency occurs, it is often difficult to save records not already properly protected.

Three basic questions must be answered in developing a Vital Records Preservation Program:

1. What information is vital to the operation of the organization?
2. Which records contain that vital information?
3. How can those records best be protected?

Protection Methods

It is important to remember that not all records will be on paper. Some may exist only in a computer database, disks, tapes, drawings, videotapes, etc.

Basically there are three ways to protect vital records:

- Store or move the records to a different location.
- Store in vaults, safes, or other types of protective devices.
- Duplicate the records and store in a different location.

The method(s) chosen will depend upon the type of record involved, its value to the operation of the organization, and the size, type and complexity of the organization. Make provisions for preserving those records that, for whatever reason, cannot be duplicated, stored, or dispersed elsewhere.

Some of the vital records of the zoological parks and prescribed method for storing them are as given below

Records related to	**Type of Record**	**Location**	**Preservation Method**	**Responsible Person**
Fiscal management	Budget data/ Monthly Accounts	Zoo in-charge office	Fire proof box	Accountant
Personnel	Employee Info. Personnel Database	Zoo in-charge office	Duplicated Copies stored in Fireproof box	Head Clerk/ Establishment clerk
Inventory	Animal records	Zoo Hospital	Duplicated (hard disk of computer)	Zoo vet. / Stenographer

And the list goes on……

RESOURCE LIST

A resource list provides a single point of reference for available public and private sector resources within, as well as outside of the Zoo community. This list should contain those resources that the organization may need during an emergency situation or disaster. These resources include, but are not limited to equipment, supplies, professional services, communication services, key officials, etc. It is always useful to list the resources by general categories as outlined below for easy reference. Developing a list of resources will definitely

help the authorities in emergency operations and disaster recovery.

Key official contact list

Name/Title of Official	Telephone Numbers		
	Office	Home	Cell
Secretary Forests			
Special Secretary			
Principle chief conservator of forests			
Chief wildlife warden			
State zoo authority			
Member Secretary CZA			
Commissioner			
Inspector General of Police			
Deputy Inspector General of Police			
District Magistrate			
Senior superintendent of police			
Superintendent of police			
M.D./ In-charge electrical supply units			
In-charge water supply units			
In-charge, Home Guards			
Local senior forest official like conservator of forests			
Police Circle Inspector, nearest police station			
In charge Fire Services, nearest fire station			
Divisional Forest Officer			
In-charge of the nearest zoological parks			
Zoo friends club			

And the list goes on…

List of experts in the field of wildlife

Experts in the field of wildlife	Telephone Numbers		
	Office	Home	Cell
• Reptile expert			

• Monkey catchers			
• Carnivore experts			
• Herbivore experts			
• Other experts			
Veterinary doctors			
• Dr			
• Dr			
• Dr			
• Dr			
• Dr			

And the list goes on…

Transporters list

Name of the transporter	Telephone Numbers		
	Office	Home	Cell

SUPPLIES (food & medicine)

Supply	Address	Contact Person	Telephone Number
Meat			
Vegetables			
Fruits			
Medicines			
Dry ration			
Fodder			

And the list goes on…..

C NATURAL DISASTERS

Floods

India is the worst flood-affected country in the world. About 40 million hectares or nearly 1/8th of India's geographical area is flood-prone. Flood is an exigency for the zoos which are in --

(A) Flood prone areas of the country,

(B) The coastal areas which receive huge amounts of rain during cyclones/ super cyclones,

(C) Tsunami affected areas (like the zoos in the Andamans and those in coastal areas)

(D) The foot hills and

(E) The changing pattern of rain fall (less rainy days with maximum downpour) some times is posing problems even for those zoological parks which are not in flood plains,

(F) The foot hills and

(G) The changing pattern of rain fall (less rainy days with maximum downpour) some times is posing problems even for those zoological parks which are not in flood plains,

These zoos must have a contingency plan for dealing with exigency associated with flooding. Every such zoo should have a foolproof planning process for effectively dealing with the flood situation. Some of the points that are to be considered while formulating the planning process are as below:

Examine all possible impacts of floods/ mud slides/ cyclones

For dealing with the flood situations, the zoo administrators should have knowledge about

- Historical information on the flood situation of the area
- Information on—drainage, geography and the quantum of rainfall received by the area that might leave to flood situation

An enclosure under deluge

Critical factors that are to be considered during the planning process are

I. **Quantity and quality of water supply:**The most serious consequence of flooding is large-scale contamination of drinking water. Water-borne diseases usually are associated with poor hygiene and sanitation, can affect a large portion of the zoo population. Under such conditions the proper storage of water is of great importance, as poorly stored supplies may become contaminated and also act as breeding grounds for vectors. During floods there is an every chance that the potable water gets contamination from the sewage systems. So provisioning for safe drinking water for the zoo animals during this exigency is very much needed

Some of the potential causes of drinking water contamination during floods are:

- Contamination of surface source due to carcass near the source;

- Excessive increase in turbidity making water difficult to purify;
- Contamination of groundwater with sewer water.

During floods the contingency team should consider the following

- During floods the zoos should access drinking water only from reliable and clean sources.
- The water should be evaluated in order to eliminate risk of water-borne infection and poisoning.
- That water suspected of contamination shouldn't be used for consumption

What should be done?

- Identify alternative sources of water which can be tapped during emergencies
- Water must be tested as soon as possible after calamity;
- Ensure sufficient vessels for water storage.
- Mobilization and deployment of water tankers
- Microbial contamination of potable water during floods is of great concern to the safety of animals and chlorine disinfection is relatively cheap, effective and usually readily available
- The zoos should have water quality field testing kits, which should be capable of testing residual chlorine and bacteriological quality of the water

II. Food sanitation

Food Safety refers to the wholesome condition of food such that its consumption does not result in food-borne illness. Food-borne illness may result from the irritation of the alimentary canal as a result of rapid bacterial multiplication, the production of toxins by pathogens (food poisoning), or as a result of the impact of chemical or physical substances in the body, introduced through the consumption of contaminated food.

The risk to food safety may result from direct contamination from floodwater, indirect contamination from poor storage of food that can lead to the proliferation of micro-organisms,

some of which produce toxins. Improperly stored food can also serve as a habitat and source of food for vectors e.g. flies and rodents.

The various aspects of food safety management in a flood situation should encompass all processes related to storage, processing, preparation, handling and distribution of food.

The contingency plan should anticipate the vulnerability of food system of zoo to risks of contamination due to flooding and it should take measures to curtail those risks. Proper planning should allow for the measurement of risks, the maintenance of surveillance and planning for remedial action.

What should be done?

- Clean and sanitize food and food contact surfaces to eliminate pathogens as much as possible.
- The utensils/ food cans used should be thoroughly sanitized between usage
- Food storage areas should be clean
- Food items should be stored above ground in water proof containers
- Storage should allow sufficient ventilation and sunlight
- Personal cleanliness of food handlers is very important.
- Contaminated and decaying food material shouldn't be given to the animals
- Contaminated and decaying food material should be properly disposed off preferably by burying/ burning rather than open dumping.
- Make provision for the safe transfer of food
- During transportation, ensure protection of food from the elements of nature.
- Most efficient mode of transport should be identified and made available for food transfer
- Ensure thorough sanitation of food store
- Ensure availability of adequate volumes of safe drinking water

III. Waste disposal and maintaining good hygiene

For protecting the health of zoo inmates it is vital that the zoo manager must maintain good sanitary conditions in the zoo after flooding. A good contingency plan will help the managers to assess the affected area in an effort that the health of zoo animals is not compromised.

Dead animals- a potent health threat to inmates of the zoo

This assessment should include among other areas, considerations for maintaining good sanitary and hygienic conditions with specific reference to water supply, excreta disposal and solid waste management. The following represents elements that should be considered when undertaking contingency planning for sanitary and hygiene conditions following a flood event.

In the case of floods it is important to ensure proper water quality in an effort to prevent the spread of diseases, which include diarrheal diseases, parasitic infections, as well as epidemics such as cholera; all of which can affect animal health. Raw sewage contains a large number of disease causing pathogens which might include: Hepatitis viruses, Salmonella sps pathogenic bacteria such as Leptospira sps pathogenic protozoa such as Entamoeba, and other parasitic organisms such as Ascaris and hookworms. Illnesses can be transmitted by these micro-organisms through an oral feacal route, directly or through water, food, hands of the zoo keepers/ animal handlers contaminated with excreta. Also playing an active role in this process are vectors such as insects, rodents, etc.

The important relationship between improper solid waste disposal and the cases of vector-borne diseases cannot be overstated. Therefore it is important that arrangements be in

place to collect and dispose of solid wastes of the animals. In emergency situations solid waste management in the zoo becomes an arduous task as at that time the zoo managers have to deal not only with solid wastes of the zoo animals but also with the things like dead animals, fallen trees, and debris from the damaged buildings etc.

IV. Vector control

Vectors carry disease-producing micro-organisms from one host to another. These potential disease carriers are capable of rapidly reproducing and dispersing within favorable environments. Floods often provide conditions for proliferation and in particular, a variety of species of flies and mosquitoes pose the greatest threat for vector-borne diseases. Vectors of significance include mosquitoes, flies, rats and mice, cockroaches, ticks, fleas, lice and mites etc, it is important to note that a disaster such as a flood does not cause new diseases. However, altering the environment may predispose a particular area to increases in the transmission of diseases already present and introduction from another area. This increase in the prevalence of a particular disease may be due to the following:

- Creation of new breeding sites
- Disruption of on-going vector control programmes
- Presence of poor sanitary conditions
- Feacal and urine contamination
- Increase in the number of vector and/or disease host species
- Increase in vector and human contact

What should be done?

The increased risk of transmission of vector-borne diseases following a flooding of the area must be viewed very seriously. For it there has to be a surveillance programme in place. A good surveillance mechanism helps us in saving the precious lives of animals of the zoo. The surveillance teams should conduct studies on vectors, sanitation and hygiene, safety of food, water quality, and on epidemiological aspects and should recommend measures for the establishment of simple and rapid monitoring and response systems.

- Knowledge of the areas prone to flooding will assist the assessment teams in rapidly locating areas that are likely to develop stagnant pools of water, that will act as breeding grounds for insects
- Monitoring of waste collection areas and food preparation areas is important to ensure that such facilities are properly managed given that they can provide a food source for rodents, mosquitoes etc.

V. Other aspects of flood management

The zoo managers for dealing with floods in their institutions should follow the following measures

- Develop some highland areas in those enclosures which have a history of inundation

- The outlets of water must be freed from leaves, mud etc just before the rainy season and during the rainy season, so that the gushing water will do no harm for the zoo infrastructure and will not deluge the zoo premises. The zoo administrators can think of making structural rearrangements like having sluice gates in their boundary walls, so that water leaves the premises without damaging the zoo infrastructure and zoo animals.
- The zoos in foot hills can think of having diversion canals, so that the water will not enter the zoo premises.
- The most important aspect is that the zoo should have a rapid response team equipped with required equipment.

VI. The team (rapid response team)

(A) Officer in-charge

The director/ administrator of the zoo being the head of the institution, he/she is responsible for overseeing all aspects of preparing for and responding to an emergency situation. He/she will be making decisions on operations, protective actions, and gives overall guidance to the members of the team. He will be receiving information and recommendations from the emergency coordinators and other advisors, and then makes the necessary decisions.

The Director's primary responsibilities are:

- Getting the emergency plan prepared and accepting it,
- Appointing personnel to perform emergency tasks,
- Deciding what protective actions should be taken for emergency situations.
- Authorizing the use of zoo's infrastructure,
- Liaising with local district authorities in cases of exigency for getting necessary help

(B) Emergency Coordinator

A person who

- Possess a thorough knowledge and understanding of the zoo layout and operation.
- Hold a responsible position within the organization with the authority to

implement protective measures and commit resources and personnel.

- Possess leadership qualities and have the ability to operate under stressful conditions.
- Possess a rudimentary knowledge of the basic concepts of emergency management, should be designated as emergency coordinator.

He will be responsible for following the flood emergency plan and ensuring that all members are trained and knowledgeable in performing their tasks before an emergency occurs. During an actual flood situation, the site coordinator does not necessarily make the decisions concerning protective actions, but coordinates the implementation of the flood emergency plan. The emergency coordinator should be capable of taking spot decisions if required.

The Emergency Coordinator's primary responsibilities are:

- Maintaining updated flood emergency plan and testing it on a regular basis.
- Training and activating personnel to perform emergency tasks,
- Organizing and maintaining control center with adequate communications capability.
- Ensuring that vital records are identified and protected.
- Implementing protective actions.
- Implementing decisions and directives of the officer in –charge of the zoo.
- Making provisions for food and water requirements of Zoo animals

The Emergency Coordinator for the Zoo can be Assistant Conservator of forests and he will be assisted by office staff, chowkidars, Gardners etc

(C) Unit Coordinator(s)

Person(s)

- With knowledge and understanding of the site layout, and a thorough knowledge of the operation of their work unit.
- Holding a responsible position within their work unit with the authority to direct and commit resources and personnel.
- Possessing leadership qualities and have the ability to operate under stressful conditions, should be designated as unit coordinators of the zoo.

The zoo, depending on its area can have any number of unit coordinators. The designated persons will be responsible for carrying out of the instructions of the flood emergency plan within their jurisdiction and liaising with the Emergency coordinator.

Unit Coordinator's primary responsibilities are:

- Participating in emergency plan review meetings
- Training personnel in their respective jurisdictions.
- Identifying, before an emergency, vital things that need protection.
- Ensuring that all persons have taken the appropriate protective actions,
- coordinating shut-down of electrical connections etc during exigencies
- Helping in the smooth movement of people and vehicles.
- Assisting assessment coordinator in the assessment of losses due to disaster
- Opening of sluice gates, and getting the water outlets cleaned before/ during rainy season
- Providing safe drinking water and sanitized food to animals
- Taking measures for the speedy disposal of solid and liquid wastes
- Helping the maintenance staff in repairing of the damaged enclosures
- Helping in the capture/ trapping of escaped animals

The Unit Coordinators for the Zoo can be foresters who can be assisted by chowkidars, Gardners, Animal Keepers, laborers who are working in their respective beats.

(D) Warning/Communications Coordinator

The warning/communications coordinator is responsible for maintaining communication equipment, such as walkie-talkies and telephone systems etc. The warning/ communications coordinator maintains a log of the different messages or information coming into and leaving the zoo during an emergency. He will be responsible for activating the primary warning system within the zoo, such as starting an alarm, making public announcement, etc

Communications Coordinator's Primary responsibilities are:

- Participating in emergency plan review meetings
- Maintaining communications system between the control center and the various work units' onsite, and the local authorities like police/ fire /revenue departments
- Maintaining of telephone logs
- Receiving and disseminating information about the flood situation that has occurred, or is imminent.
- Activating the onsite warning if necessary.
- Establishing communications links between control center and media center.

Warning/communications coordinator for the Zoo can be Forest Range Officer and will be assisted by Stenographer, Head Clerk, and orderly.

(E) Assessment Coordinator

The assessment coordinator will be responsible for collecting, verifying and displaying statistical information about the floods to other team members, as well as to the local authorities like police /fire department. He should maintain a record or diary of events and decisions made during the floods.

Assessment Coordinator's Primary responsibilities shall be:

- Participating in emergency plan review meetings
- Collecting and compiling information on previous floods, rainfall data of the area
- Maintaining a written record of all events that occur including actions taken, decisions made and by whom, personnel involved, costs incurred, etc.
- Reporting verified damage information to the director for release to media and for sharing information with the local authorities
- Assisting with the preparation of other reports as necessary, including an after-action report.

Emergency Assessment Coordinator for the Zoo can be Forest range officer he can be assisted by L.D.C and an orderly.

(F) Information Coordinator

The information coordinator is responsible for developing news releases, answering media questions, ensuring that protective actions are publicized. He should be comfortable working with the media and have a clear understanding of management's priorities.

Emergency Information Coordinator's Primary responsibilities shall be:

- Participating in emergency plan review and updates.
- Obtaining verified flood-related information.
- Preparing and issuing news releases to the media
- Establishing Media Center (if necessary) during disaster to coordinate emergency information and brief the media.
- Conducting media tours whenever possible.

Emergency Information Coordinator for the Zoo can be Forest range officer and will be assisted by L.D.C and an orderly.

(G) Maintenance Coordinator

The maintenance coordinator is responsible for controlling site mechanical systems and ensuring that they are shut down properly during the floods.

Maintenance Coordinator's Primary responsibilities shall be:

- Participating in emergency plan meetings
- Maintaining procedures for controlling systems, such as electrical supply points, Tube wells, Cages, Tractor, Trolleys, Squeeze cages, fire extinguishers and their spare parts etc
- Training personnel working under him
- Providing emergency repair/power services as necessary.
- Erecting barricades and other traffic/access control devices as necessary.
- Providing for debris clearance and site clean up as necessary.
- Providing damage inspection and site re-entry recommendations
- Replenishing, repairing and/or replacing emergency equipment

Emergency Maintenance Coordinator for the Zoo can be curator and he will be assisted by carpenter, massion, electrician, tube well operator, ticket checkers etc.

(H) Medical Coordinator

The medical coordinator will be responsible for providing immediate care to injured Zoo animals, capturing the escaped animals; as well as the collecting and compiling of health and

medical-related disaster information.

Medical Coordinator's Primary responsibilities shall be:

- Participating in emergency plan review meetings
- Ensuring that medical care is provided to injured animals
- Ensuring that the escaped animals are caught
- Collecting and compiling health/medical disaster information for the Assessment Coordinator.
- Coordinating the disease surveillance mechanism of the zoo etc.

Medical Coordinators for the Zoo can be the Veterinary Doctor

(I) Security Coordinator

The security coordinator is responsible for controlling the movement of people and vehicles, preventing unauthorized entry into the zoo.

Security Coordinator's Primary responsibilities shall be:

- Participating in emergency plan review meetings
- Controlling the movement and preventing unauthorized entry of people and vehicles
- Assisting with fire suppression, if necessary.
- Directing media representatives to the Media Center.

Emergency Security Coordinator for the Zoo can be **Head Keeper**

Equipment needed

ITEMS	**Essentially needed**	**needed**
Flashlight/ Torch lights and spare batteries	√	
Rubber boots	√	
Drinking water bottles	√	
First aid kit	√	
Protective gloves	√	
Helmet	√	
Measuring tape	√	
Disposable masks	√	
Sealing tape and string	√	
Residual chlorine/ Chlorine tablets and pH testing equipment	√	
Shovels	√	

Pick axe	√	
Generator with sufficient fuel	√	
Water quality field testing kits	√	
Tranquilizing gun with drugs	√	
Welding machine with sufficient welding rods	√	
Ropes and nets	√	
Cages	√	
Sufficient larvicides, insecticides and their delivery systems	√	
Construction and repair materials like Cement, iron rods, sand etc	√	
Sandbags	√	
Gas cutters		√
Earth moving equipment		√

And the list goes on….

Critical Decisions to be made in a Flood situation

Indicator	**Decision**
Water Supply	
1. Total interruption of the normal system	Establish alternative water source
2. Poor water quality at source	Initiate chlorination
3. Poor drinking water quality	Recommend chlorination/boiling
Sewage Disposal	
Total interruption of the normal system/ interruption	Provide alternative methods of sewage disposal
Solid Waste Disposal	
Inadequate collection/removal and dumping site	Obtain equipment for a) debris removal, b) reconditioning of dump and c) garbage collection
Food Hygiene	
Frequent inspections	Provide additional personnel for food hygiene inspections
Corpses	
Large number of corpses	Initiate mass burials

Mosquitoes	
Increase in vector population and breeding sites	Initiate Spraying and larval control
Determination of the biological life cycle	Select best spraying time and larvicide application
Sensitivity of mosquitoes, availability, cost and familiarity of personnel to insecticide	Select appropriate insecticide
Other Pests	
Increase in number of poisonous snakes	Stock the snake venom serum

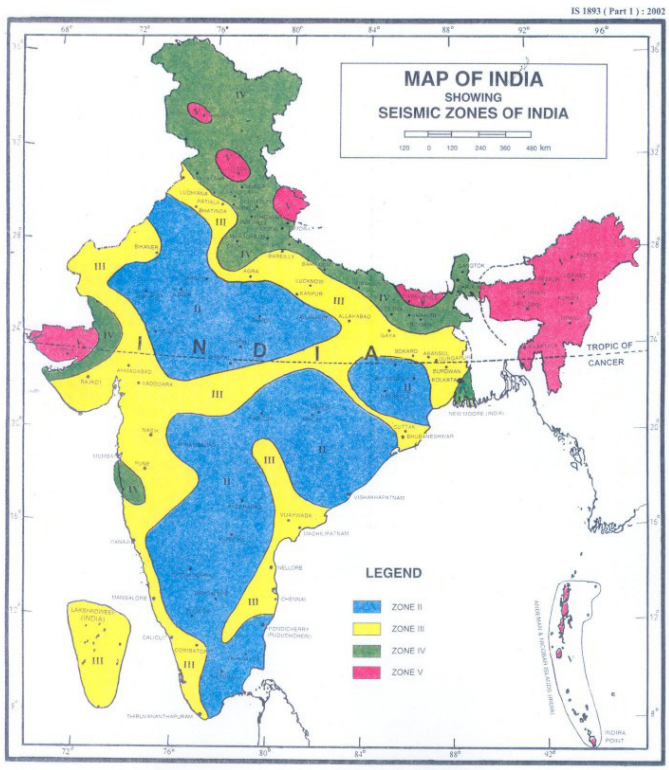
Source: Assessing Needs in the Health Sector after Floods and Hurricanes, Technical Paper No. 11, Pan American Health Organization (PAHO), 1987

Mud/Landslides

Incidences of mud /land slides are very frequent in

- Western Himalayas (Uttar Pradesh, Himachal Pradesh and Jammu & Kashmir) incidence of landslides is very high to high
- Eastern & N.E Himalayas (West Bengal, Sikkim and Arunachal Pradesh) incidence of landslides is high
- Naga-Arakkan Mountain belt (Nagaland, Manipur, Mizoram and Tripura) incidence of landslides is high
- Western Ghats including Nilgiris (Maharashtra, Goa, Karnataka, Kerala & Tamil Nadu) incidence of landslides is high to moderate
- Plateau margins in the Peninsular India and Meghalaya in the NE India

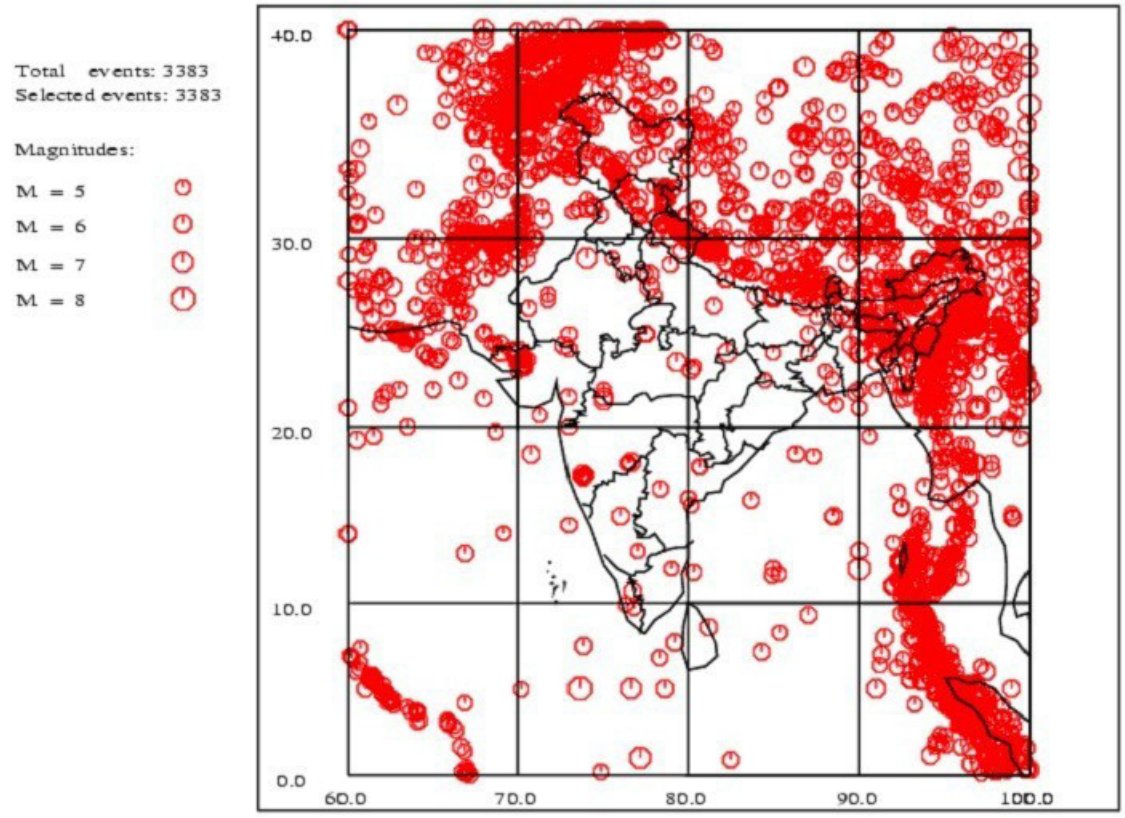
The zoological parks of these areas are highly vulnerable to the mud /land slides. Occurrence of land slides depend upon factors like thickness of the soil, slope, landform, relative relief, drainage, rainfall, geology of the area etc. The zoological parks of these vulnerable areas should be prepared for the exigencies rising due to landslides. The contingency plan so prepared can be in the lines of flood contingency plan.



Earthquakes

The issue of seismic hazard in India has been addressed by scientists as early as 1956 when a 3 zone (Severe, Moderate, Minor hazard) Seismic Zoning map of India was produced. This map was based on a broad concept of earthquake distribution and geotectonics. The severe hazard zones are roughly confined to plate boundary regions i.e. the Himalayan Frontal Arc in the north, the Chaman fault region in the north west and the Indo-Burma border region in the north east. The lower hazard zone is confined to Indian shield region in the south and the moderate hazard zone confined to the transitional zone in between the two. Since then, many versions of the seismic zoning map of India have been brought out. The Bureau of Indian Standards which is the official agency for publishing seismic hazard maps and codes in India, produced a six zone map in 1962, a seven zone map in 1966, and a five zone map in 1970 / 1984 which is currently valid.

PLOT OF EARTHQUAKES (M >= 5.0) FROM IMD CATALOGUE FOR THE PERIOD FROM 1800 TO SEPT. 2001



The above map shows that for the period from 1800 to 2001 different areas of India faced earthquakes of different magnitudes, which makes the zoological parks in these parts of the country vulnerable for this kind of natural disaster, hence they should be prepared well for facing this exigency. The contingency plan so prepared can be in the lines of flood contingency plan.

The buildings of the zoological parks should be built on the lines of technology developed by the institutions like HUDCO, Building Materials and Technology Promotion council (BMTPC), the premium institutions working on developing earthquake resistant building technologies. This will definitely help us in saving the precious lives of our animals under display

d FIRE OR EXPLOSION PROCEDURES

in the events of disasters.

The threat of fire and explosion exists at every wooded place. Fire and explosion can be accidental (such as short circuit or by the accidental fire caused by the thrown cigarette but by the Zoo visitor) and at times can be intentional (by the Zoo visitor/ anti social elements).

Fires are most devastating when they occur in Zoos with large concentrations of people and near to the animal enclosures. Heat, smoke, and flying or falling debris may cause injury or loss of life to persons/ inmates of the zoo, at or near to the accident site. Structural damage or collapse may occur if a fire or explosion is strong enough.

Vital records may be damaged or destroyed by the fire or by water from overhead sprinkler systems. Essential operations may be disrupted for a long period of time as facilities are to be repaired or reconstructed.

The Following three things must be present at the same time in order to produce fire:

- Enough oxygen to sustain combustion,
- Enough heat to raise the material to its ignition temperature,
- Some sort of fuel or combustible material

During Fire it is very important that the stranded visitors should be evacuated to safe area. As the zoo is visited, largely by women and children evacuating them to safe areas becomes more imminent as panic may result in further injuries if people attempt to evacuate in a disorganized manner.

Considering it, the plan below mainly emphasizes on the evacuation of stranded people from the accident site.

Notifying and Warning

- Whoever comes across Fire/ explosion with in the premises of Zoo/ he/she should notify to the zoo authorities
- The warning may be by siren, ringing bell, horn, etc.
- The first person spotting a fire should activate the alarm system and contact the authorities.

General Response Regarding People

- The Director will fully activate the control center may be nearer to the accident site
- Personnel should evacuate people especially women and children from the accident place to the evacuation assembly area upon hearing the alarm
- Small or isolated fires should be immediately extinguished

- Unit Coordinators will check their work areas to ensure that all persons have taken the appropriate action.
- Unit Coordinators will account for their personnel at the evacuation assembly area and report this information to the Emergency Coordinator.
- The Emergency Coordinator will authorize reentry into the site/facility after consulting the fire personnel

Regarding Zoo animals

- Fire lines be cut near to the animal enclosures
- Adequate supply of water for sprinkling on the animals and for dousing the fire be made available
- Measures be taken that the crowns of the trees of the animal enclosures are not caught fire. It is very much necessary in the Zoos where there is a lot of vegetation. As a precautionary measure lopping of the trees should be done at regular intervals
- Unit Coordinators will check their work areas to ensure that all animal keepers have taken appropriate action

Director Checklist

- Activate the control center
- Determine the extent of the fire and its effect on Zoo visitors and on the animals of the zoo
- Determine what staff and personnel should do during interim period.
- Authorize the use of zoo's resources by emergency teams of the zoo and local agencies.
- Coordinate with the local authorities
- Augment personnel and resources as necessary.

Emergency Coordinator Checklist

- Ensure that the Fire Department has been informed
- Ensure that the fire alarm system has been activated.
- Determine the extent of the fire
- Activate the Disaster management plan.
- Coordinate with maintenance personnel(Electrical Dept.) during power shut down.
- Notify persons of the need to evacuate.
- Ensure that vital records are preserved.

- Coordinate shutdown procedures as necessary.
- Direct persons to the assembly area located.
- Coordinate people in dousing of fires
- Determine the extent of the fire or explosion and report this information to the Emergency Coordinator.

Assessment Coordinator Checklist

- If necessary, evacuate the stranded people to the evacuation assembly area.
- Maintain a written record of all events that occurred during the fire, including actions taken, decisions made and by whom, personnel involved, costs
- Collect and compile damage information.
- Report verified damage information to the Information Coordinator.
- Prepare an after-action report.

Warning/Communications Coordinator Checklist

- Activate the fire alarm system, if applicable.
- Maintain a primary and alternate communications system between the control room, the various work units onsite, and Local emergency authorities like police, fire and medical departments
- If necessary, evacuate the stranded people to the evacuation assembly area.
- Notify key officials as necessary.
- Log messages received by and dispatched from the control room
- Establish communications links between the control room and media center

Information Coordinator Checklist

- Obtain verified information about the fire damage.
- Prepare and issue news releases
- Establish a Media Center (if necessary).
- Conduct media tours of the fire or explosion scene (if possible).

Medical Coordinator Checklist

- Ensure that emergency medical care is provided to injured persons.
- Coordinate offsite medical assistance, ambulance calling/pickup, etc.
- Collect and compile fire/explosion-related health/ medical information for the Assessment Coordinator.

Maintenance Coordinator Checklist

- Shut down electricity lines or systems as necessary.

- If necessary, evacuate the stranded people to the evacuation assembly area
- Erect barricades and other traffic/access control devices to regulate movement of men and vehicles
- Re-entry recommendations are given after consulting fire personnel.
- Provide emergency repair services
- Assist with debris clearance
- Provide auxiliary power/lighting if necessary.
- Start up systems like electricity when appropriate.
- Replenish, repair, or replace emergency equipment.

Security Coordinator Checklist

- Direct fire personnel to the fire scene.
- Control the movement of people and vehicles
- Maintain access lanes for emergency vehicles and personnel.
- Prevent unauthorized entry into the hazardous area, control room and media Center (if established).
- Assist with fire suppression as necessary.
- Assist with the care and handling of injured persons as necessary.
- Direct media representatives to the Media Center, if established.

Equipment required for dealing with fire

Items	**Essentially needed**	**needed**	**What the zoo has with it**
Rubber boots	**√**		
Drinking water bottles	**√**		
First aid kit	**√**		
Protective gloves	**√**		
Helmet	**√**		
Measuring tape	**√**		
Shovels	**√**		
Pick axe	**√**		
Tranquilizing gun with drugs	**√**		

Unit Coordinator Checklist

Welding machine with sufficient welding rods	√		
Ropes and nets	√		
Cages	√		
Construction and repair materials like Cement, iron rods, sand etc	√		
Gas cutters		√	
Earth moving equipment		√	
Fire proof dress		√	
Goggles	√		

And the list goes on…..

e CIVIL DISTURBANCE PROCEDURES

Demonstrations, riots, looting, curfew and other forms of civil disturbance can threaten the supply of food to the Zoo animals and at times for the safe evacuation of zoo guests and the zoo staff. Evacuation or other protective measures may be required to protect people in those extreme cases where violence may result in injury or loss of life or loss of zoo property.

Property damage resulting from civil disturbance is often extensive and costly, both in terms of money and in diminished operating ability of the Zoo. Damage to utility systems may cause a disruption of service to the Zoo for several days or more, forcing a reduction or curtailment of essential operations until utility service are restored. Fear and reluctance on the part of citizens to enter areas perceived to be dangerous could interrupt the normal functioning of the Zoo if it is located within such an area.

If the Zoo is susceptible to such disturbances, the Site Emergency Team should develop an alternate set of response procedures including provisions for maintaining essential operations or services**.**

During Civil Disturbances, it is very important that arrangements may be made to send the zoo visitors and the staff safely to safer areas. As the zoo is visited, largely by women and

children evacuating them to safe areas becomes more imminent as panic may result in further injuries if people attempt to evacuate in a disorganized manner.

Considering it, the plan below mainly emphasizes on the evacuation of stranded people from the Zoo during Civil Disturbances.

Plan for Evacuating Zoo visitors and Zoo personnel

Notification and Warning

As and when information about a major civil disturbance-affecting the Zoo is received from the Police Department / radio and television; personnel will be given instructions about the incidences of Civil Disturbances

General Response

- The Emergency Coordinator will fully activate the control room to monitor conditions and determine appropriate response actions.
- The Emergency Coordinator will assess the situation and determine what actions are needed to protect Zoo visitors and Zoo personnel. The type of protective actions taken will depend upon several factors, including the size, type, and location of the disturbance, and the level of violence and property destruction involved.
- Assistance from **law enforcement personnel** will be requested
- The Emergency Coordinator will brief Unit Coordinators of the situation as soon as possible and inform them of actions to be taken. Unit Coordinators will brief persons within their work areas.
- Zoo personnel may be released early as deemed appropriate and the Zoo guests will be asked to leave the Zoo immediately.
- If conditions do not warrant or allow the early release of zoo personnel and Zoo guests, all points of entry into the Zoo will be secured and access should be limited to those persons transacting legitimate business.
- Assistance from law enforcement personnel will be requested as deemed necessary to prevent unauthorized access into the zoo

Director Checklist

- Activate control room
- Consider releasing personnel early if conditions warrant and the Zoo guests should be asked to leave the Zoo immediately
- Authorize the use of organization resources by Emergency Team and local response agencies like Police/Fire service personnel.

Emergency Coordinator Checklist

- Activate the disaster management plan.
- Notify Unit Coordinators of the situation.
- If necessary notify Police Department
- Ensure that all points of entry into the zoo are secured**.**
- Ensure that vital facilities, operations, equipment, and records are secured.
- Augment personnel and resources as necessary.
- Ensure that work areas are checked for possible damage as a result of the disturbance.

Unit Coordinator Checklist

- Inform zoo personnel of their early release. Check work areas to ensure that everyone has left as per instructions.
- Ensure that vital records, equipment, animals etc are secured.
- Assist Police personnel
- As conditions permit, inspect work area for damage from the disturbance. Report any damage to the Emergency Coordinator in the control room.

Emergency Assessment Coordinator Checklist

- Report to the control room and maintain a written record of all events that occur

related to the civil disturbance, including actions taken, decisions made and by whom, personnel involved, costs incurred, etc. If possible, a photographic or video record should be arranged.

- As necessary, collect and compile damage information
- Report verified damage information to the local Police and to the Information Coordinator for and to the officer in-charge of the zoo
- Prepare an after-action report.

Warning/Communications Coordinator Checklist

- Report to the control room and maintain a primary and alternate communications system between the control room, the various work units onsite, and with the agencies like Police
- Notify key officials about the crisis
- Log messages received by and dispatched from the control room

Information Coordinator Checklist

Report to the control room and coordinate the activities listed below.

- Obtain verified information about any damage incurred as a result of the disturbance to the Zoo.
- Prepare and issue news releases and submit to the officer in-charge of the zoo
- Establish a Media Center (if necessary).
- If the Zoo is attacked then conduct media tours of the site (if damage was incurred).

Medical Coordinator Checklist

Report to the control room and coordinate the activities listed below.

- Ensure that emergency medical care is provided to injured persons.
- Coordinate medical assistance, ambulance calling/pickup, etc., (if necessary).

- Collect and compile disturbance-related health/medical information for the Assessment Coordinator.

Maintenance Coordinator Checklist

Report to the control room and coordinate the activities listed below.

- Erect barricades and other traffic/access control devices
- Assist with securing entry points as necessary.
- Provide auxiliary power/lighting as necessary.
- Provide emergency repair services as necessary.
- Inspect the site for possible damage (if the Zoo is attacked).
- Assist with debris clearance and site cleanup as necessary (if the Zoo is attacked).
- Replenish, repair or replace emergency equipment

Security Coordinator Checklist

Report to the control room and coordinate the activities listed below.

- Secure entry points to the site as necessary.
- Prevent unauthorized entry into the zoo.
- Control the movement of people and vehicles
- Assist with the care and handling of injured persons as necessary.
- Assist with fire suppression as necessary.
- Secure vital facilities, resources, equipment, and operations.

Equipment required for dealing with civil disturbances

Items	**Essentially needed**	**needed**	**What the zoo has with it**
Rubber boots	√		

Alarm systems	√		
Public address system	√		
Radio communications (walkie talkie)	√		
Protective gloves	√		
Helmet	√		
Measuring tape	√		
Shovels	√		
Pick axe	√		
Tranquilizing gun with drugs	√		
Welding machine with sufficient welding rods	√		
Ropes and nets	√		
Cages	√		
Construction and repair materials like Cement, iron rods, sand etc	√		
Gas cutters		√	
Earth moving equipment		√	
Fire proof dress		√	
Goggles	√		

f ANIMAL DISEASE PROCEDURES

The captive animals of the zoos are subjected to a number of diseases of viral, bacterial, rickettsial and mycoplasmal origin. Some of these diseases are dreadful and occurrence of these diseases amongst the captive populations of the zoo may have disastrous consequences, like

- Serious losses to the zoo by the way of loss of valuable genetic materials;
- Increased concerns of animal diseases transmitting to humans (i.e. zoonotic);
- Cause unnecessary pain and suffering to the captive animals

In order to save the zoo collections from the diseases every zoo should have an emergency preparedness planning

Benefits of emergency preparedness planning

A well prepared zoo can recognize the disease while still it is localized and can take steps to eliminate it, before the disease becomes more widespread (amongst the captive populations) and virulent.

Components of Animal disease emergency preparedness planning

The two very important components of the planning are: early warning and early reaction to the disease.

I Early warning

This becomes more imperative to the zoos, considering the fact that most of the zoos get their food requirements met from the outside sources. These can be very important sources for transmitting diseases from outside areas in to the zoos. Early warning includes all initiatives, mainly based on disease surveillance, reporting and analysis that would lead to improved awareness and knowledge of the distribution and behaviour of disease outbreaks (and of infection).

Step-I Disease surveillance

Disease surveillance should be an integral and key component of the zoo. This is important for early warning of diseases, planning and monitoring of disease control and provision of sound animal health. Disease surveillance can be categorized into Passive surveillance and Active surveillance.

- **Passive disease surveillance**

Passive disease surveillance is the routine gathering of information on disease incidents from different sources such as reports from the personnel of the zoo (mostly related to deaths of feral animals of the zoo), reports from the press, and from the laboratory reports of the periodic targeted serological investigations and that of urine, and fecal samples of the zoo animals.

Another important element in disease surveillance in zoos is the use of molecular diagnostics to identify and characterize novel agents responsible for disease outbreak. For it the samples obtained from the dead animals must be sent to the labs for detailed investigations.

It is important that passive surveillance systems be strengthened and the disease information be captured and analyzed. However, it should be recognized that complete reliance on passive surveillance usually leads to significant under-reporting of diseases. So it is essential that passive surveillance be supplemented by a strong system of active disease surveillance, particularly for emergency animal diseases.

Periodical inspections of the food sources (slaughter houses, areas where the grasses are grown) must be given top priority

- **Active disease surveillance**

Active disease surveillance requires purposeful and comprehensive searching for evidence of disease in animal populations or for verification that such populations are free of specific diseases. Active disease surveillance programmes are meant to detect any significant disease occurrences, targeted against specific high-threat diseases or designed to monitor the progress of individual disease control.

The zoo vet as a part of the disease surveillance in Zoos must follow the practice of performing complete necropsies on every animal that dies within the Zoo and should maintain a record of it.

Daily observation by animal care staff of each animal for clinical signs of disease and method of reporting abnormalities helps in early veterinary investigation.

Step-II Risk Analysis

Risk analysis is a tool that can also be used to good advantage for animal disease emergency preparedness planning. Under risk analysis we mostly follow: risk assessment, risk management and risk communication.

- **Risk assessment**

During risk assessment likelihood of occurrence of particular disease and its potential consequences are identified and evaluated. For example, a disease like avian influenza is a high risk disease and has maximum potential consequences hence receives high score on risk assessment.Risks can be described as “extreme”, “high”, “medium” or “low”, or by a

simple scoring system, for example, 1-4 for the level of risk and 1-4 for the level of potential consequences.

- **Risk management**

This is the process of identifying, documenting and implementing measures to reduce risks and their consequences. Risks can never be completely eliminated. The aim is to adopt procedures to reduce the level of risk to an acceptable level.

- **Risk communication**

This is the process of exchange of information on the potential risk of disease in the zoo animals between the zoo and stakeholders. Stakeholders in this context include all those who could be affected by the consequences of risks, that is, everyone from zoo personnel to public to wildlifers to scientists to policy makers. Exchange of information between the keepers and the veterinary staff is also very important aspect in disease surveillance.

Step-III Risk profiling (Assessing the seriousness of the threat)

After having identified and listed the disease threats, the next step is to assess the seriousness of the threat of each disease. For it the questions to be raised include:

- Is there a past history of the disease in the zoo?
- How is the disease spread? What are the relative roles of live animals, meat, dairy and other animal products, insect vectors, migratory birds and feral animals in transmitting the disease causing agent?
- How secure are your quarantine procedures and quarantine areas?
- Are there any epidemiological factors that will either inhibit or facilitate the spread of the disease?
- Will the disease cause human illness or deaths?
- How much we are prepared to handle the situation (availability of medicines, vaccinating the individuals etc)
- What is the current distribution and incidence of the disease? And how close is the disease to the zoo? (in case of exotic diseases like avian flu)

Risk profiling helps us in

- determining the life threatening diseases for which there is a greatest need and urgency;
- strengthening the active and passive surveillance needs
- preparing ourselves with imparting training to the personnel and
- stockpiling of medicines, disinfectants and vaccines etc

Step-IV Laboratory diagnostic capabilities

Accurate diagnosis of diseases can only be assured in fully equipped laboratories that have a range of standardized diagnostic reagents, experienced staff. Some of the diseases like avian influenza can be diagnosed only in microbiologically high-security laboratories.

For sending the materials for laboratory diagnosis, the handlers at the zoo should know how to procure and preserve the specimen. They further should be trained in- method of packaging and refrigeration and the labeling of packages. The zoos must have enough of specimen transport containers with them. They must have basic information on the different reference laboratories like name of the in-charge, address and phone numbers of various laboratories.

II Early reaction

The disease causing germs can get their way in to the zoological parks through infected animals (new acquisitions/ migratory birds/ feral animals etc), contaminated vehicles, visitors to the zoo with zoonotic diseases, contaminated food (meet/ milk products/ fodder) contaminated biological products (vaccines) and by the natural factors like spread by vectors or by wind currents. Some times the diseases can spread through the hair, clothes footwear of visitors and of the staff. Another major area of concern is the infected premises may be because of improperly disposed carcasses and other zoo waste. Further the diseases can spread from one part of the zoo to the other part by the feral animals of the zoo. This condition necessitates us to have contingency plans for early reaction.Early reaction means carrying out without delay the disease control activities needed to contain the outbreak and then to eliminate the disease and infection in the shortest possible time and in the most cost-effective way.It may be too late to plan for the disease control/ eradication by the time it has already achieved magnanimous proportions. In such situations we tend to do lots of mistakes, chances that resources are

misused, and finally the precious lives are lost. The early reaction contingency plans should include the following:

1. Dealing with new acquisitions

All newly acquired animals must be identified at all times and detailed records kept.

- Treatment records of newly acquired animals must be procured, as this will facilitate "trace-back" investigations.
- The veterinarian should analyze the cause of death of any quarantined or imported animal (after detailed post mortem and detailed histopathological tests) as soon as possible after the postmortem examination.
- During quarantine, access to animals should be limited to the essential staff only (veterinary and designated animal care staff only).
- Waste material from animals in quarantine should be treated in a manner that limits access by all other fauna (including free-ranging animals/birds).
- Biological specimens from animals in quarantine should be handled, transported, and stored under conditions that will minimize the potential transmission of pathogens while preserving the integrity of the sample for diagnostic testing.
- There may be a need to consider the spatial requirements (distance) between animals in quarantine and those that have been cleared.

2. Denial of access of the disease agent to susceptible host animals

This can be achieved by

- Applying good hygiene and sanitary practices
- Removing potentially contaminated materials (Feces, bedding, and used hay of the ailing animals) by disinfection, destruction and /or safe disposal
- Vector numbers in the zoo be reduced by treatment and/or elimination of potential breeding sites like bushes, stagnant water etc

- Care must be routinely exercised to ensure all food (living or dead) brought into the zoo (to feed zoo animals) should originate only from safer sources. It requires periodical checking of fodder cultivation areas, and being in touch with the local vets. of those areas, for ensuring that diseases should not enter the Zoo through the feed. Similar care also should be taken while procuring meat and poultry from different sources.

3. Avoiding contact between infected and other zoo animal collection

To reduce the risk of transmission of disease among the inmates of the Zoo

- Exotic animals (including the free ranging animals) should not have any direct contact with the collection animals.
- An effective pest management program is implemented and maintained.
- Exhibit and holding facilities should be free from the contamination of adjacent areas by waste materials and / or drainage
- Isolation premises for small species must be indoors and bird, vermin, and insect-proof. Such premises should also have no wind currents; efficient waste collection and disposal; and dedicated utensils, instruments, and clothing. Isolation areas should meet requirements for quarantine facilities as outlined in the CZA guidelines.
- Large animal isolation premises must be in a part of the property that has as wide a buffer zone as possible from other stock or have solid walls that prevent aerosol transmission. The enclosures must also have foot baths; dedicated utensils, instruments and clothing; and be tended by staff that will not have further contact with any other collection animals that day.
- All movements of susceptible species within and into the zoo should cease

4. Maintaining hygiene of the zoo through proper waste disposal system

Proper and speedy disposal of the biological wastes, carcasses, animal products, materials etc help in preventing the diffusion of infection within the zoo. Hence it should be given a top priority by the zoo managers.

Disposal of the waste should be completed as soon as possible after destruction to minimize

opportunities for infectious material to disperse. Some of the measures that can be adopted by the zoo managers are listed as below.

(A) Burial

Under Indian conditions, the ideal method for disposing of the wastes is through **burial**, as burial is easier to organize, cheaper, quicker and environmentally cleaner. But, while considering burial as a disposal method, the following things are to be kept in mind, they are

- Access to the burial site should be a very important consideration, the site should be easily approachable for the materials to be buried;
- nature of soil/rock formation (issues related to permeability and stability of the soil);
- slope of the site;
- level of water-table;
- proximity to water catchment areas, bores and wells;
- presence of underground services, e.g. water, drainage, sewerage etc;
- proximity to built up areas and dwellings;
- Surface runoff should be prevented from entering the pit by the construction of diversion banks if required
- Similar banks should be constructed to prevent any liquids escaping from the burial site.
- Subsequent plans for the use of the area, e.g. the soil from the burial pit area may be unusable in future.
- Fencing the area in order to sanitize the area from the free ranging animals of the zoo.
- When closing the pit, care should be taken that surplus soil should be heaped over the pit as overfill. The weight of soil acts to stop carcasses rising out of the pit due to gas entrapment, prevents scavengers digging up carcasses, helps filter out odors and assists in absorbing the fluids of decomposition
- Lime may be added to pits to prevent earthworms bringing contaminated material to the surface after pit closure. Cover the carcasses with soil and add an unbroken layer of

slaked lime [Ca (OH)2] before filling is completed. Lime should not be placed directly on carcasses because it slows, and may prevent, decomposition. In order to hasten the rate of decomposition salt can also be added.

(B) Cremation

The animals that died due to highly contaminable infectious diseases and that of felid family should be cremated as per the guidelines of Central Zoo Authority. Cremation can be done through funeral pyres, and incinerators.If the cremation is done through the funeral pyres, the following points should be kept in mind

- Consider the ill effects of heat, smoke, odor that emancipate from the burnt carcass on the near by habitations, enclosures of the animals, underground utilities like water pipes, sewage lines etc
- The ashes should be buried and the site restored as well as possible.

(C) Incinerators

In the context of zoos, incinerators are a very efficient carcass disposal system. They help us in achieving safe and complete disposal, virtually of a little pollution. However, their cost (establishment and operation) and lack of portability means they are unlikely to be readily available or easily accessible in most situations and moreover incinerators are usually only suited to disposal of small amounts of materials. Incinerators are best suited for disposing off the surgical wastes.

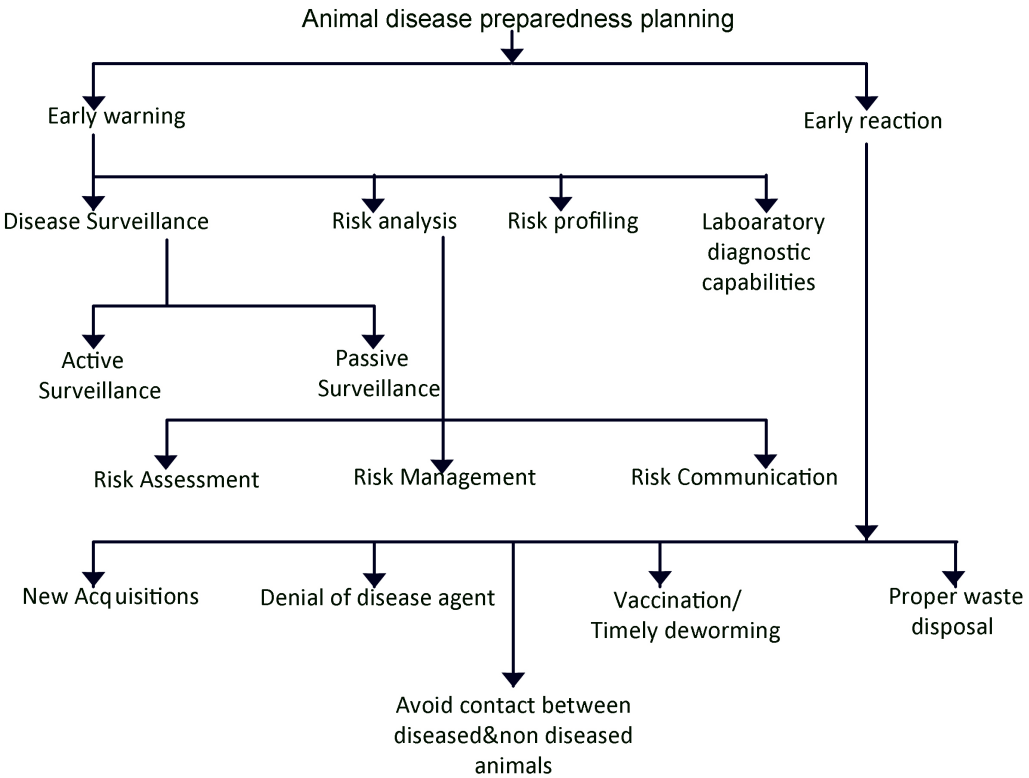
(D) Composting

Where there is a minor risk of fomite spread, composting of stable manure, feeds, hay, litter and bedding is the best available alternative to burial or burning. The composting is best done by following pit method. The compost that we get from the wastes can be used in the lawns etc

5. Vaccination- a vital component in emergency disease preparedness

Well planned vaccination programmes supplemented by other disease control measures help in eliminating the disease in the zoological parks. The issues related to vaccines are

- Time tested vaccines should only be used.
- It is important to select the correct antigenic type and subtype vaccine in order to achieve good levels of immunity
- It's been documented that poor quality vaccines have actually caused the diseases that they were meant to prevent. Hence procure vaccines from reputed firms only.
- Vaccines must be stored at the correct refrigeration temperature at all times and used before expiry dates. Heat-stable, live vaccines, if available, reduce cold storage problems.
- Depending upon the necessity the veterinarian can go for ring vaccination and/ or blanket vaccination



SCHEMATIC REPRESENTATION OF ANIMAL DISEASE PREPAREDNESS PLAN

chapter VII

CONTINGENCY PLAN

1 Animal rescues from wild

2 Escape of animals from enclosures

3 Monkey and dog menace

4 Arrangement of food in case of strke

5 Snake bite

6 Visitors getting injured/visitors falling inside the enclosures

7 Fighting among animals

8 Epidemics

9 Breakdown of power supply

10 Free ranging animals/Feral animal menace

1 ANIMAL RESCUED FROM WILD

Ideally, any animal rescued from the wild should be rehabilitated and released back. However, there are times when a full recovery takes extensive time or is never possible. In such a circumstances, the zoo will assume responsibility for the animal. It will undertake an evaluation of health of the animal through a proper veterinary examination. The zoo may find appropriate accommodation for the animal through its national network. It can possibly allow the animal to live out the rest of the animal's life on its own premises. In such a case, an appropriate enclosure will be prepared for the animal. It will be given adequate security and health care.

The animals rescued from the wild can be brought to the zoo under different circumstances. It could either have been orphaned, or injured or due to conflict with human settlements. In all the cases, the care for the animal will be different as their requirements are different. The injured animal will receive immediate healthcare as required in the zoo hospital where it will remain under observation till deemed necessary. The orphaned animal will be stabilized, provided nourishment and all other ancillary healthcare facility. It may also be considered to provide the orphan with a foster parent. In case of the animal received due to conflict with human settlement, the first consideration will be of releasing back to an environment where it will be able to adjust. Only in case such an environment is not possible, will it be considered to provide the animal with an enclosure of its own.

In all cases, a close monitoring of the animal will be undertaken. A data file of observations will be prepared such that it can provide with a case history of the animal. Regular animal data sheets as are available in the zoo will be filled up for the records.

2 ESCAPE OF ANIMALS FROM ENCLOSURES

The zoo has a mechanism in place for controlling the escape of animals from the enclosures, so as to avoid damage caused by the escaped animals in terms of injuries/fatalities done to the zoo guests/staff of the zoo and in terms of possible loss of the wild animal.

Considering the above situation the contingency plan for the zoo emphasizes on what to be done when animal escapes from its enclosure and the issues related to public safety.

Designing of Enclosures

- Barriers/Gates and doors are designed, constructed and maintained to contain animals within enclosures with precaution as not to trap or otherwise injure visitors, particularly children or those with disabilities.
- Enclosures are free from any vegetation or other items, which would aid escape, as in case of animals like Bears, Leopards etc.
- Water-filled and dry moats used for the confinement of animals are provided with means of escape back to the enclosure for animals falling into them.
- Trees within or near animal enclosures are regularly inspected and lopped or felled as necessary to avoid animals being harmed by falling branches, toxicity or trauma.
- Sufficient distance has been kept between barriers, animals, enclosures and visitors to minimize transmission of disease or potential pathogens, this considering the public safety in view.
- The enclosure in which a digging or burrowing animal is to be constructed with a subterranean floor consisting entirely of concrete covered by sufficient soil or sheet metal piling up to adequate depth so that the animal can dig of burrow without escaping: or with an enclose fence of galvanized metal mesh or concrete extending below ground level to a depth of at least one meter and then extended horizontally with the enclosure for at least one meter so that animal can dig or burrow without escaping from the enclosure.
- Toughened and unbreakable glass has been used in the exhibits of snakes.
- Where moats are used to contain animals, they (whether wet or dry) are surrounded by fences, walls, hedges or shrubs sufficient enough to prevent the public from approaching too close to the edge.
- Safety barriers are designed to prevent children either from getting through, under or over them.

The following security principles are followed in the zoo:

- Proper care of locks and keys of animal's houses.
- Proper cleansing and oiling of animal squeezers.

- daily checkup of chain links of the enclosures and if there is any breach immediate reporting to the higher authorities through daily report forms.
- Animals on display or being transported are always protected from other animals.

For preventing the escape of animals from the enclosures of the Zoological Park and for providing emergency escape routes to the zoo visitors during emergency situations, the following points have been taken into consideration.

- The perimeter boundary, including access points is designed, constructed and maintained to discourage unauthorized entry.
- Security guards have been appointed to minimizing the risks of theft, malicious damage or release of animals by intruders entering the grounds out of hours.
- Zoo periodically will assess whether any danger may arise in the event of an animal escaping from its enclosure, and consider the possible or likely attempted escape route from the zoo if this were to happen.
- The escapes within or from the zoo (or of accidental or unauthorized releases) of any animal should be brought to the attention of the Director immediately.
- An adequate number of clearly visible safety signs, providing warning are displayed at each enclosure containing any species of hazardous animal, which is likely to cause injury.

Following procedure is followed in case of animal escape:

- The security of the perimeter barrier, involving the closure of all points of access to, and exit from, the zoo is made.
- Reporting to the Director of the Zoo and police as soon as incident takes place.
- Control of visitors, including reassurance, ushering them into buildings, closing doors and windows, evacuating the zoo is very important;
- The provision of nets/cages/traps etc for capturing the escaped animals and darting equipment to tranquillize the escaped animals is available.
- Darting equipment are available for immediate use by trained personnel under the

command of zoo director.

- All escapes are recorded and detailed reports made. Risk assessments is reviewed periodically in the light of experience.

Immediate goals:

1. Ensure public safety

2. Ensure staff safety

3. Ensure animal safety

4. Recapture the animal

Every animal escape is different. The procedures presented here will undoubtedly require some modification to fit the circumstances. Special attention needs to be taken with dangerous animals, those that pose a serious risk to humans, other animals or itself.

General principles followed;

- An escaped animal is confused and frightened. Given the opportunity, it will move towards familiar surroundings.

- To make the animal move, methodically violate the flight distance. Attempt to "persuade" the escaped animal to move towards a secure enclosure by carefully, slowly and slightly violating its flight distance.

- The chief concern is to protect the public and staff. This is especially critical when a dangerous animal escapes and confronts the public or attempts to breach the zoo's perimeter fence. Make every effort to keep the public away from an escaped animal. If persuasion or immobilization is ineffective in recapturing the animal, the escaped animal will have to be dispatched (shot). Only police or a staff member who is licensed to use a firearm may exercise this option.

The Shooter

Only the Director or Emergency Coordinator can issue the command to kill an escaped animal, The reasons to do so are as follows:

1. Human injury or loss of life

2. Threat of human injury or loss of life

3. Animal has breached the parameter fence surrounding the zoo

4. Only trained Individuals are authorized/licensed to use firearms and are allowed to carry the keys to the locked gun cabinet

Human injury or death:

1. The Base Coordinator contacts the Emergency Medical Service as soon as injury comes in notice of zoo keepers.

2. The injured person is attended by a staff member, preferably someone who is trained in First Aid/CPR.

3 MONKEY AND DOG MENACE

For controlling the monkey menace the following actions are taken in the zoo

1. We don't allow visitors to feed the monkeys
2. We take strict measures to feed the animals (esp. the herbivores) strictly in the feeding cells only
3. Periodically drive away the monkeys from the zoo campus by non-lethal weapons

If their populations go beyond management procedure of capturing them and reallocate them to the forest areas is followed.

Controlling dogs

For controlling the Dog menace within the zoo the following measures can be undertaken;

1.Check-up and surveillance of the boundary wall periodically (may be twice in a week)

2.Security guards are asked to look out for the stray dogs

3.Periodically drive away the dogs from the Zoo campus by non-lethal weapons if they breach the security

If their populations go beyond management procedure of capturing them and reallocate them to the forest areas is followed.

4 ARRANGEMENT OF FOOD DURING STRIKE

Ahmedabad being a state with a high level of entrepreneurship does not face situations of strike on a regular basis. It is a rare occurrence. In the past 25 years, there is no recorded instance of any food - contractor going on strike. However, in the rare instance when such a situation does occur, the zoo will fall back upon the Ahmedabad Municipal Corporation which is the body under which the zoo falls. Being a government body, with about 35,000 employees, the corporation will be able to provide suitable alternatives. The Essential Commodities Act can also be called into play if required in an extreme condition.

5 SNAKE BITE

In case of snakebite following procedure is followed;

1. Getting the victim away from the snake

2. Checking the snakebite for puncture wounds. If one or two fang markings are visible, the bite is from a poisonous snake

3. Identifying the snake to provide the proper treatment by the trained veterinarian for which anti-venom has been kept for all the poisonous snakes in the zoo

4. Get the victim to the hospital as soon as possible for the further treatment

6 VISITORS GETTING INJURED

Any animal bite or other animal contact that may result in rabies in persons must, by law, is reported immediately to the local Medical Officer of Health.

For animal care and management following points are considered;

1. Zoo operators work with a veterinarian to develop a preventive care program, including vaccination and parasite control, for displayed animals.

2.All mammals, for which vaccine use has been approved by a veterinarian, are vaccinated against rabies unless they are accessible only by those responsible for their care.

3. Ill, injured or distressed animals are isolated from other animals and the public, and are provided with appropriate veterinary care.

4. First aid facilities are well stocked and conveniently located to staff and the public.

5.Trained staff has been assigned in animal areas to reduce risk by:

• Encouraging appropriate human-animal contact.

• Preventing/rectifying situations that could lead to injuries or aggressive exhibit animal behavior.

• Processing reports of visitor injuries.

• Identify aggressive and distressed animal behavior.

• Prevent visitors from harming or provoking animals.

• Fully documents all witnessed or reported incidents, and notify event operators.

• Locate first aid facilities/resources and treat injuries.

• Maintain proper visitor flow to avoid overcrowding in the animal area, since overcrowding may lead to unwanted animal exposure and injuries.

• Keep walkways clear and free of hazards.

• Instruct visitors to immediately report bites and scratches to event staff.

• Retain incident reports for at least six months for public health investigation.

7 FIGHTING AMONG ANIMALS

Infighting amongst animals in the zoo is categorized in two - that between the herbivores like antelopes and that between the carnivores like leopards. In anticipation of such events, the zoo has kept provision by providing in-situ options. Feeding cubicles for each animal in the case of carnivores is provided so that in case of infighting, the animals can be separately placed, away from each other. Each animal within the enclosure has its own feeding cubicle. For herbivores, though each animal is not provided with a separate feeding cubicle, some smaller cubicles are made. These are provisional, to be used when infighting occurs as a way to keep the animals separately.

In order to monitor the behavior of the animal on a regular basis to prevent infighting as far as possible, a close watch over the animals using CCTV cameras is to be done.

Zoo keepers on a regular basis follow the animals closely so that they are aware of the behavior of the animal and can anticipate any infighting that can occur. It will also help to understand if any particular animal is prone to such behavior and why. Periodic medical checkups are done and the animals are provided sufficient enrichment so that they are not in stressed conditions.

In case a situation gets out of control, the zoo has tranquilizers available and experienced shooters as well as veterinarians on call at all times. This is a step that is to be taken only in an extreme condition when none else works.

8 EPIDEMICS

Technical contingency plan consist of four sets of complementary documents:

1. Specific disease contingency plans that document the strategies to be followed in order to detect, contain and eliminate the disease.

2. Standard operating procedures for activities and programmers that may be common to several or all emergency disease campaigns.

3. Enterprise manual that set out zoo sanitary guidelines for enterprises that may involved in an emergency animal disease outbreak.

4. Simple job description cards for individual officers. These plans should be written in straightforward language that can be understood and followed by all those who have to

implement them. These should be prepared for each of the diseases that have been identified as being of high risk. They should not be very long, but should be clear, authoritative documents that provide sufficient information to allow authorities to make informed decisions on what policies and procedures should be used to control and eradicate an outbreak of that disease, and which are enforceable in law.

Nature of the disease;

· Etiology

· Susceptible domestic and wildlife animal species

· World distribution and previous occurrences in the country

· Epidemiology (including likely pathways for spread within the country)

· Clinical signs and pathology

Risk assessment (including potential consequences)

· Risk profile of the disease for the country

· Likely methods of introduction and geographical areas at high risk· potential consequences for food security and poverty alleviation, production losses, trade losses and public health

Diagnosis and surveillance

· Early warning mechanisms for disease introductions/outbreaks

· Disease reporting procedures

· Field and laboratory diagnostic strategies

· Linkages with international reference laboratories

· Surveillance strategies during different phases of eradication

Principles of control and eradication

· Methods to prevent spread of infection and to eliminate the pathogen

· Factors that may affect control and eradication: agricultural production systems,

epidemiological, social and economic

· Feasibility of control and eradication in the country

9 BREAKDOWN OF POWER SUPPLY

Ahmedabad has uninterrupted supply of electricity for many years. Torrent Power transmits and distributes more than 12 billion units of power to around 2.2 million customers in the cities of Gujarat and generates 1647.5 MW of electricity. As a result there were very rare incidences of power breakdowns.

As a precautionary measure provision of backup generator has been made in electrical layout for the master plan proposal, which will provide power to all the important locations within zoo in case of power break down, emergency and rescue.

10 FREE RANGING ANIMALS/FERAL ANIMAL MENACE

Pests in the form of insects, rodents, birds and certain mammals are common in zoos due to the ready availability of shelter, food and water. Despite the prevalence of pests in a zoological Park, the ways in which a zoo chooses to confront the problems are as variable as the types of pests. Ignoring the presence of unwanted pests especially in the enclosures of birds etc detracts from the visitor experience, increases operating costs due to physical damage and food waste, and presents a real threat to the health and welfare of the animal (and plant) collection as well as those of the employee and visitors.

Attention to sanitation and proper storage and removal of refuse and solid waste are important first steps while tackling the pest control. Using the basic principles of pest control, one must appreciate the uniqueness of implementing these control procedures in zoological Parks. A successful control program must combine a thorough knowledge of both the biology of the pests in question and the effects of any proposed control methods on not only the pests, but also on the zoo's animal collection, the employees and visitors.

Implementing a pest control program in a zoological Park poses many unique problems. One must attempt to control pest populations in and around exhibits without harming any of the exhibit specimens. One must consider primary toxicity of the materials used as well as the secondary effects. Not only can the exhibit specimens be poisoned directly by coming in contact with residual deposits, but they may eat insects that have ingested chemical or experienced external contamination. One must consider cumulative dosages arising from the ingesting of carcasses.

How to control Pests

Control measures for the commonly occurring pests of the Zoo are as follows

Rodents

Rat control consists primarily of gassing rodent burrows with hydrogen phosphate pellets and baiting perimeters of buildings and enclosures

Mice are a bit more difficult to control in a zoological setting. Traps can be used for mouse control in areas where baiting is unacceptable especially in bird houses.

Watering the rat holes can be another effective method for controlling Rats and Mice in the Zoo.

Free-Flying Birds

For controlling of the 'birds of prey' populations at a zoo very little can be done. Elimination of nesting and roosting sites and trapping may help to some degree.

Attention to sanitation and proper storage and removal of refuse and solid waste are important first steps when tackling the pest control

The populations of birds of prey will notably decrease with proper sanitation of the enclosures of the zoo. The problem to a greater extent is addressed by providing food to the inmates of the zoos within their feeding cells.

chapter VIII

CAPACITY BUILDING

The Ahmedabad Zoo is a member of ISIS International Species Information system. There is a constant effort made to maintain the standards and be innovative. At present training programs are held in Zoo for the animal keepers. Initiatives should be taken to arrange more such programs related to Animal keeping, healthcare, Animal Breeding. Zoo already has many research students coming for their study, hence Experts could be called and discussions can be held between heads of different Zoos. There should be Annual training sessions held for continuous exchange of ideas through informal dialogues and formal Seminars. It can take place both at the Regional and National levels. Annual seminars and Conference should be done.

The training program will be held for the staff members in order to advance their career, to regularly update them on the internal issues. The staff will also be made aware of the developments and inputs of technologies.In case of inadequate human resources, the zoo can offer volunteering opportunities and programs for school students as well as adults. Applications can be invited and selected persons can undergo an orientation/ training program.

Samples of the training programme charts are added in the annexures.

chapter IX

E-GOVERNANCE

E-governance refers to the use of internet technology as a platform for exchanging information, providing services and transacting with public as well as smooth and easy working of the zoo administration.

The effective use of IT services in the Ahmedabad Zoo can greatly enhance existing efficiencies drive down communication costs, and increase transparency in the functioning of various departments. It can work at two levels, one of the General Public and Secondly for the easy functioning of the Zoo administration. At present the website of Ahmedabad Zoo at www.ahmedabadzoo.com is active. It provides information related to the updates regarding the weekly programs held in the Zoo for the children and the information for the zoo timings.

Certain other information can be added like the Animals present in the Zoo, their fun facts, their daily activity, their names, peculiar habits with the photograph of the animal, these facts could be educative for the children who come to visit them. There could be a section on FAQ's for children where the children can ask questions regarding animals and they can be answered by the Zoo staff. This can make the website interactive and more useable by the children.

Secondly, at the administration level, detail information of each animal should be kept in terms of daily activity, peculiar habits, health and history of the animal. This detail information can help the administrative staff to know and understand the animals better and react accordingly during situations. This information can also help the research students in their study work. Observations during the Disaster or any mishap could be recorded and kept as database for the reference. Regular data has to be continuously collected for the purpose of research and analysis which will aim at the welfare and health care of the animal.

E-GOVERNANCE

Member of ISIS

The Central Zoo Authority (CZA) has granted special sponsorship to 47 zoos of India, to become members of ISIS. Ahmedabad zoo is one of them and is therby a member of Zoological Information Management Sytems (ZIMS) which is a part of ISIS.

ISIS stands for International Species Information System. It is a global diversity database custodian for wild animal species held in captivity. It provides management systems to the member institutions. ISIS software products include,

1. Animal Records Keeping System (ARKS)
2. Medical Animal Records Keeping System (MedARKS)
3. Regional Animal Species Collection Plan (REGASP)
4. Single Population Analysis & Records Keeping System (SPARKS)
5. Physiological Reference Values

ISIS members have access to the central database that contains information on more than 2 million animals – almost 15,000 taxa/ 10,000 species – held in zoological institutions, and some animals in wild. ISIS also serves as a centre for cooperative development of zoological software for in-facility use. This also allows software development costs to be spread across more institutions – making professional software and professional-level support available to all participants at a reasonable cost.

As a member of ISIS, Ahmedabad zoo is linked to various other institutions and also has access to ISIS Global Database and ARKS Training Workbooks. Further exploration of the helpfulness of this software program would be done to set-up a better organized management system.

chapter X

BROAD BUDGET ANALYSIS 1

CONSTRUCTION AND DEVELOPMENT 2

DAY TO DAY MAINTENANCE 3

1 BROAD BUDGET ANALYSIS

The zoo is self sufficient in terms of its regular maintenance. Its resources are from the ticket collection on daily basis. This is possible since it has very high footfalls. It will continue receive sufficient finances for maintenance even in the future master plan.

The capital expenditure required for the master plan implementation will be procured through a multi pronged strategy.

1. The AMC(Ahmedabad Municipal Corporation) under which the zoo belongs sets aside funds through annual budgetary allocation which will be utilized.

2. For specific targeted activities as mentioned in the following table, additional budgets will be approved through the process of AMC which includes approval from,

a. Mayor : Through the standing committee.

b. Municipal Commissioner : Through block estimates and presentations.

c. Deputy Municipal Commissioner : By Assisting Municipal commissioner about the context and background.

d. Zoo Superintendent : By guiding and coordinating the making of proposal with corresponding authorities.

The zoo will also apply for the grants from other agencies and might also explore the possibility of PPP(Public Private Partnership) on and as required basis.

2 CONSTRUCTION& DEVOLOPMENT

a Environment friendly materials

b Bamboo & Timber construction

c Stone and Earth construction

d Safari Park

e Enrichment devices

f Training Programme

g Audio Tour

a ENVIRONMENT FRIENDLY MATERIALS

The design of the new buildings on the site would include the enclosures, the administrative buildings, visitor amenities and other small ancillary buildings like ticket booths, security cabins, etc.

It is proposed, keeping in view the future planning of the zoo in a manner where the natural habitat of the animals is simulated in the maximum possible manner that the new constructions should be camouflaged in the natural habitat. They should be strong but also made, wherever possible of environmentally friendly materials. These would include bamboo, wood, earth and stone constructions. The character of the zoo as a whole would thus develop accordingly.

All structures would appear to grow from the landscape and be compatible with the surroundings.
Throughout the zoo, structures would present an overall unity of character while secondary variation in colour, texture and material would be carefully integrated with the various landscapes of the bio climatic zones.

Whenever possible, material would be of an elemental nature, environmentally sustainable like timber, rock, mud and earth. Industrial or highly processed materials like steel and iron to be used only where required. Materials would be self maintaining. The use of paints and finishes requiring constant maintenance is discouraged. They would encourage attachment by vines or covering vegetation. Structures would incorporate a minimum of materials: each specifically suitable to the visual and functional use it is designated to perform.

Building sited near existing trees will give “right of way” to the trees without damaging its root or crown. Roof forms would not dominate the skyline.

b BAMBOO CONSTRUCTION

Over the years, bamboo craft has developed greatly with the availability of a large ethnic population capable of refined craftsmanship. Understanding of its strengths and limitations has made it a formidable material.

It is a natural resource, can be planted and harvested, thereby reducing load considerably on natural resources. Bamboo as a material is hard, stiff and resistant to both moisture and termites.

The use of bamboo in the zoo will make the constructions look more homogeneous and friendly to the environment. They would enrich the theme of the zoo and would help to create an environment closer to nature.

Bamboo can also used to make non-structural elements like; benches, fences, railings, partition panels, gates, dust bins, etc.

TIMBER CONSTRUCTION

Timber has been used as a construction material since years. It has been used differently using various methods.

In the context of the zoo, where the theme is to conserve natural world, the idea of using timber as a building material is apt. It would blend easily with the context and would enrich the theme of the zoo. It is an environmentally friendly building material and is generally cheaper than alternative building materials.

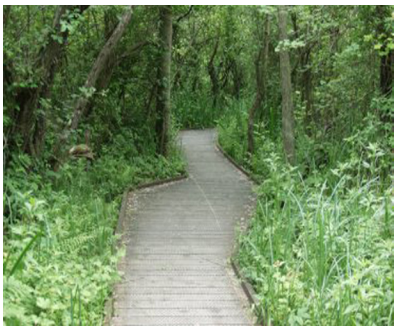
Timber can also be used to make products like, benches, table, chairs, doors, fences, partition panels, viewing decks, litter bins, signages, etc.

C STONE CONSTRUCTION

Stone is one of the oldest building construction material available in various types all around the world.

Almost all building elements can be built with different kinds of stones cut in different shape and size. Using local stone can reduce its embedded energy. It, being a natural material, would easily fit into the overall theme of the zoo.

Stone can also be make non-structural elements like, compound wall, benches, etc. It can also be used as a paving material for walkways, visitor amenities, etc.



EARTH CONSTRUCTION

Earth can be used as a construction in various methods. It has been used traditionally in India by the people.

In the zoo, where one is trying to sensitize people to the natural environment, it is but natural to steer towards earth constructions.

Many animals also use earth as their natural habitat and use of earth in those enclosures would simulate the natural habitat.

Stabilized earth constructions also give a good finish, strength and reduce the maintenance aspects.

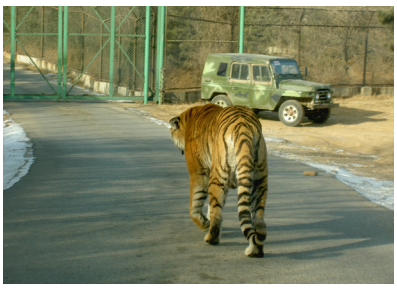
d SAFARI PARK

Concept of Safari Park:

The Safari Park is based on the concept of an 'open zoo'. The Safari Park is a specialized zoo where the captive animals are housed in large naturalistic enclosures. The visitors are allowed to drive in this park in the mechanized vehicles and observe the wildlife, unlike zoo where the animals are viewed in enclosures. Safari Parks usually have a predetermined route from close quarters. The basic concept of a Safari Park is to create a natural environment, where animals are seen in their natural habitats and visitors are en caged. The theme of the Safari Park will be biome-based, thus making the visitor aware of a natural condition where different species coexist.

Area Requirements:

The area for the proposed Safari Park will be 150-200 acres. This will depend on the number of animals the Safari Park houses. With the increase in the number of animals, the area of the park will be increased in order to ensure the fulfillment of the biological requirements of the animals housed therein.



Location of the park:

The Safari Park will be an extension of the Kamla Nehru Zoological Garden, but will be located on the outskirts of Ahmedabad city. The proposed site for the Safari park will be away from the hustle and bustle of the city.

Status of the land:

The land for the Safari Park will be made available to the zoo authorities by the government. The present zoo director has already made an appeal to the AMC for more land, about 200 acres for the proposed Safari Park. Allotment is expected in about 2-3 years. The present zoo is to become an educational zoo.

SAFARI PARK

Collection plan:

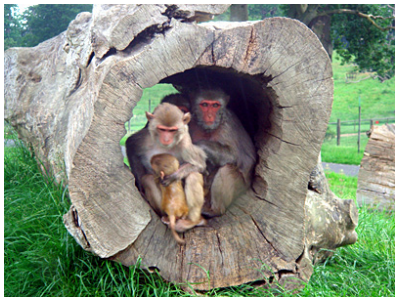
Gujarat is the only natural habitat of the Asiatic lions. Keeping this context in mind the Safari Park will house the Asiatic lions along with other compatible species.

The animals under the collection plan will be selected and be kept in viable and compatible groups.

The park intends to house;

Large carnivores like

1. Asiatic lions - small viable prides,
2. Leopards - small numbers,
3. Tiger
4. Cheetah
5. Bear



Herbivores like

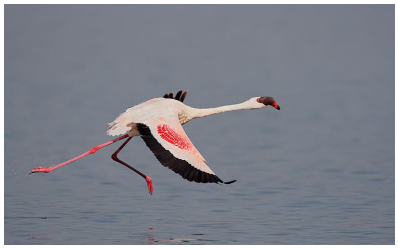
1. Bison – small herds
2. Deers like chital, sambar, etc – small herds
3. Primates like common langur, etc – small troops
4. Four horned antelope

and also birds and reptiles that are indigenous to the park land.

The collection plan will be formulated in a way that the park is not overpopulated by any species and will maintain the quality of its environment. In order to maintain hygiene and ensure ease of management, carnivores will be fed in feeding cubicles, preferably away from public scrutiny.

The animals will also be provided with adequate number of drinking water points with a running supply of potable water. These water points will be naturalistic and designed in a way to merge with natural environment.

Animals, mainly carnivores will be brought into night chambers at night for security and observation.



Landscape of the park:

SAFARI PARK

The park will be sited amidst the open lands to provide a natural setting for the animals and the visitors to view them more closely.

The vegetation at the Safari park will be indigenous in nature and its density will be regulated in accordance with the requirements of the species housed in. Adequate tree cover, shelters and withdrawal areas will be provided to its residents.

The Safari Park will be surrounded by a suitable peripheral fence/ moat to avoid escape of animals from the defined territory.

There shall be large water bodies, artificially created mounds/ hillocks (if necessary) and large forested areas.

The entire park complex will be bounded by a 2m high compound wall. The setting would be as close to nature as possible. The enclosures would be bounded by a moat or fence.`

Vision:

1. Center for research and training in conservation of wildlife.
2. Model for innovative integration and alignment of zoological conservation programs.
3. Organization engaging diverse audiences in conservation outcomes.
4. Collaborative efforts in restoration of ecosystems, wildlife and biodiversity.
5. Work towards animal well-being and application of the same to conservation.

This facility is to function as a cluster of interconnected facilities and landscapes that provide a dynamic environment for interactive life-long learning. It is preferable for this to be oriented toward the interior of the Safari and intended to become a central hub for visitors of all ages to learn about the Safari and its exhibits as well as the Safari's wildlife and

SAFARI PARK

Safe activities to engage toddlers in exploration and experimentations and project areas where children can participate in activity oriented workshops and other creative activities.

A conservation exhibit gallery with rotating exhibits could also be featured.

A conservation/information centre should ideally:

- Offer a venue for changing experiences and exhibits to attract new and repeat visitors.
- Add exhibits and other learning environments so that visitors have access to a fuller zoo experience.
- Provide opportunities for contact or close association with animals, particularly in ways that will engage young children.
- Provide an amphitheater, featuring demonstrations of the natural behavior of birds and other animals. The flexible nature of the amphitheater should also allow for other programs. No live animals shall be used for these demonstrations. Instead interactive multimedia presentation would be featured.
- Encourage personal interaction between Safari staff and visitors, as well as among Safari visitors themselves.
- Provide opportunities for the exhibition of large animals that are difficult to display elsewhere in zoos.
- Help visitors understand how and why most of the zoo is organized ecologically, according to different biome rather than taxonomic divisions.

Buildings:

All buildings to be one or two stories, and within the height limit for single family zoning. Area and volume of the building is to be restricted to the minimum. Some of the building may have

Family Science Learning Centre:

A highly active and flexible space, where visitors will gain a view into behind the scenes activities and conservation projects at the Safari and in different biome of the world.

Conservation Exhibit Gallery:

With rotating exhibits, it should allow for an all-weather experience.

Other smaller structures include an amphitheater stage and animal holding.

Barriers:

Barrier-free accessibility. Safety barriers are required for protection and well being.

Significance of Safari Park:

The Safari Park is becoming crucial in many ways. It provides an opportunity to:

- Experience the true characteristics of the species
- Allow the animals to conform to their typical behavioral patterns as much as possible within a captive environment
- Create awareness and sensitivity through near-to-direct experiences

With the emphasis now on conservation and therefore the need to integrate the activities of the zoo with all aspects of conservation breeding, Safari has the potential to promote and encourage conservation breeding.

e ENRICHMENT DEVICES

Animals housed in a barren environment generally show an overall decrease in interaction with the environment. This comes to expression in a variety of symptoms like the animals lie down, sleep more, and spend significantly more time sitting.

To prevent the development of such states - boredom and depression in captive animals, a successful enrichment should be provided in their enclosures to enhance their active character of behavior such as exploration, manipulation, play, and social interaction.

The zoo presently, is exploring and practicing various innovative ideas to provide better enrichment devices to its residents and encourage them to behave more naturally. By doing so, the zoo aims to;

1. Increase the behavioral gamut of its captive population
2. Reduce abnormal behavior characteristic of wild animals in captivity
3. Encourage positive utilization of enclosure space – horizontal and vertical
4. Enhance the ability of the animal to cope with novelty - make their activities more playful
5. Prepare the animal for eventual re-introduction programs
6. Enable visitors to learn more about the animal - its natural behavior and habits

f TRAINING PROGRAM

The Training programs will take place at two levels:

1. **Internal (for the staff):**
   The training program will be held for the staff members in order to advance their career, to regularly update them on the internal issues.
   The staff will also be made aware of the developments and inputs of technologies.
   In case of inadequate human resources, the zoo can offer volunteering opportunities and programs for school students as well as adults. Applications can be invited and selected persons can undergo an orientation/training program.

2. **External (for the visitors):**
   The visitors that are targeted can be categorized as the teachers and persons from educational field, interested volunteers from the city, children, adults and parents.
   Workshops (short term and long term) for teachers can be offered in order to provide them with the opportunity to participate in an active learning experience, to increase their skills to enhance classroom learning with innovative activities.

Zoos are not only visited as part of family groups, but also as 'students groups' ranging from kindergarten students to students at the university level. The range of educational opportunities offered by a zoo visit is inexhaustible. To provide facilities and services to optimize the opportunities requires planning both on the part of the school authorities and the zoo authorities. Also summer training programs can be organized for teenagers.

These training programs can take place either at the Interpretation centre, Multimedia centre or in the open.

g AUDIO TOUR

Concept:

This function will provide regular information in terms of recorded spoken commentary to the visitors about the various areas and segments within the zoo with the help of earphones, which will be given to them at the starting point.

Advantages:

- It will provide background, context and information on the walking tour describing points of interest.
- It will offer instantaneous information to the visitors, which would help them to understand along with the written matters at every enclosure and junction.
- The recorded commentary will briefly describe and provide the significance of the particular place or the species.
- It will guide them on the directions as well as the utility locations.
- This function can be effectively used by visitors who may not be able to read or decipher the written information easily.
- It will give information without distracting the visual aspect of zoo.

At the beginning of the tour all the visitors will be provided with the earphones and all they will have to do is to choose their preferred language.

At every junction, path and enclosure, they will be made aware about the significance of that particular place or species.

Also the user can select a short piece of spoken information by typing in a number that may be displayed by a picture of animal.

AUDIO TOUR

Components:

Audio tour will be available in Hindi, Gujarati and English languages. Users will have to enter a number and select the language.

Disadvantage:

With the use of this function, some of the natural sounds may be lost to the visitors. Hence recommendations for its use in parts will be given.

3

DAY TO DAY MAINTENANCE

a Animal Management

b Daily Management

c Daily Management Feed chart

d Daily Management Summary

e Seasonal Management

f Veterinary Services

a ANIMAL MANAGEMENT

Management of animals is one of the most important aspects of zoo management. Ahmedabad zoo houses around 2000 animals - birds, mammals and reptiles, of around 200 different species. These animals are housed in approx. 250 enclosures of varied sizes. These enclosures are further divided into 19 sections for an organized animal management.

The present set-up of the management team is hierarchical starting from zoo director running down to the animal keeper. The present management setup is as follows.

Zoo director (1)
Veterinary doctors (2)
Live stock inspector (1)
Head animal keeper (2)
Asst. Head animal keeper (1)
Animal keeper (30)

Animal Keeper	**Number**
Section	19
Weekday leave	4
Night duty 4pm – 12am	1
Kitchen	2
Elephant keeper/ Mahavat	3
General	1
Total	**30**

Animal management includes,

1. Daily management
2. Seasonal management
3. Veterinary services

b DAILY MANAGEMENT

Daily management of animals includes various activities like;

a. Food supply
b. Cleaning
c. Security
d. Health care supervision, etc.

a. Food supply system

It includes - Appointing agencies, collection of food, checking food quality, preparation of food, distribution of food, collection and disposal of left-over.

Appointing agencies

Every year the zoo invites tenders from agencies who are interested in supplying food materials to the zoo. Out of the tenders received they select agencies and appoint them on an annual contract, for the supply of the same. The selection is based on the technical competence and quality as well as financial bid.

Collection of food

The 6 different types of food supplied are

i. Fruit and vegetables
ii. Dairy products, bread and honey
iii. Grass
iv. Grains
v. Fish
vi. Meat

Except grains, all others are delivered on a daily basis to maintain freshness and quality. They are collected and weighed by the store-keepers on delivery. The store-keeper also makes a note of the quantity and checks the quality of the food supply in the presence of veterinary doctors, head animal keepers and animal keepers. In case of grains, they are delivered by appointed agency seasonally and are stored at the granary.

DAILY MANAGEMENT

Checking the food

All food supply is firstly checked by store-keepers on delivery. It is then checked by veterinary doctor in the presence of head animal keepers and animal keepers and is allowed for further processing only after their approval. In case the stock quality is not upto the mark or of bad quality - stale/rotten, it is sent back to the agency and is replaced thereby. The supervision of food supply by this team – veterinary doctor, head animal keeper and animal keeper ensures food of good quality and hygiene to the animals. It plays an important role in animal health care as it prevents a lot of diseases and infections.

Preparation of food

Once, food quality is approved by the doctors, it needs to be prepared. Different animals have different food requirements and so the food is then prepared to suit their requirements.

i. Fruits and vegetables

There is a huge variety of fruits and vegetables like apple, chickoo, banana, tomatoes, cabbage, potatoes, etc that are served to the animals. Out of these the seasonal fruits and vegetables like watermelon, brinjal, etc are served only when available.

The stock is then cut into pieces – small and big, as per animal requirements. E.g., sugarcane is cut into small pieces for birds whereas it is cut into long pieces for elephants. These pieces are then mixed according to the animal diet requirements and made ready to be served. The fruits and vegetables are collected, checked and stored at the kitchen.

ii. Dairy products, bread and honey

Milk is mixed with bread and in some cases with honey as required by the animal. This food is prepared - made ready to be served to the animals, stored at and distributed from the kitchen.

DAILY MANAGEMENT

iii. Grass

Grass needs no preparation for being served. It is sorted according to animal diet requirements and stored at grass store.

iv. Grain

Whole grains are served to some birds. But some animals require flour, soaked grains or cooked food that is prepared at the kitchen. The kitchen has huge stove and a set of utensils to facilitate the same. There is no storage of cooked food but the stock of grains is stored at the granary.

v. Fish

Fish is stored at the cold storage near the kitchen. Also at the kitchen the fish is fried, as per some animal diet requirements. e.g. Cat

vi. Meat

The meat delivered from AMC slaughter-house by meat vans and is further processed, i.e., bones and flesh are separated at the meat supply room. The flesh is cut into pieces and then weighed and filled in buckets in quantities required by animals. Some flesh is crushed with the help of machine – into small pieces for smaller mammals and into even smaller pieces and for birds. The meat is generally not stored. For the time it is processed, there is a separate room, away from the other stores.

Distribution of food

The system for food distribution is very organized. Each keeper is allotted a section. Incase any keeper is absent, his duty is taken up by other one. The zoo has recently provided containers with name of the animal on it. The store-keeper and animal keeper fill in food materials of allotted sections in the respective container of the animal. The animal keeper carries the container to his allotted section by cycle or cart. Once at the enclosure, he places the food in feed container/ feeding chamber of the animals.

DAILY MANAGEMENT

b. Cleaning

Cleaning system includes cleaning of animal enclosures and other areas of the zoo like visitors amenities, administration block, walkways, etc.

Cleaning of enclosures

As mentioned in the food supply system, each animal keeper is allotted a section. These keepers regularly clean the enclosures of the sections allotted to them. Incase a keeper is absent his task is performed by other one.

The water pools in the enclosures are also cleaned by the animal keeper every 3-4 days and incase of some animals like hippos they are cleaned every alternate day. These water pools are cleaned with bleaching powder or any other medium prescribed by the veterinary doctor. Incase there are blockages in the outlets of the pools they are cleaned by the sweeper. The faeces of the animals are collected and cleaned manually by the animal keeper and he disposes it along with other wastes.

Incase of big enclosures the keeper cleans the feeding chamber while the kraal is cleaned by the sweeper. The keeper collects the litter and fills them in bins, which are then emptied into open pit.

Cleaning of other areas

Sweepers clean other areas of the zoo like pathways, rest houses, etc. they collect garbage fill them in bins, which are then emptied into the open pit.

All waste is collected in the bins that are transported to the open pit for waste collection. The solid waste management department of AMC further collects this collected waste from the zoo by special bins.

DAILY MANAGEMENT

c. Security system

The security guards are placed at different points throughout the zoo. These guards are allotted some sections and are responsible for the security of animals and visitors therein. They give keys to the head animal keeper every morning and when the keys are returned to them after the food supply - morning and evening, they recheck all enclosures, ensuring they are properly locked.

Besides checking the locks of enclosures, the security also supervises animals and incase there is a change in its behavioural pattern or accident, they report immediately to the head animal keeper who takes charge of the situation. If the situation is beyond the scope of the head animal keeper, he reports it to the veterinary doctor who then consults the zoo director. The security guards also ensure the security of the visitors visiting that particular section. They also keep a check on visitors and prevent them from feeding, teasing or disturbing the animals.

d. Animal health care supervision

A lot of care is taken of the animals at this zoo. Doctors, head and asst. head animal keepers take regular rounds of sections, observing animals carefully. Incase the animal is sick, depressed, injured or dead they immediately report to the veterinary doctor, who further takes the animal under supervision. Animal keepers keep a check on their section animals round their duty time (8 hours).

Also proper care is taken during the food supply to the animals. Doctors check food materials supplied and also mix necessary nutrient supplements – minerals and vitamin tablets/ liquid in food or water to be consumed by the animal. In this way, the zoo team ensures good health to its residents and prevents spread of diseases. Also, there is a regular check-up of animals and testing of their faecal and blood samples scheduled by veterinary doctors.

DAILY MANAGEMENT

Collection and disposal of left over

Once food is placed in the feeding chamber the animal eats enough to fill itself and the rest is left over. The animal keeper collects this left-over food from the feeding chamber after 2-3 hours and notes the quantity of it. This helps to record daily consumption of the animal. The left-over is mostly collected from feeding chambers of big and medium-sized carnivores like lions, tigers, leopards, etc. and disposed off. The left-over in other enclosures is disposed and cleaned off during the consecutive-day cleaning.

C DAILY MANAGEMENT FEED CHART

No	Name of Mammals	Feed	Quantity	Timings
1	Lion	Buffalo meat	8-10 Kg.	10.30 am
2	Lioness	Buffalo meat	7-9 Kg.	10.30 am
3	Tiger	Buffalo meat	8-10 Kg.	10.30 am
4	Tigress	Buffalo meat	7-9 Kg.	10.30 am
5	Panther	Buffalo meat	2-3 Kg.	10.30 am
6	Wolf	Goat meat	2 Kg	10.30 am
7	Hyena	Buffalo meat	1.5-2 Kg.	10.30 am
8	Jackle	Goat meat	500-700 gm	10.30 am
9	Jungle cat	Chicken	800-1000gms	10.30 am
10	Leopard cat	Chicken	500-750 gms	10.30 am
11	Himalayan Bear	Milk 2lit, rice 500gms, roti of gram flour 250gm fruits, bread		9 am, 2.30 pm
12	Sloth Bear	Milk 2lit, rice 500gms, roti of gram flour 250gm fruits, bread		9 am, 2.30 pm
13	Binturong	Milk, Bread and Fruits	300 ml , as per requirement	9 am, 2.30 pm
14	Siamese cat	Minced boiled meat, fried fish	50-100gms 200-300gms	9 am, 2.30 pm
15	Ratel	Goat meat with bone, Papaya, Milk, Bread	500-1000gms,250 gms.200ml.2-3 slices	9 am, 2.30 pm
16	Palm civet	Milk, Banana, Papaya, Bread	200ml, Banana 4-5, 250 gms, 4-6 slices	9 am, 2.30 pm
17	Manipuri deer	Dry Concentrate feed, Dry bay, green folder	1.5-2 Kg.adlib,3.5 kg Dry concentrate(gram pieces, maiz pieces, ground nut cake, cattle feed	7.30 am, 5 pm
18	Blue bull	Dry Concentrate feed, Dry bay, green folder	1.5-2 Kg.adlib,3.5 kg Dry concentrate(gram pieces, maiz pieces, ground nut cake, cattle feed	7.30 am, 5 pm
19	Spotted deer	Dry Concentrate feed, Dry bay, green folder	600-900gm adlib,2-5 kg	7.30 am, 5 pm
20	Fellow deer	Dry Concentrate feed, Dry bay, green folder	600-900gm adlib,2-5 kg	7.30 am, 5 pm
21	Black buck	Dry Concentrate feed, Dry bay, green folder	400-600gms adlib,2-3 kg	7.30 am, 5 pm
22	Hog deer	Dry Concentrate feed, Dry bay, green folder	600-900 gms adlib,2-4 kg	7.30 am, 5 pm
23	Samber	Dry Concentrate feed, Dry bay, green folder	1.5-2 kg adlib, 3-5 kg	7.30 am, 5 pm
24	Monkey	Soaked grams, Banana,papya and seasonal fruits and vegetables	150-200 gms, 2-5 no. 200 gms,200-300 gms fruits and vegetables	9 am, 2.30 pm
25	Porcupine	Pulses math, grams, seasonal vegetables	100-150 gms.500-700 gms	9 am, 2.30 pm
26	Squirrel	Seed grains and fruits and vegetables	50-100 gms of mix	9 am, 2.30 pm

DAILY MANAGEMENT FEED CHART

No	Name of Mammals	Feed	Quantity	Timings
27	Otter	Fish, carrot	2-2.5 kg and 2 pieces	9 am, 4 pm
28	Mouse deer	Soaked grams, seasonal vegetables, leaves	20-40 gms, 80-100 gms, adlib	10 am, 4 pm
29	Elephant	Cooked rice, ragi flour, kulthi grains, jaggery, coconut, sugar cane, green grass, leaves bark	cooked food 5-8 kg, jaggery 2-3 kg. 1 piece coconut, 10-15 kg S.cane, 100-150 kg greens and bark leaves adlib	10 am, 4.30 pm
30	Wild boar	Soaked grams math, seasonal fruits and vegetable	1.5-2 kg and fruits and vegetable 1-2 kg.	10 am, 4.30 pm
31	Hippopotamus	Dry Concentrate vegetable, green grass	5-7 kg,2-3 kg 50-100 kgs	10 am, 4.30 pm

Io	Name of Birds	Feed	Quantity	Time
	King vulture	Buffalo meat	800-1000 gms	10.30 am
	Greater flamingoes	Jowar bajra, Socked wheat bran and prawn powder	Adlib	8 am, 2 pm
	Stork	Buffalo meat	1-1.5 kg	10.30 am
	Pigeons	jawar bajra grains	Adlib	10.30 am
	Duck	Socked prawn powder and wheat bran,jawar bajra, greens	Adlib	10.30 am
	Love birds and Budgrigars	Cannery black seed, kang cheena (fine grains), greens	Adlib	10.30 am
	Cockatiels	Cannery black seed, kang cheena (fine grains), greens	Adlib	10.30 am
	Parrots	Sun flower seeds, rice paddy, ground nut with cover,grams, hard fruits and vegetables	Adlib* Parrots food mix (sunflower seeds, paddy, grams, ground nut with cover)	10 am, 2 pm
	Macaw	Sun flower seeds, rice paddy, ground nut with cover,grams, hard fruits and vegetables	Adlib* Parrots food mix (sunflower seeds, paddy, grams, ground nut with cover)	10 am, 2 pm
0	Cockatoos	Sun flower seeds, rice paddy, ground nut with cover,grams, hard fruits and vegetables	Adlib* Parrots food mix (sunflower seeds, paddy, grams, ground nut with cover)	10 am, 2 pm
1	Lorikeets	Sun flower seeds, rice paddy, ground nut with cover,grams, hard fruits and vegetables and milk, bread and citrus fruits	Adlib and milk 20-50 ml with 1-2 bread slice and citrus fruits	10 am, 2 pm
2	Eclactus parrot	Parrot food mix and fruits vegetable with sugar cane pieces	adlib	10 am, 2 pm
3	Grey honbill	papaya and boiled chicken	adlib	10 am, 2 pm
4	Swan	Soaked wheat bran with prawn powdwe, jwar bajra and greens	adlib	10 am, 2 pm
5	Rosy pelican	fish	500-900gms	10 am
6	Spoon bill, Ibis, Night heron	Minced buffalo meat and fish	adlib per bird appx 100-150gms	10 am, 4 pm

DAILY MANAGEMENT FEED CHART

No	Name of Birds	Feed	Quantity	Time
17	Koel	papaya	50-100 gms	10 am, 4 pm
18	Emu, Cassowary	Soaked grams and math, green vegetables banana,bread	1-1.5 kg soaked grains and others fruits vegetables 1 kg.	10 am, 4 pm
19	Peacock	Jwar bajra, greens	100-200gms 50-100 gms	10 am, 4 pm
20	Partridge	Jwar bajra grains and greens	25-50 gms10-20 gms	10 am, 4 pm
21	Doves	Cannery black seed, jawar bajra	20-50 gms	10 am, 4 pm
22	Pheasants	Jowar bajra grains and greens	40-80 gms	10 am, 4 pm
23	Munia, Zebra finches	Cannery black seeds, Kang cheena fine grains and greens	5-10 gms	10 am, 4 pm
24	Bulbul, Mynah	Papaya and banana and other seasonal fruit	20-50 gms	10 am, 4 pm

No.	Name of Reptiles	Feed	Quantity	Time
1	Crocodile	Buffalo meat	2-5 kg twice a week	10 am
2	Gharihal	Fish	2-4 kg	10 am
3	Tortoise stared	Soaked grams, math and greens	40-100 gms	10 am
4	Giant tortoise	Soaked grams, math and greens	500-1000 gms	10 am
5	Water monitor,	Fish and minced meat	200-300 gms each	10 am
6	Iguana	Soaked grams,math, shoe flowers,fruits	20-30 gms adlib	10 am
7	Turtle	Fish	adlib	10 am
8	Snakes	White mice,rat, G.pig, rabbit	As required once a week	10 am

d DAILY MANAGEMENT SUMMARY

	Activity	Personnel performing the activity	Place where the activity is performed	Time
General management	Mark attendance in daily attendance sheet	All animal keepers	Administration office	8.00 am
	Collect keys from the security	Head animal keepers, Asst. head animal keeper	Gate	8.00 am, 2.00pm
	Meet for section allocation	All animal keepers	Kitchen	8.00 am, 2.00pm
	Allocate sections, distribute keys	Head animal keepers, Asst. head animal keeper	Kitchen	8.00 am, 2.00pm
	Check locks on enclosures	Security guards	Enclosures	11.00 am, 5.00 pm
	Meet and return keys	All animal keepers	Gate	12.00 pm, 6.00 pm
	Lunch break			12.00 - 6.00 pm
Food Supply	Collect food materials from assigned agencies	Store keepers	Kitchen, meat room, granary*	8.00 am
	Weigh food supply and check food quality	Keepers	Kitchen, meat room, granary*	8.00 am
	Check food quality	Veterinary doctors, Store keepers, Head animal keepers, Asst. Head animal keeper	Kitchen, meat room, granary*	8.00 am
	Prepare food	Keepers	Kitchen, meat room	8.00 am onwards
	Supervise the keeper's work and observe animals' health, behaviour, etc	Head animal keeper, Asst. Head animal keeper	Allotted set of sections	8.30 am onwards, 2.30 pm onwards
	Collect and distribute food materials	Animal keepers	Kitchen, meat room, granary, grass store	Ref. Feed chart
	Serve food to animals	Animal keepers	Enclosures – feeding container/chambers	Ref. Feed chart
	Lock the enclosures	Animal keeper	Enclosures	After serving food
	Collect the left over	Animal keeper	Feeding chambers of big carnivores	11.30 am

* only when grains are delivered by the agency

DAILY MANAGEMENT SUMMARY

	Activity	Personnel performing the activity	Place where is the activity performed	Time
Cleaning	Clean visitor amenities and pathways	Sweepers	Visitor areas, pathways and administration block	8.00 am onwards
	Clean enclosures – section-wise	Animal keeper, Sweepers (big enclosures)	Allotted enclosures	8.30 am onwards
	Supervise the keeper's work and observe animals' health, behaviour, etc	Head animal keeper, Asst. Head animal keeper	Allotted set of sections	8.30 am onwards, 2.30 pm onwards
	Collect litter in dustbins	Animal keeper, Sweepers	Enclosures, visitor amenities and administration block	After cleaning
	Lock the enclosures	Animal keeper	Enclosures	After cleaning
	Transport and dispose litter	Sweepers	Open pit	After collection of litter
	Collect waste from the open pit using special bins	Solid waste management department of AMC	Open pit	12.00 pm
Gardening	Gardening	Gardener, garden labourers	Allotted areas	8.00 am onwards

e SEASONAL MANAGEMENT

Ahmedabad being a city of extreme climates, measures are to be provided to protect the animals from the harsh climate. Various indigenous techniques are explored and practiced by the zoo team to provide maximum comfort to its residents. Ahmedabad zoo has also been awarded a 'Certificate of Appreciation' by Central Zoo Authority (CZA) for its innovative nature of work.

Winter

Winters in Ahmedabad are usually pleasant, except for a month, when temperatures go down to upto 5°C. Following provisions are made to protect the animals from the cold weather and the winds.

1. Heaters for big cats like lions, tigers, leopards, etc.
2. Brooders for birds
3. Brooders for reptiles

Summer

Summer is the longest season in Ahmedabad. It is very harsh and dry. Summer afternoons usually have very high temperatures of around 40-45°C and they temperatures often hit 47°C. Thus following provisions become very important for animals and their protection from harsh sun and hot-dry winds.

1. Aircoolersforbiganimalslikelions,tigers,leopards,bears,etc.
2. Earth Heat Tube Exchange (ETHE) system for tigers
3. Green curtains and moist khas tatties on enclosure surfaces to keep the interiors cool and humid
4. Green nets over enclosures of hippos and elephants to provide shade and protect them from skin burns
5. Green nets on enclosure surfaces of birds
6. Oral re-hydration therapies to prevent dehydration in animals
7. Water is sprinkled in enclosures to keep them cool and provide comfort to the animals against hot-dry winds

SEASONAL MANAGEMENT

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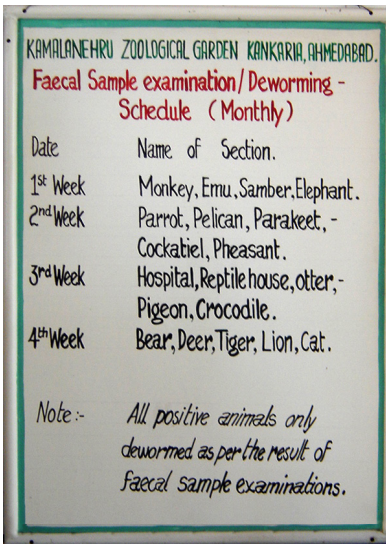
f VETERINARY SERVICES

The zoo gives round the clock veterinary services to the animals. The veterinary hospital is well equipped with facilities like operation theatre, laboratory, doctor rooms, conference room, indoor – outdoor patient wards and rescue center. The veterinary doctors give regular check-ups to the animals and treatments (if necessary). If needed the animals are hospitalized in the hospital as indoor/outdoor patients and treated thereafter.

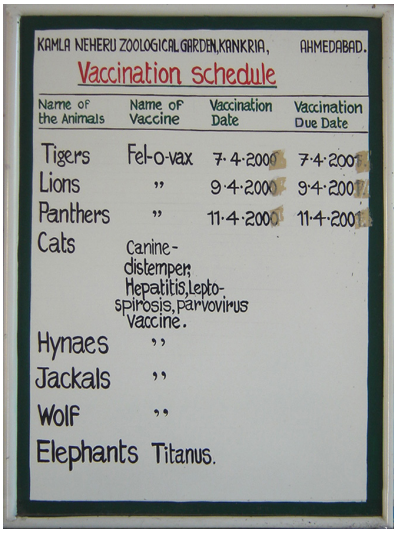

KAMALANEHRU ZOOLOGICAL GARDEN KANKARIA, AHMEDABAD.

Faecal Sample examination / Deworming - Schedule (Monthly)

Date	Name of Section.
1st Week	Monkey, Emu, Samber, Elephant.
2nd Week	Parrot, Pelican, Parakeet, - Cockatiel, Pheasant.
3rd Week	Hospital, Reptile house, otter, - Pigeon, Crocodile.
4th Week	Bear, Deer, Tiger, Lion, Cat.

Note :- All positive animals only dewormed as per the result of faecal sample examinations.

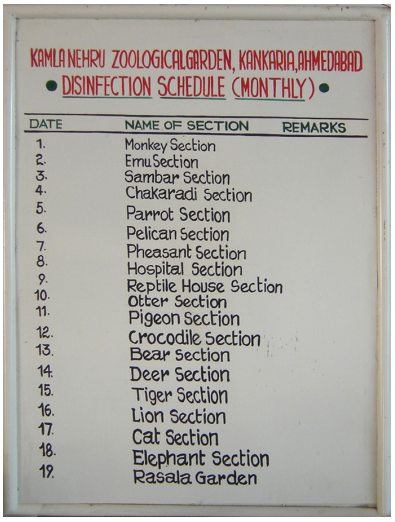
Besides the hospital facilities, the animals in the zoo (display and off-display) are given vaccines, medicines, anti-stress, anti-bacterial, anti-biotic, deworming, disinfection and other treatments seasonally/ annually as and when prescribed by the veterinary doctors. The animals are also given supplemental nutrients - minerals and vitamins mixed with food or water as prescribed by the doctor every fortnight/ month. These supplements complete nutrition requirements of animals for their life activities and avoid nutritional deficiency.


KAMLA NEHRU ZOOLOGICAL GARDEN, KANKRIA, AHMEDABAD.

Vaccination schedule

Name of the Animals	Name of Vaccine	Vaccination Date	Vaccination Due Date
Tigers	Fel-o-vax	7-4-2000	7-4-2001
Lions	"	9-4-2000	9-4-2001
Panthers	"	11-4-2000	11-4-2001
Cats	Canine-distemper, Hepatitis, Lepto-spirosis, parvovirus Vaccine.		
Hynaes	"		
Jackals	"		
Wolf	"		
Elephants	Titanus.		

The doctors also conduct regular health check-ups of the animals and collect faecal and blood samples for the same. They have regular schedules formulated for these tests and check-ups at their laboratory. Also history of (imperative) animals is maintained on records.


KAMLA NEHRU ZOOLOGICAL GARDEN, KANKARIA, AHMEDABAD

• DISINFECTION SCHEDULE (MONTHLY) •

DATE	NAME OF SECTION	REMARKS
1.	Monkey Section	
2.	Emu Section	
3.	Sambar Section	
4.	Chakaradi Section	
5.	Parrot Section	
6.	Pelican Section	
7.	Pheasant Section	
8.	Hospital Section	
9.	Reptile House Section	
10.	Otter Section	
11.	Pigeon Section	
12.	Crocodile Section	
13.	Bear Section	
14.	Deer Section	
15.	Tiger Section	
16.	Lion Section	
17.	Cat Section	
18.	Elephant Section	
19.	Rasala Garden	

The doctors use any of following techniques to make the animal unconscious for various purposes like health check-up, vaccination, dressing wounds, etc.

1. Squeeze cage system to hold the animal in place
2. Tranquilization gun/ Air-gun to give anesthesia
3. Distance Drug Dispersal (DDD) instrument

For emergencies and communication, some of the zoo authorities and keepers are provided with the wireless sets to make quick communication with the authorities and take rapid

Part III

MANAGEMENT PLAN

Masterplan Budget

ACTIVITIES TO BE CARRIED OUT IN THE MASTER PLAN

Management Plan (Budget)				
Sr. No	Proposed work (Activities as per Master plan)	Time frame (Yr)	Budget (Rs.)	Sources of funding
1	Nocturnal house	2	10 Cr	AMC/External Grants
2	Aviary	3	50 Cr	AMC/External Grants
3	Antelopes and Antlers	2	03 Cr	AMC/External Grants
4	Carnivores	1	05 Cr	AMC/External Grants
5	Primates	1	07 Cr	AMC/External Grants
6	Entrance gate	6 months	01 Cr	AMC/External Grants
7	Aquarium	3	100 Cr	AMC/PPP/External Grants

AMC - Ahmedabad Municipal Corporation

PPP-Public Private Partnership

The management plan to be adopted is carried out by the following members:

a. **Mayor** : Through the standing committee.

b. **Municipal Commissioner** : Through block estimates and presentations.

c. **Deputy Municipal Commissioner** : By Assisting Municipal commissioner about the context and background.

d. **Zoo Superintendent** : By guiding and coordinating the making of proposal with corresponding authorities.

Part IV

ANNEXURES TO MASTER PLAN

a PRESENT LAYOUT PLAN

b ELECTRICAL LAYOUT PLAN

c STORM WATER LAYOUT PLAN

d ANIMAL COLLECTION PLAN

e FREE LIVING SPECIES

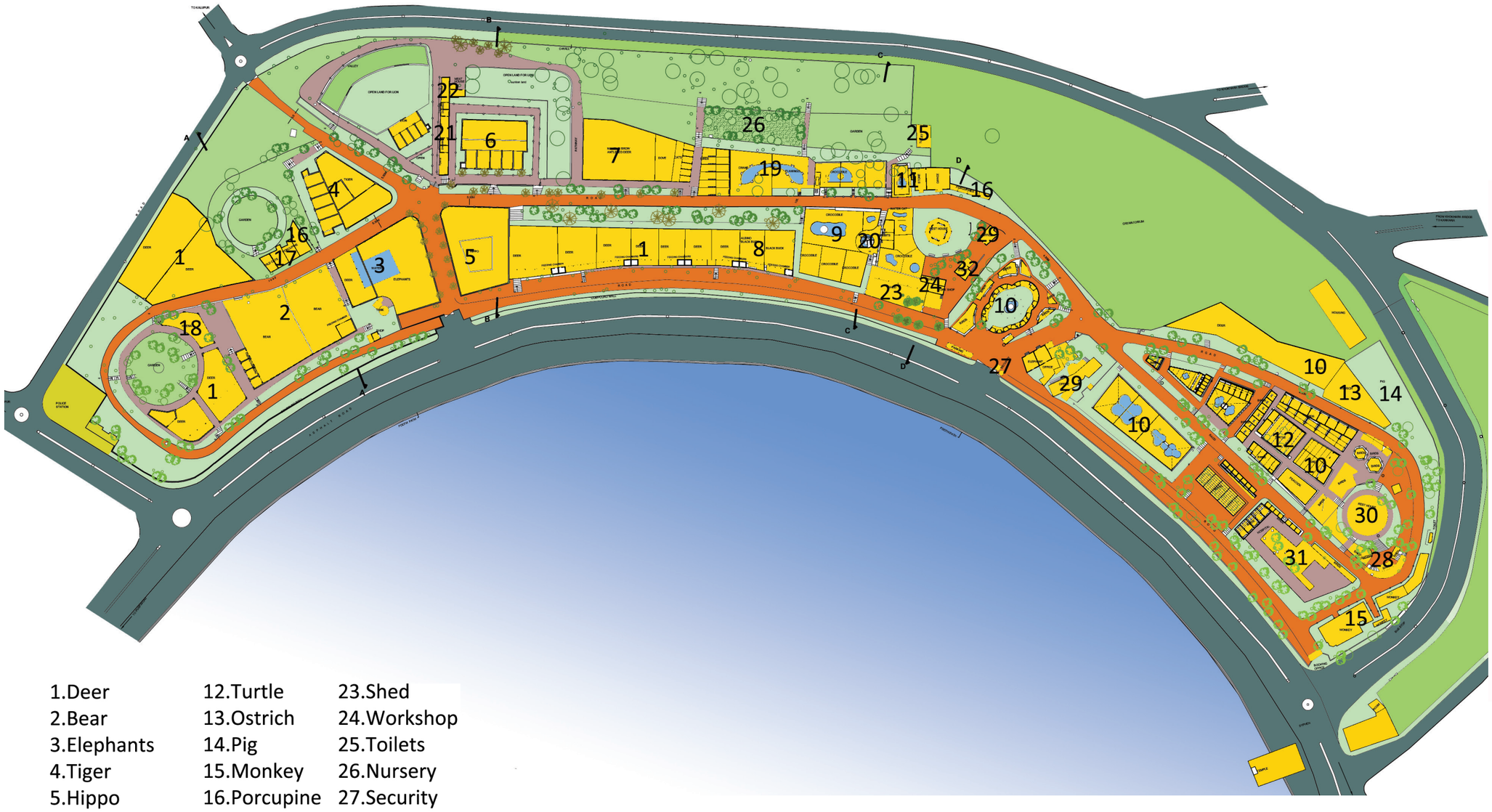
f FLORA AND FAUNA

g STAFFING PATTERN

h BUILDINGS OTHER THAN ENCLOSURES

i ANNEXURES

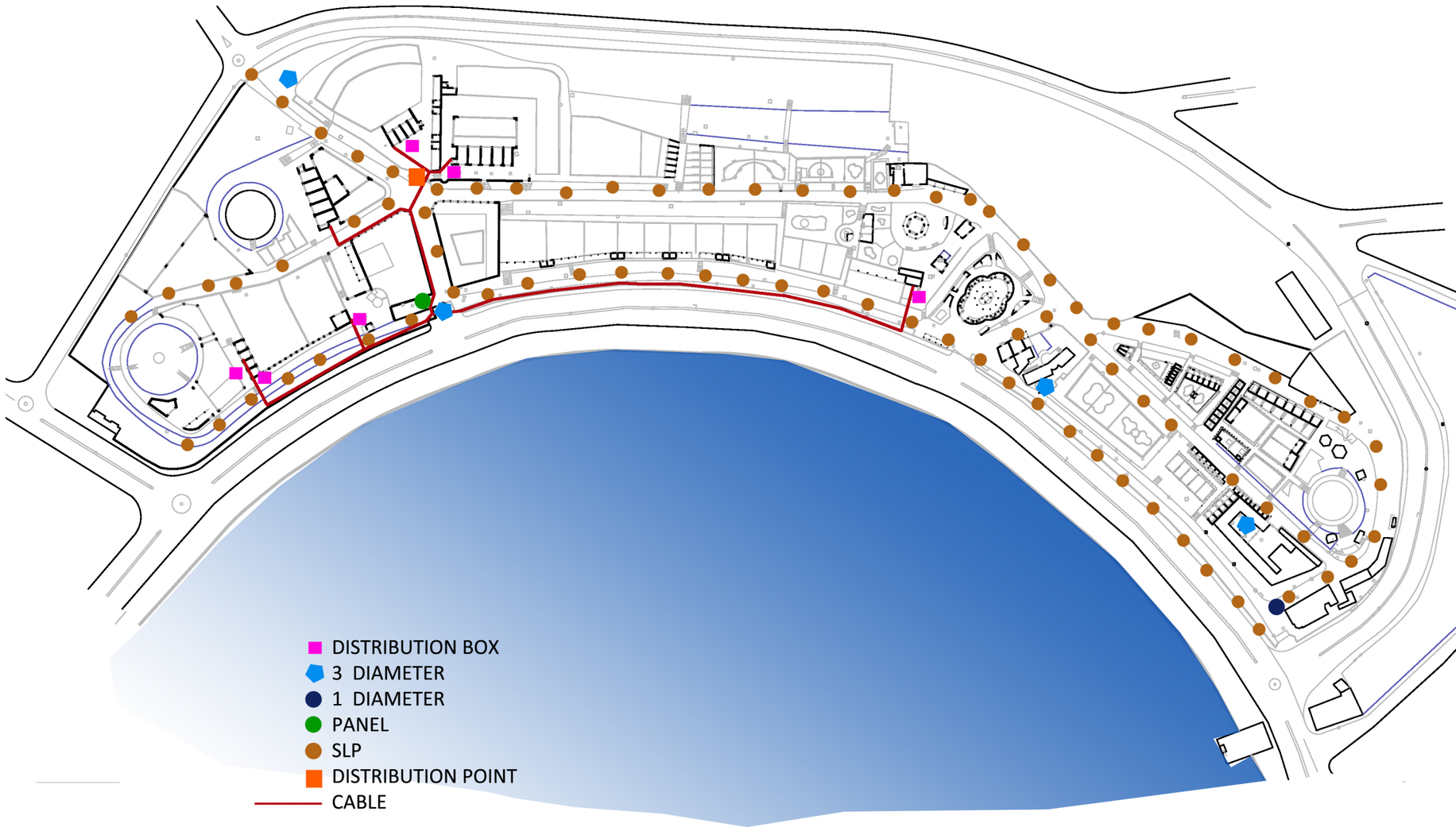
a PRESENT LAYOUT PLAN



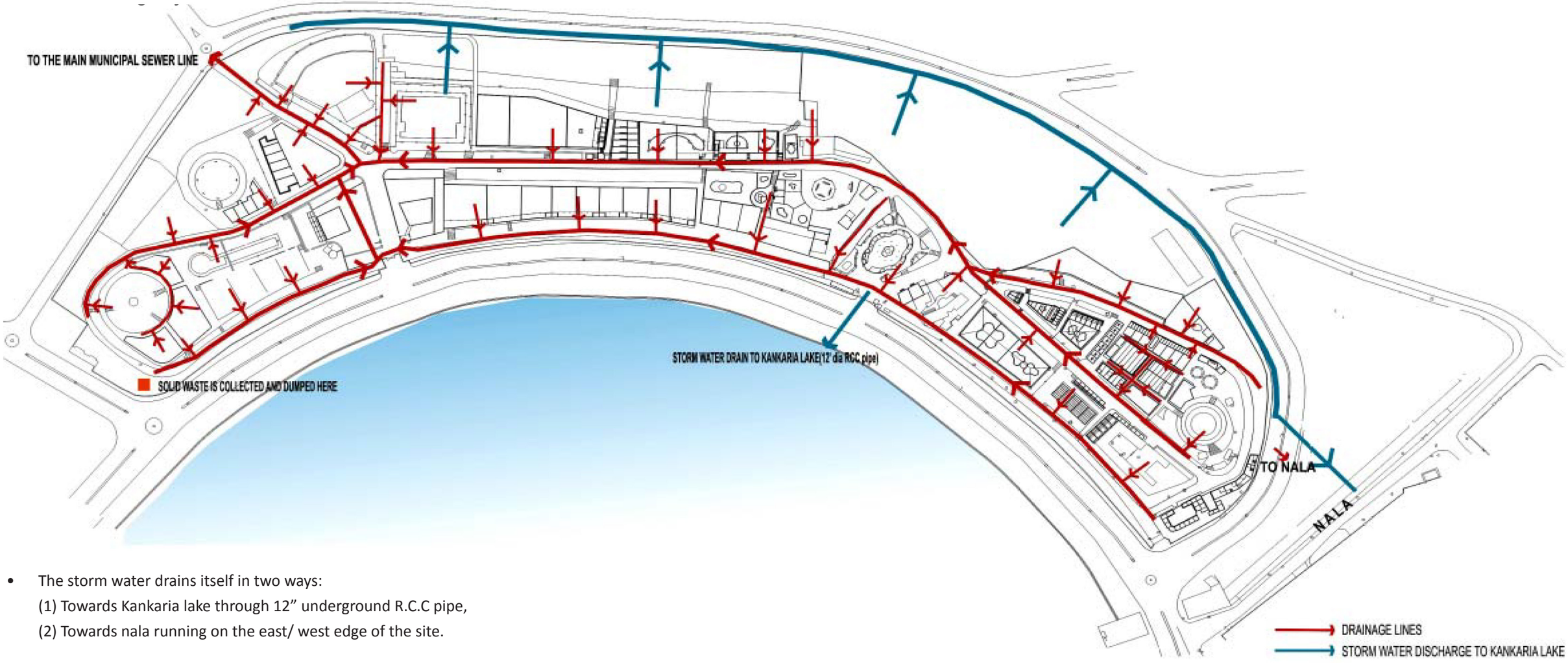
Animal Enclosures	Area(Sq.m)
Elephant	4790
Giraffe+Zebra	5425
Primates	2200
Aviary	6900
Breeding Zone	3314
Reptiles Park	300
Rodents Park	725
Tortoise & Turtle	2980
Otters	1500
Crocodiles	1512
Antelers & Antelopes	2800
Asiatic Lions	2400
Tigers	2400
African Lions	1550
BlackBucks	3985
Kangaroo	2330
Bear	1860
Wild pig	350
Hippo	1800

1.Deer
2.Bear
3.Elephants
4.Tiger
5.Hippo
6.Lion
7.Manipur Brow Antlered Deer
8.Black Buck
9.Crocodile
10.Birds
11.Otter
12.Turtle
13.Ostrich
14.Pig
15.Monkey
16.Porcupine
17.Wild Cats
18.Hyena
19.Crane& Flamingo
20.Watercats
21.Wolf
22.Jackal
23.Shed
24.Workshop
25.Toilets
26.Nursery
27.Security
28.Canteen
29.Office
30.Rest house
31.Hospital
32.Store

b ELECTRICAL LAYOUT SECTION



C STORM WATER DISCHARGE SECTION



- The storm water drains itself in two ways:
  (1) Towards Kankaria lake through 12" underground R.C.C pipe,
  (2) Towards nala running on the east/ west edge of the site.

d EXISITING ANIMAL COLLECTION PLAN

Ahmedabad Zoo

Schedule I

S.N.	Species	Opening stock as on 1/4/2011	During the Year Birth	Acqstn	Sale	Disposal	Death	Closing stock as on 31/3/12
	BIRDS	M F U T	M F U	M F U	M F U	M F U	M F U	M F U T
1	Hawks(Accipitridae)	nil						nil
2	Peafowl (Pavo cristatus)	... ... 30 30	 3				1 2 ..	... ... 30 30
3	Pheasant Peacock (Polyple	nil						nil
	ctron bicalcaratum)							
4	Pigeon Nicobar (Caloenas	... ... 21 21	2					... ... 23 23
	nicobarica pelewensis)							
5	Spoonbill White (Platalea	10 8 1 19	 4					10 9 4 23
	leucorodia)							
	TOTAL BIRDS	10 8 52 70	 9				1 2 ...	10 9 57 76

S.N.	Species	Opening stock as on 1/4/2011	During the Year Birth	Acqstn	Sale	Disposal	Death	Closing stock as on 31/3/12
	MAMMALS	M F U T	M F U	M F U	M F U	M F U	M F U	M F U T
6	Ass Wild Indian-Ghorkhar	nil						nil
	(Equus heminous khur)							
7	Bear Himalayan Black	1 1 2						1 1 02
	(Selenarctos thibetanue)							
8	Bear Sloth	1 1 ... 02					... 1 ...	1 01
	(Melursus ursinus)							
9	Binturong	nil						nil
	(Arctictis binturong)							
10	Black Buck- Krishna Mrig	2 02					1	1 01
	(Antilope cervicapra)							
11	Black Buck- White	6 4 2 12	 2				3 1 ...	5 3 2 10
12	Cat Jungle	nil						nil
	(Felis chaus)							
13	Cat Leopard	1 01					1	nil
	(Felis bengalensis)							
14	Chinkara- Indian Gazella	nil						nil
	(Gazelia gajelia bennetti)							
15	Civet Common Palm	nil						nil
	(Paradoxurus hermaphco-							
	ditus)							
16	Civet Himalayan Palm	nil						nil
	(Pagoma larvata)							
17	Deer Brow-Antlered-Sangai	nil						nil
	Manipur (Cervus eldi eldi)							
18	Deer Swamp	1 01						1 01
	(Cervus duvauceli)							
19	Elephant Indian	... 1 ... 01						... 1 ... 01
	Elephas maximus							
20	Jackal	5 3 1 09	 3				1	5 3 3 11
	(Canis aureus)							
21	Langur Capped	nil						nil
	(Presbytis pileatus)							
22	Langur Common	9 2 ... 11		2				11 2 ... 13
	(Presbytis entellus)							
23	Leopard / Panther	4 4 08						4 4 ... 08
	(Panthera pardus)							
24	Lion Indian	1 1 02						1 1 02
	(Panthera leo persica)							
25	Loris Slow	nil						nil
	(Nycticebus coveang)							
26	Macaque Bonnet	7 1 ... 08					1	6 1 ... 07
	(Macaca radiata)							
27	Macaque Pig Tailed	nil						nil
	(Macaca nemestrina)							

EXISTING ANIMAL COLLECTION PLAN

		Opening stock as	During	the Year				Closing stock
		on 1/4/2011	Birth	Acqst	Sale	Disposal	Death	as on 31/3/12
S.N.	**MAMMALS**	M F U T	M F U	M F U	M F U	M F U	M F U	M F U T
28	Macaque Rhesus	21 22 4 47	 4				1 1	22 23 4 49
	(Macaca mulatta)							
29	Macaque Stump Tailed	nil						nil
	(Macaca speciosa)							
30	Otter Common	1 2 ... 03					1 1 ...	... 1 ... 01
	(Lutra lutra)							
31	Porcupine Bengal	... . 39 39	 3				1	... ... 41 41
	(Hystrix indica)							
32	Ratel	nil						nil
	(Mellivora capensis)							
33	Tiger bengal	1 2 ... 03					... 1 ...	1 1 ... 02
	(Panthera tigris tigris)							
34	Tiger bengal (White)	nil						nil
	(Panthera tigris tigris)							
35	Wolf Indian	nil						nil
	(Canis lupas pallipes)							
	TOTAL	61 44 46 151	 12	2			10 5 ..	59 41 50 150

		Opening stock as	During	the Year				Closing stock
		on 1/4/2011	Birth	Acqst	Sale	Disposal	Death	as on 31/3/12
S.N.	**REPTILES**	M F U T	M F U	M F U	M F U	M F U	M F U	M F U T
36	King cobra	nil						nil
37	Cobra Indian	... . 15 15						.. ... 15 15
	(Naja naja)							
38	Crocodile Long Snouted-	.... . . 04 04						.... 04 04
	Gharial (Gavialis ganget-							
	icus)							
39	Crocodile Marsh (Mugger)	.... 18 18						... .18 18
	(Crocodylus palustris)							
40	Crocodile Salt Water	2 1 ... 03						2 1 ... 03
	(Crocodylus porosus)							
41	Monitor Lizard/ Common In	1 2 ... 03						1 2 ... 03
	dian (Varanus bengalensis)							
42	Monitor Water Lizard	... 1 ... 01					... 1 ...	nil
	(Varanus salvator)							
43	Python Indian-Rock	... ... 6 06		 1				... ...7 07
	(Python molurus molurus)							
44	Snake Russel's Viper	... ... 4 04						... ... 4 04
45	Snake Keelback Checkered	... . 7 07						... ... 7 07
	(Zeno chrophis piscator)							
46	Snake Rat/ Dhaman	... ... 3 03						... ... 3 03
47	Krait	... ... 3 03					 1	... ... 2 02
	TOTAL	3 4 60 67		 1			... 1 1	3 3 60 66

EXISTING ANIMAL COLLECTION PLAN

		Opening stock as	During	the Year				Closing stock
		on 1/4/2011	Birth	Acquisit	Sale	Disposal	Death	as on 31/3/12
S.N.	BIRDS	M F U T	M F U	M F U	M F U	M F U	M F U	M F U T
1	Babbler Common	... ... 4 04					 1	... ... 3 03
	(Turdodies caudatus)							
2	Budgriger	... ... 340 340	 62		 34		 22	.. ... 346 346
	(Melopsittacus undulatus)							
3	Bulbul Red Vented	nil						nil
	(Pycnonotus cafer)							
4	Cannary	nil						nil
5	Cardinal Red Crested	nil						nil
6	Cassowary	1 01						1 01
7	Cebia Black Headed	nil						nil
8	Cockatiel	... ... 368 368	 74		.. . 28	4 4 ...	 17	... ... 389 389
	(Nymphicus hollandicus)							
9	Cockatoo	... . 6 06						... ... 6 06
10	Connure Black Headed	nil						nil
11	Connure Brown Eared	... . 7 07					1	... ... 6 06
12	Connure Jandaya	nil						nil
	(Aratinga jandaya)							
13	Connure Patagonian	5 1 ... 06						5 1 ... 06
14	Connure Peruyian	nil						nil
15	Connure Red Headed	2 1 03						2 1 ... 03
16	Cormorant Little	.... 17 17	 6					... ... 23 23
	(Phalacrocorax niger)							
17	Crane Crowned	1 1 02						1 1 ... 02
	(Grus grus)							
18	Crane Demoseille	nil						nil
	(Anthropoidus virgo)							
19	Crane Sarus	nil						nil
	(Grus antigone)							
20	Crow White	nil						nil
	(Corvus splendens)							
21	Dove rufous turtle	... ... 19 19						... ... 19 19
22	Duck Brahminy-Ruddy She-	nil						nil
	l Duck (Tadorna ferruginea)							
23	Duck Comb	... ... 39 39				2 2 ...	5 6	... ... 24 24
	(Saskidiornis aelanotos)							
24	Duck common	nil						nil
25	Duck Pin Tail	nil						nil
	(Anas acuta)							
26	Duck Spotbill	nil						nil
	(Anas poecilornyncha)							
27	Egret Cattle	.... 12 12	 2					... . 14 14
	(Bubulcus ibis)							
28	Emu	... . 04 04					... 1 ...	... . 03 03
	(Dromaius novaeholladiae)							
29	Finches	... ... 12 12					2	... ... 10 10

EXISTING ANIMAL COLLECTION PLAN

		Opening stock as	During	the Year				Closing stock
		on 1/4/2011	Birth	Acquisit	Sale	Disposal	Death	as on 31/3/12
S.N.	BIRDS	M F U T	M F U	M F U	M F U	M F U	M F U	M F U T
30	Flamingo	... ... 10 10					... 1 ...	... ... 9 09
	(Phoenicopterus roseus)							
31	Fowl Jungle Grey	nil						nil
	(Gallus sonneratii)							
32	Fowl Jungle Red	nil						nil
	(Gallus gallus)							
33	Fowl Painted Spur	nil						nil
	(Gallopardix lunulata)							
34	Fowl Red Spur	1 01						1 01
	(Gallopardix spadiceal)							
35	Goose	nil						nil
	(Anser anser)							
36	Goose Bar Headed	nil						nil
	(Anser indicus)							
37	Goose Canadian	nil						nil
38	Goose Grey Leg	nil						nil
39	Heron Grey	nil						nil
	(Ardea cinevea)							
40	Heron Indian Reef	... . 1 01						... ... 1 01
	(Egretta gularis)							
41	Heron Night	... ... 39 39	 8				 2	... ... 45 45
	(Nycticorax nycticorax)							
42	Heron Pond	nil						nil
	(Ardeola grayii)							
43	Hornbill Common Grey	nil						nil
	(Tockus bitrostis)							
44	Ibis Black	... ... 1 01						... ... 1 01
	(Preudibis papillosa)							
45	Ibis White	.... 30 30	 3			2 2 ...		.... 29 29
	(Thresk ornis acthiopica)							
46	Kite	.... 1 1						... . 1 1
47	Koel	1 ... 2 03						1 ... 2 03
	(Eudynamys scolopaces)							
48	Lapwing Red Wattled	.... 02 02						.... 02 02
	(Vauellus indicus)							
49	Lorry Black	nil						nil
50	Lorry Black Capped	nil						nil
51	Lorry Black Winged	nil						nil
52	Lorry Chattering	3 2 05					1 1 ...	2 1 ... 03
53	Love Birds	... ... 138 138	 7				 15	... .. 130 130
54	Macaw Blue & Yellow	nil						nil
55	Macaw Illiger's	nil						nil
56	Macaw Military	nil						nil
57	Macaw Yellow Collard	nil						nil
58	Moorhen	nil						nil
	(Gallinula chloropus)							

EXISTING ANIMAL COLLECTION PLAN

		Opening stock as	During	the Year				Closing stock
		on 1/4/2011	Birth	Acquisit	Sale	Disposal	Death	as on 31/3/12
S.N.	BIRDS	M F U T	M F U	M F U	M F U	M F U	M F U	M F U T
59	Moorhen Purple	nil						nil
	(Porphyria porphyria)							
60	Moorhen White Breasted	nil						nil
61	Munia Red	nil						nil
	(Estrilda amandava)							
62	Munia Spotted	nil						nil
	(Lonchura punctulata)							
63	Munia Three Colour	... . 1 01						... ... 1 01
64	Munia White Throated	nil						nil
	(Lonchura malabarica)							
65	Myna Brahminy	nil						nil
	(Sturnus pagodarum)							
66	Myna Common	... ... 4 04	 1					... ... 5 05
	(Acridotheres tristis)							
67	Myna Hill	... . 1 01						... . 1 01
	(Gracula religiosa)							
68	Myna Pied	nil						nil
69	Owl Barn	nil						nil
70	Pakin Robin	nil						nil
71	Parakeet	.... 11 11		 1			1 1 ...	... ... 10 10
	(Psittacula eupatria)							
72	Parakeet Alexandrine	.... 47 47	 6				2 4 ...	... ... 47 47
	(Psittacula eupatria)							
73	Parakeet Blossum Headed	3 3 ... 06					1	2 3 ... 05
	(Psittacula cyanocephala)							
74	Parakeet Rose Breasted	13 11 3 27					4 1 ...	10 12 ... 22
	(Psittacula krameril)							
75	Parakeet Rose Ring	25 22 4 51	3				... 1 ...	26 24 3 53
	(Psittacula krameril)							
76	Partridge Grey	3 2 2 07					2 1...	3 1 ... 04
	(Francolinus pondicerianus)							
77	Partridge Swamp	nil						nil
	(Francolinus gularis)							
78	Peafowl White	3 5 08					... 1 ...	3 4 ... 07
	(Pavo cristatus)							
79	Pelican Dalmatian (Pelec-	... . 01 01						.... . 01 01
	anus philippensis crispus)							
80	Pelican Rosy/ White	17 19 3 39	1			1 1 ...		18 19 1 38
	(Pelecanus onocrotalus)							
81	Pheasant blue ring necked	2 1 ... 03						2 1 ... 03
82	Pheasant Edward	nil						nil
83	Pheasant Golden	1 01						1 01
	(Chrysolophus pictus)							
84	Pheasant Lady Amherset	1 1 2						1 1 02
	(Chrysolophus amherstiae)							
85	Pheasant Silver	5 6 ... 11					1	4 6 ... 10
	(Lophura nycthemera)							
86	Pigeon Crowned	6 1 07						6 1 ... 07
87	Pigeon Green Imperial	nil						nil
	(Ducula aenea)							
88	Pigeon pied imperial	1 1 ... 02						1 1 ... 02
	(Ducula bicolor)							

EXISTING ANIMAL COLLECTION PLAN

		Opening stock as	During	the Year				Closing stock
		on 1/4/2011	Birth	Acqustn	Sale	Disposal	Death	as on 31/3/12
S.N.	BIRDS	M F U T	M F U	M F U	M F U	M F U	M F U	M F U T
89	Pigeon Southern Green	nil						nil
90	Quail Jungle Bush-Bater	nil						nil
	(Perdiula asiolica)							
91	Rosella Crimson	nil						nil
92	Rosella Eastern	nil						nil
93	Sea Gull Brown Headed	nil						nil
	(Larus brunnicephalus)							
94	Sparow Common	nil						nil
95	Sparow Java	... ... 121 121					 17	... ... 104 104
	(Padda oryzivora)							
96	Stilt Black Winged	nil						nil
	(Himantopus himantopus)							
97	Stork Adjutant	... . 01 01						.. ... 01 01
	(Leptoptilos dubius)							
98	Stork Black	nil						nil
	(Ciconia nigra)							
99	Stork Black Neck	1 01						1 01
	(Ephippiothynchus asiatius)							
100	Stork Painted	3 2 2 07		.. 1 ...			2	3 3 ... 06
	(Mycteria leucocephala)							
101	Stork White	nil						nil
	(Ciconia ciconia)							
102	Stork White Neck	... . 02 02						.... 02 02
	(Ciconia episcopus)							
103	Swan Black	nil						nil
	(Cygnus atratus)							
104	Teal Common	nil						nil
	(Anas crecca)							
105	Teal Lesser Whistling	... ... 3 03					 1	... ... 2 02
	(Dendrocygna javanica)							
106	Turaco White Cheeked	nil						nil
107	Vulture Black	nil						nil
108	Vulture King	nil						nil
	(Sarcogyps calvus)							
109	Vulture Scavenger	nil						nil
	(Neophron percnoptarus)							
110	Vulture White Backed-Ben	.... 11 11		 1				... .12 12
	gal (Gyps bengalensis)							
111	Weaver bird	.... 1 1						... ... 1 1
	(Ploceus phillepincus)							
112	Duck Japanese Carolina	nil						nil
113	Lorry Red/Molucan	... 1 ... 01						... 1 ... 01
114	Pheasant Japanese Green	nil						nil
	TOTAL	98 80 1270	... 173	... 1 2	...62	9 9 ...	20 18	94 81 1254
		1448					77	1429

EXISTING ANIMAL COLLECTION PLAN

		Opening stock as	During	the Year				Closing stock
		on 1/4/2011	Birth	Acqstn	Sale	Disposal	Death	as on 31/3/12
S.N.	**MAMMALAS**	M F U T	M F U	M F U	M F U	M F U	M F U	M F U T
115	Cat Siamese	nil						nil
116	Deer Barking -Muntjac	nil						nil
	(Muntiacus muntjac)							
117	Deer Fallow	1 01					1	nil
	(Dama dama)							
118	Deer Hog	21 19 2 42	 2				5	17 20 2 39
	(Axis porcinus)							
119	Deer Sambar	4 6 1 11					1 2 ...	3 5 ... 08
	(Cervus unicolar)							
120	Deer Spotted -Chital	24 30 24 78	 15				2	34 42 15 91
	(Axis axis)							
121	Fox Flying	.. ... 04 04						... . 04 04
	(Pteropus gingateus)							
122	Hedge Hog	... ... 1 01						... .. 1 01
	(Hemiechinus auritus)							
123	Hippopotamus	1 2 03						1 2 ... 03
	(Hippopotamus amphibius)							
124	Hyaena Stripped	... 1 ... 01		1 1 ...			... 1 ...	1 1 ... 02
	(Hyaena hyaena)							
125	Lion African	1 01						1 01
	(Panthera leo)							
126	Nilgai-Blue Bull (Boselaph-	9 5 ... 14		1			1	9 5 ... 14
	us tragocamalus)							
127	Pig Wild- Wild Boar	1 01					1	nil
	(Susscrofa)							
128	Porcupine Brush Tailed	nil						nil
	(Atherurus macrourus)							
129	Squirrel Albino Fivestripped	nil						nil
	TOTAL	62 63 32 157	 17	2 1 ...			11 3...	66 75 22 163
		Opening stock as	During	the Year				Closing stock
		on 1/4/2011	Birth	Acqstn	Sale	Disposal	Death	as on 31/3/12
S.N.	**REPTILES**	M F U T	M F U	M F U	M F U	M F U	M F U	M F U T
130	Boa John's	... . 3 03						... ... 03 03
131	Boa Russell's	... . 05 05						... . 05 05
132	Caiman Spectacled	nil						nil
133	Gavial False	nil						nil
134	Iguana Green	nil						nil
135	Snake Trinket	... . 1 01					 1	nil
	(Elaphe helena)							
136	Tortoise Giant	nil						nil
	(Galopogus)							
137	Tortoise Indian Star	... ... 79 79						... . 79 79
	(Geochelone elegans)							
138	Turtle	... ... 31 31						.... 31 31
139	Green Anaconda	nil		2 2 ...				2 2 ... 04
	(Eunectus murinus)							
	TOTAL	... ... 119 119		2 2 ...			 1	2 2 118 122
	Grand Total	234 199 1579	 211	6 4 3	62	9 9 ...	42 29	234 211 1561
		2012					79	2006

e FREE LIVING SPECIES

1.Monkey

2.Peacock

3.Stray dogs

4.Local species of birds

5.Cats

6.Rats

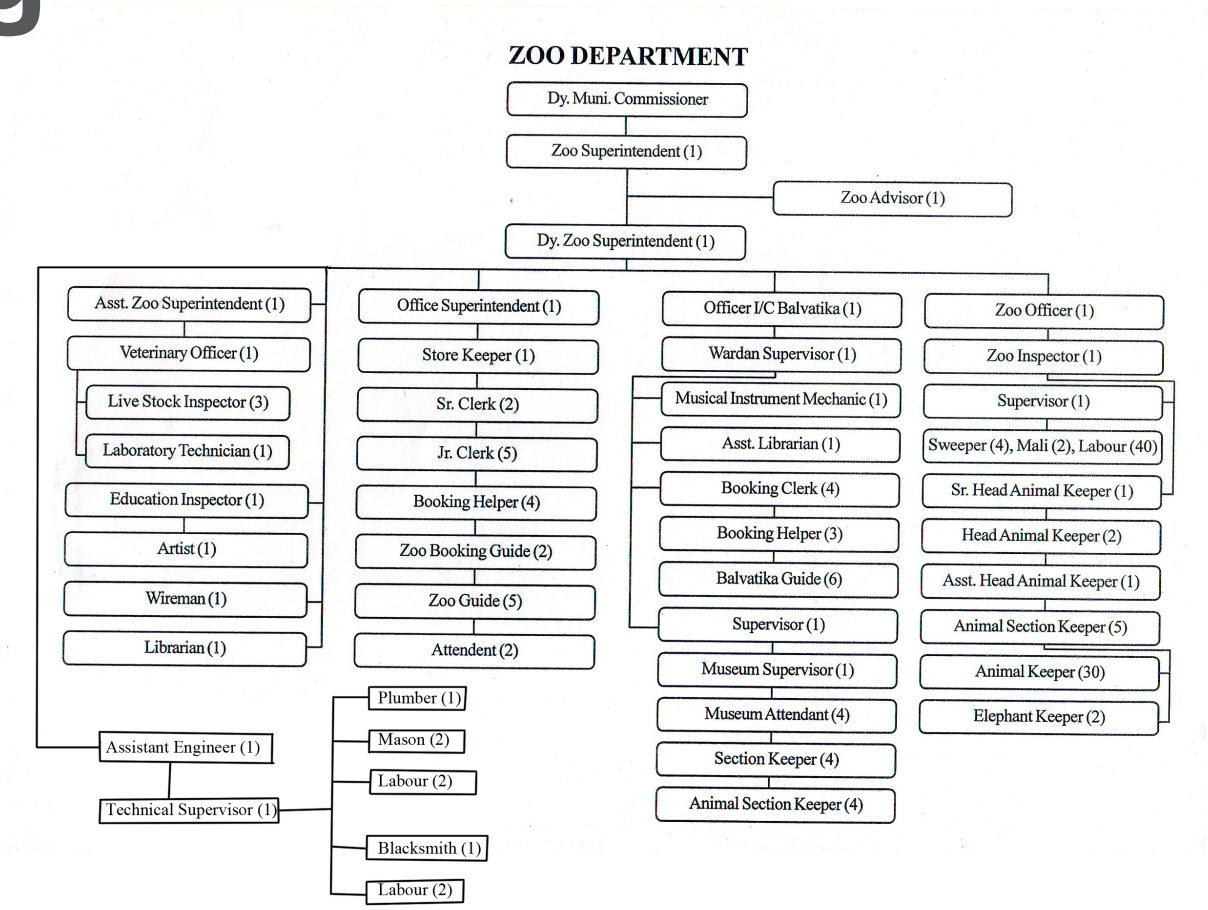
7.Rodents

8.Mongoose

f FLORA AND FAUNA

No.	Local name	Total number	Botanical name
1	Banyan	34	Ficus bengalensis
2	Badam	25	Prunus amygdalus
3	Gum	42	
4	Asopalav	319	Polyalthia longifolia
5	Neem	442	Azardirachta indica
6	Date Palm	05	Phoenix dactylifera
7	Jujube (Jamun)	07	Syzygium cumini
8	Copperpod	1614	Peltophorum pterocarpum
9	Keyshia	08	
10	Borsalli	164	Mimusops elengi
11	Tamarind	16	Tamarindus indica
12	Peepal	54	Ficus religiosa
13	Kachnar	02	Bauhinia
14	Coconut Palm	08	Cocos nucifera
15	Gulmohar	20	Delonix regia
16	Drumstick	08	Moringa oleifera
17	Bottle Palm	02	Hyophorbe lagenicaulis
18	Eucalyptus	03	Eucalyptus spp.
19	Sevan/Sun flower	04	Heptacodium miconiodes
20	Leburnum	01	Watereri
21	Neem	35	Azardirachta indica
22	Mahogany	93	Swietenia macrophylla
23	Kadam	175	Neolamarckia cadamba
24	Silver rock	03	
25	Amla	01	Phyllanthus emblica
26	Spethodia	138	
27	Banyan	05	Ficus bengalensis
28	Mango	05	Mangifera indica
29	Jujube (Jamun)	01	Syzygium cumini
30	Meswak	01	Salvadora Persica
	Total	3207	

g STAFFING PATTERN



h BUILDINGS OTHER THAN ENCLOSURES

1. Store

2.Administration/Office

3.Rest house

4.Workshop

5.Hospital

6.Canteen

7.Security cabin

8.Electrical room

9.Toilet

ઝૂ કીપર્સ તાલીમ પ્રોગ્રામ

કમલા નહેરૂ ઝૂઓલોજીકલ ગાર્ડન,

કાંકરિયા, અમદાવાદ - ૩૮૦૦૦૮

તા. ૦૩.૧૨.૨૦૧૦ થી તા. ૧૭.૧૨.૨૦૧૦

પ્રથમ દિવસ

શુક્રવાર, ૩ ડિસેમ્બર - ૨૦૧૦

સમય	વિગત	વ્યાખ્યાતાનું નામ અને હોદ્દો
સવારે ૯-૩૦ થી ૧૧.૦૦	રજીસ્ટ્રેશન શ્રી કૃષ્ણકાંત બી. રાવલ. અમદાવાદ ઝૂ	
સવારે ૧૧-૦૦ થી ૧-૦૦	ઉદ્‌ઘાટન સમારોહ કોન્ફરન્સ હોલ, અમદાવાદ ઝૂ	
બપોરે ૧-૦૦ થી ૨-૦૦	ભોજન માટેનો વિરામ	
બપોરે-૨-૦૦ થી ૩-૩૦	ઝૂનોટીક ડીસીઝીસ ઓફ ઝૂ બર્ડસ	(ડો. એ.કે.જૈન) પ્રોફેસર, લાઈવ સ્ટોક પ્રોડક્સન એન્ડ મેનેજમેન્ટ, વેટરીનરી કોલેજ, દાંતીવાડા.
સાંજે ૩-૩૦ થી ૪-૦૦	ચા માટેનો વિરામ	
સાંજે ૪-૦૦ થી ૫-૩૦	ઝૂ એજ્યુકેશન ટુ વીઝીટર્સ થ્રુ એનીમલ કીપર	(શ્રી મધુ મેનન) અનાલા, અમદાવાદ.

ઝૂ કીપર્સ તાલીમ પ્રોગ્રામ

કમલા નહેરૂ ઝૂઓલોજીકલ ગાર્ડન,
કાંકરિયા, અમદાવાદ - ૩૮૦૦૦૮
તા. ૦૩.૧૨.૨૦૧૦ થી તા. ૧૭.૧૨.૨૦૧૦

બીજો દિવસ
શનિવાર, ૪ ડિસેમ્બર - ૨૦૧૦

સમય	વિગત	વ્યાખ્યાતાનું નામ અને હોદ્દો
સવારે ૮-૩૦ થી ૯-૧૫	યોગા	શ્રી પ્રવીણભાઈ આચાર્ય, અમદાવાદ.
સવારે ૯-૧૫ થી ૧૦-૦૦	ચા નાસ્તા માટેનો વિરામ	
સવારે ૧૦-૦૦ થી ૧૧-૩૦	અમદાવાદ ઝૂ ઈન્ટ્રોડકશન એન્ડ ઝૂ વિઝીટ	શ્રી ભરતસિંહ પી. વિહોલ, એજયુ.ઈન્સ્પે. અને શ્રી ભરતકુમાર મરાઠા, હેડ એ.કીપર.
સવારે ૧૧-૩૦ થી ૧-૦૦	મેનેજમેન્ટ ઓફ બર્ડસ	વડોદરા ઝૂ
બપારે ૧-૦૦ થી ૨-૦૦	ભોજન માટેનો વિરામ	
બપોરે ૨-૦૦ થી ૩-૩૦	ડાયગ્નોસીસ ઓફ ડીફરન્ટ ડીસીઝીસ ઓફ ઝૂ બર્ડસ	ડો. જી.આર.પટેલ, આસી.ડાયરેકટર, પશુપાલન ખાતુ, અમદાવાદ.
બપોરે ૩-૩૦ થી ૪-૦૦	ચા માટેનો વિરામ	
સાંજે ૪-૦૦ થી ૫-૩૦	રોલ ઓફ એનીમલ કીપર્સ ઈન ઝૂ મેનેજમેન્ટ	ડો.આર.કે.સાહુ, ઝૂ સુપ્રિન્ટેન્ડેન્ટ, અમદાવાદ ઝૂ

ઝૂ કીપર્સ તાલીમ પ્રોગ્રામ

કમલા નહેરૂ ઝૂઓલોજીકલ ગાર્ડન,

કાંકરિયા, અમદાવાદ - ૩૮૦૦૦૮

તા. ૦૩.૧૨.૨૦૧૦ થી તા. ૧૭.૧૨.૨૦૧૦

ત્રીજો દિવસ

રવિવાર, ૫ ડિસેમ્બર - ૨૦૧૦

સમય	વિગત	વ્યાખ્યાતાનું નામ અને હોદ્દો
સવારે ૮-૩૦ થી ૯-૧૫	યોગા	શ્રી પ્રવીણભાઈ આચાર્ય, અમદાવાદ.
સવારે ૯-૧૫ થી ૧૦-૦૦	ચા નાસ્તા માટેનો વિરામ	
સવારે ૧૦-૦૦ થી ૧૧-૩૦	પ્રેકટીકલ-ડેમોસ્ટ્રેશન ઓફ ટ્રાન્કવીલાઈઝેશન	ડો.એન.કે. સાવધરીયા, ડે.ઝૂ સુપ્રિ. અને ડો.જે.બી.કાચા, વેટ.ઓફિસર, અમદાવાદ ઝૂ
સવારે ૧૧-૩૦ થી ૧-૦૦	કેર એન્ડ ટ્રીટમેન્ટ ઓફ સીક બર્ડસ.	ડો.એન.કે. સાવધરીયા, ડે.ઝૂ સુપ્રિ. અમદાવાદ ઝૂ
બપારે ૧-૦૦ થી ૨-૦૦	ભોજન માટેનો વિરામ	
બપોરે ૨-૦૦ થી ૩-૩૦	વિઝીટ ટુ સુંદરવન સ્નેક પાર્ક, અમદાવાદ.	
બપોરે ૩-૩૦ થી ૮-૦૦	વિઝીટ ટુ ગુજરાત સાયન્સ સીટી, અમદાવાદ. વ્યાખ્યાન : લર્નીંગ ફ્રોમ ફોરેસ્ટસ્	ડો.નરોત્તમ સાહુ, સીની. સાયન્ટીસ્ટ, ગુજરાત સાયન્સ સીટી, અમદાવાદ.

ઝૂ કીપર્સ તાલીમ પ્રોગ્રામ

કમલા નહેરૂ ઝૂઓલોજીકલ ગાર્ડન,

કાંકરિયા, અમદાવાદ - ૩૮૦૦૦૮

તા. ૦૩.૧૨.૨૦૧૦ થી તા. ૧૭.૧૨.૨૦૧૦

ચોથો દિવસ

સોમવાર, ૬ ડિસેમ્બર - ૨૦૧૦

સમય	વિગત	વ્યાખ્યાતાનું નામ અને હોદ્દો
સવારે ૮-૩૦ થી ૯-૧૫	યોગા	શ્રી પ્રવીણભાઈ આચાર્ય, અમદાવાદ.
સવારે ૯-૧૫ થી ૧૦-૦૦	ચા નાસ્તા માટેનો વિરામ	
સવારે ૧૦-૦૦ થી ૧૧-૩૦	પ્રેક્ટીકલઃ સેફ્ટી પ્રીકોશન્સ ડ્યુરીંગ ધ શીફ્ટીંગ, ફીડીંગ, ટ્રાન્સપોર્ટેશન ઓફ બર્ડસ્.	(શ્રી આર. એ.જાડેજા) આસી.હેડ.એની.કીપર, અમદાવાદ ઝૂ.
સવારે ૧૧-૩૦ થી ૧-૦૦	હેલ્પ વીઝીટર્સ મેક ફેન્ડસ વીથ યોર ફેન્ડસ્.	(શ્રી મીના નરેશ્વર) સી.ઈ.ઈ., અમદાવાદ.
બપારે ૧-૦૦ થી ૨-૦૦	ભોજન માટેનો વિરામ	
બપોરે ૨-૦૦ થી ૩-૩૦	કેર એન્ડ મેનેજમેન્ટ ઓફ ફેજન્ટસ ઈન કેપ્ટીવીટી.	(શ્રી વી.જે.રાણા) ડાયરેક્ટર, જુનાગઢ ઝૂ.
બપોરે ૩-૩૦ થી ૪-૦૦	ચા માટેનો વિરામ	
સાંજે ૪-૦૦ થી ૫-૩૦	સી.ઝેડ.એ., વાઈલ્ડ લાઈફ પ્રોટેકશન એક્ટ-૧૯૭૨, ઝૂ પોલીસીસ્.	(ડો આર કે. સાહુ) ઝૂ સુપ્રિન્ટેન્ડેન્ટ અમદાવાદ ઝૂ.

ઝૂ કીપર્સ તાલીમ પ્રોગ્રામ

કમલા નહેરૂ ઝૂઓલોજીકલ ગાર્ડન,

કાંકરિયા, અમદાવાદ - ૩૮૦૦૦૮

તા. ૦૩.૧૨.૨૦૧૦ થી તા. ૧૭.૧૨.૨૦૧૦

પાંચમો દિવસ

મંગળવાર, ૭ ડિસેમ્બર - ૨૦૧૦

સમય	વિગત	વ્યાખ્યાતાનું નામ અને હોદ્દો
સવારે ૮-૩૦ થી ૯-૧૫	યોગા	શ્રી પ્રવીણભાઈ આચાર્ય, અમદાવાદ.
સવારે ૯-૧૫ થી ૧૦-૦૦	ચા નાસ્તા માટેનો વિરામ	
સવારે ૧૦-૦૦ થી ૧૧-૩૦	પ્રેકટીકલ- ફીડ પ્રિપરેશન એન્ડ સપ્લાય ટુ બર્ડસ્.	(શ્રી એફ.બી.પટેલ) હેડ એની.કીપર, અમદાવાદ ઝૂ
સવારે ૧૧-૩૦ થી ૧-૦૦	મેનેજમેન્ટ એન્ડ આઈડેન્ટીફીકેશન ઓફ ફીશ.	(શ્રી ડી.આઈ.સુતરીયા) ઈનચાર્જ મત્સ્યઉદ્યોગ અધીક્ષક,અમદાવાદ.
બપારે ૧-૦૦ થી ૨-૦૦	ભોજન માટેનો વિરામ	
બપોરે ૨-૦૦ થી ૩-૩૦	ડીસીઝ ઓફ બર્ડસ એન્ડ ઈટ્સ પ્રીવેન્સન	ડો દીપક પટેલ, ડે.ડાયરેક્ટર, પોલ્ટ્રી ફાર્મ, મકરબા,અમદાવાદ
બપોરે ૩-૩૦ થી ૪-૦૦	ચા માટેનો વિરામ	
સાંજે ૪-૦૦ થી ૫-૩૦	બ્રીડીંગ એન્ડ ટ્રાન્સપોર્ટેશન ઓફ બર્ડસ્.	(ડો આર કે. સાહુ) ઝૂ સુપ્રિન્ટેન્ડેન્ટ અમદાવાદ ઝૂ.

ઝૂ કીપર્સ તાલીમ પ્રોગ્રામ

કમલા નહેરૂ ઝૂઓલોજીકલ ગાર્ડન,
કાંકરિયા, અમદાવાદ - ૩૮૦૦૦૮

તા. ૦૩.૧૨.૨૦૧૦ થી તા. ૧૭.૧૨.૨૦૧૦

છઠ્ઠો દિવસ
બુધવાર, ૮ ડિસેમ્બર - ૨૦૧૦

સમય	વિગત	વ્યાખ્યાતાનું નામ અને હોદ્દો
સવારે ૮-૩૦ થી ૯-૧૫	યોગા	શ્રી પ્રવીણભાઈ આચાર્ય, અમદાવાદ.
સવારે ૯-૧૫ થી ૧૦-૦૦	ચા નાસ્તા માટેનો વિરામ	
સવારે ૧૦-૦૦ થી ૧૧-૩૦	પ્રેકટીકલ- હેન્ડલીંગ ઓફ ડીફરન્ટ બર્ડસ સ્પીસીસ	શ્રી ભરતકુમાર એસ. મરાઠા, હેડ એની.કીપર, અમદાવાદ ઝૂ
સવારે ૧૧-૩૦ થી ૧-૦૦	ઝૂ માસ્ટર પ્લાન	(શ્રી મેઘલ આર્ય) આર્કીટેક,સેપ્ટ,અમદાવાદ
બપારે ૧-૦૦ થી ૨-૦૦	ભોજન માટેનો વિરામ	
બપોરે ૨-૦૦ થી ૩-૩૦	બીહેવીયર ઓફ બર્ડસ	ડો.એન.કે.જૈન, રીડર, ગુજરાત યુનિર્વસીટી, અમદાવાદ.
બપોરે ૩-૩૦ થી ૪-૦૦	ચા માટેનો વિરામ	
સાંજે ૪-૦૦ થી ૫-૩૦	પ્રેજન્ટેશન	તાલીમાર્થી

ઝૂ કીપર્સ તાલીમ પ્રોગ્રામ

કમલા નહેરૂ ઝૂઓલોજીકલ ગાર્ડન,

કાંકરિયા, અમદાવાદ - ૩૮૦૦૦૮

તા. ૦૩.૧૨.૨૦૧૦ થી તા. ૧૭.૧૨.૨૦૧૦

સાતમો દિવસ

ગુરૂવાર, ૯ ડિસેમ્બર - ૨૦૧૦

સમય	વિગત	વ્યાખ્યાતાનું નામ અને હોદ્દો
સવારે ૮-૩૦ થી ૯-૧૫	યોગા	શ્રી પ્રવીણભાઈ આચાર્ય, અમદાવાદ.
સવારે ૯-૧૫ થી ૧૦-૦૦	ચા નાસ્તા માટેનો વિરામ	
સવારે ૧૦-૦૦ થી ૧૧-૩૦	બીહેવીયર ઓફ ધ એનીમલ કીપર ઈન ધ ઝૂ ફોર અપકિપીંગ ઓફ ધ કેપ્ટીવેટેડ એનીમલ્સ.	(ડો. પ્રફુલ મહેતા) ઝૂ સુપ્રિન્ટેન્ડેન્ટ, સુરત ઝૂ.
સવારે ૧૧-૩૦ થી ૧-૦૦	મેનેજમેન્ટ ઓફ પેરાકીટ્સ એન્ડ લોરીકીટ્સ.	(ડો. બી.જી.પટેલ) અમદાવાદ ઝૂ.
બપારે ૧-૦૦ થી ૨-૦૦	ભોજન માટેનો વિરામ	
બપોરે ૨-૦૦ થી ૩-૩૦	આઈડેન્ટીફીકેશન ઓફ બર્ડસ	શ્રી. ડો બકુલ ત્રીવેદી, અમદાવાદ.
બપોરે ૩-૩૦ થી ૪-૦૦	ચા માટેનો વિરામ	
સાંજે ૪-૦૦ થી ૫-૩૦	રેકોર્ડ કીપીંગ ઓફ ઝૂ	શ્રી આર.સી.પટેલ, પશુધન નિરીક્ષક, અમદાવાદ ઝૂ.

ઝૂ કીપર્સ તાલીમ પ્રોગ્રામ

કમલા નહેરૂ ઝૂઓલોજીકલ ગાર્ડન,
કાંકરિયા, અમદાવાદ - ૩૮૦૦૦૮

તા. ૦૩.૧૨.૨૦૧૦ થી તા. ૧૭.૧૨.૨૦૧૦

આઠમો દિવસ
શુક્રવાર, ૧૦ ડિસેમ્બર - ૨૦૧૦

સમય	વિગત	વ્યાખ્યાતાનું નામ અને હોદો
સવારે ૮-૩૦ થી ૯-૧૫	યોગા	શ્રી પ્રવીણભાઈ આચાર્ય, અમદાવાદ.
સવારે ૯-૧૫ થી ૧૦-૦૦	ચા નાસ્તા માટેનો વિરામ	
સવારે ૧૦-૦૦ થી ૧૧-૩૦	રોલ પ્લે	
સવારે ૧૧-૩૦ થી ૧-૦૦	ગ્રીન હાઉસ	(શ્રી ગિરીજા શરણ) પ્રોફેસર, DAIICT, ગાંધીનગર.
બપારે ૧-૦૦ થી ૨-૦૦	ભોજન માટેનો વિરામ	
બપોરે ૨-૦૦ થી ૩-૩૦	રોલ ઓફ મીડીયા ઈન વાઈલ્ડલાઈફ એજ્યુકેશન	(શ્રી હિમાંશુ ત્રીવેદી) અમદાવાદ.
બપોરે ૩-૩૦ થી ૪-૦૦	ચા માટેનો વિરામ	
સાંજે ૪-૦૦ થી ૫-૩૦	ફેજન્ટસ્ ઓફ ઈન્ડીયા	(શ્રી ભરતસિંહ પી.વિહોલ) એજયુકેશન ઈન્સ્પેકટર, અમદાવાદ ઝૂ

ઝૂ કીપર્સ તાલીમ પ્રોગ્રામ

કમલા નહેરૂ ઝૂઓલોજીકલ ગાર્ડન,

કાંકરિયા, અમદાવાદ - ૩૮૦૦૦૮

તા. ૦૩.૧૨.૨૦૧૦ થી તા. ૧૭.૧૨.૨૦૧૦

નવમો દિવસ

શનિવાર, ૧૧ ડિસેમ્બર - ૨૦૧૦

સમય	વિગત	વ્યાખ્યાતાનું નામ અને હોદ્દો
સવારે ૮-૩૦ થી સાંજે ૭-૩૦	વિઝીટ ટુ ગાંધી આશ્રમ, અમદાવાદ. વિઝીટ ટુ ઈન્દ્રોડા પાર્ક એન્ડ અક્ષરધામ- વોટર શો, ગાંધીનગર. વ્યાખ્યાન : વાઈલ્ડલાઈફ ઓફ ગુજરાત	(શ્રી ભરત પાઠક) નિયામક, ગીર ફાઉન્ડેશન, ગાંધીનગર.

ઝૂ કીપર્સ તાલીમ પ્રોગ્રામ

કમલા નહેરૂ ઝૂઓલોજીકલ ગાર્ડન,

કાંકરિયા, અમદાવાદ - ૩૮૦૦૦૮

તા. ૦૩.૧૨.૨૦૧૦ થી તા. ૧૭.૧૨.૨૦૧૦

દસમો દિવસ

રવિવાર, ૧૨ ડિસેમ્બર - ૨૦૧૦

સમય	વિગત	વ્યાખ્યાતાનું નામ અને હોદ્દો
સવારે ૮-૩૦ થી ૯-૧૫	યોગા	શ્રી પ્રવીણભાઈ આચાર્ય, અમદાવાદ.
સવારે ૯-૧૫ થી ૧૦-૦૦	ચા નાસ્તા માટેનો વિરામ	
સવારે૧૦-૦૦ થી૧૧-૩૦	ગ્રુપ ડીસ્કશન	
સવારે ૧૧-૩૦ થી ૧-૦૦	ડીવાઈન લાઈફ	(શ્રી ડી.જે.દેસાઈ) પ્રોફેસર,એલ.ડી.એન્જી.કોલેજ, અમદાવાદ.
બપારે ૧-૦૦ થી ૨-૦૦	ભોજન માટેનો વિરામ	
બપોરે ૨-૦૦ થી ૩-૩૦	ડેઈલી રીપોર્ટસ ઓફ હેલ્થ ઓફ એનીમલ્સ, સેનીટેશન એન્ડ હાઈજીન મેજર્સ.	(ડો જે.બી.કાચા) વેટરીનરી ઓફીસર, અમદાવાદ ઝૂ.
બપોરે ૩-૩૦ થી ૪-૦૦	ચા માટેનો વિરામ	
સાંજે ૪-૦૦ થી ૫-૩૦	બીહેવીયર ચેન્જીસ ઓફ ઝૂ બર્ડસ્ ઈન ડીફરન્ટ સીઝન.	(ડૉ.જે.બી.ગોસ્વામી) વેટરીનરી ઓફીસર, પશુપાલનસંકુલ,મહેસાણા.

ઝૂ કીપર્સ તાલીમ પ્રોગ્રામ

કમલા નહેરૂ ઝૂઓલોજીકલ ગાર્ડન,

કાંકરિયા, અમદાવાદ - ૩૮૦૦૦૮

તા. ૦૩.૧૨.૨૦૧૦ થી તા. ૧૭.૧૨.૨૦૧૦

અગિયારમો દિવસ

સોમવાર, ૧૩ ડિસેમ્બર - ૨૦૧૦

સમય	વિગત	વ્યાખ્યાતાનું નામ અને હોદ્દો
સવારે ૮-૩૦ થી ૯-૧૫	યોગા	શ્રી પ્રવીણભાઈ આચાર્ય, અમદાવાદ.
સવારે ૯-૧૫ થી ૧૦-૦૦	ચા નાસ્તા માટેનો વિરામ	
સવારે ૧૦-૦૦ થી ૧૧-૩૦	ફુડ એન્ડ ન્યુટ્રીશન રિક્વાયરમેન્ટસ ઓફ ડીફરન્ટ એનીમલ્સ ઈન ડીફરન્ટ સ્ટેજીસ	(ડો.આર.જી.જાની) આસી.પ્રોફેસર,(મેડીસીન) વેટરીનરી કોલેજ, આણંદ
સવારે ૧૧-૩૦ થી ૧-૦૦	આઈડેન્ટીફીકેશન ઓફ સીક એનીમલ્સ એન્ડ મેથડ્સ ઓફ ડાયગ્નોસીસ.	(ડો.કે.એસ.પ્રજાપતિ) પ્રોફેસર,(પેથોલોજી) વેટરીનરી કોલેજ, આણંદ
બપારે ૧-૦૦ થી ૨-૦૦	ભોજન માટેનો વિરામ	
બપોરે ૨-૦૦ થી ૩-૩૦	પ્રોફાયલેક્ટીક એન્ડ કંટ્રોલ મેઝર્સ ફોર કેપ્ટીવ એનીમલ્સ	(ડો.પી.આર.પટેલ) પ્રોફેસર,(મેડીસીન) વેટરીનરી કોલેજ, આણંદ
બપોરે ૩-૩૦ થી ૪-૦૦	ચા માટેનો વિરામ	
સાંજે ૪-૦૦ થી ૫-૩૦	બેક્ટેરીયલ એન્ડ પેરાસાઈટીક ડીસીઝીસ ઓફ વાઈલ્ડ એનીમલ્સ એન્ડ બર્ડસ્.	(ડો.આર.જી.જાની) આસી.પ્રોફેસર,(મેડીસીન) વેટરીનરી કોલેજ, આણંદ

ઝૂ કીપર્સ તાલીમ પ્રોગ્રામ

કમલા નહેરૂ ઝૂઓલોજીકલ ગાર્ડન,

કાંકરિયા, અમદાવાદ - ૩૮૦૦૦૮

તા. ૦૩.૧૨.૨૦૧૦ થી તા. ૧૭.૧૨.૨૦૧૦

બારમો તથા તેરમો દિવસ

૧૪ ડિસેમ્બર થી ૧૫ ડિસેમ્બર -૨૦૧૦

મંગળવાર થી બુધવાર

વિઝીટ ટુ ઉદેપુર ઝૂ એન્ડ અંબાજી-માઉન્ટ આબુ

ઝૂ કીપર્સ તાલીમ પ્રોગ્રામ

કમલા નહેરૂ ઝૂઓલોજીકલ ગાર્ડન,

કાંકરિયા, અમદાવાદ - ૩૮૦૦૦૮

તા. ૦૩.૧૨.૨૦૧૦ થી તા. ૧૭.૧૨.૨૦૧૦

સમાપન સમારોહ

શુક્રવાર, ૧૭ ડિસેમ્બર - ૨૦૧૦

સમય	વિગત
સવારે ૦૯-૩૦ થી ૧૧-૦૦	ઈવેલ્યુએશન
સવારે ૧૧-૦૦ થી ૧-૦૦	વેલીડીકટરી પ્રેઝન્ટેશન ઓફ સર્ટીફિકેટ્સ
બપોરે ૧-૦૦ થી ૨-૦૦	ભોજન માટેનો વિરામ

Treatment Sheet

Kamala Nehru Zoological Garden- Ahmedabad.

Species _____

S.No.	Date	Personal name of animal	Symptoms (i) Disease (ii) Condition of animal	Diagnosis	Description	Reaction to treatment	Remarks of V. O.

Date	Observation	Observer	Date	Observation	Observer

Kamala Nehru Zoological Garden-Ahmedabad.

Animal History Card/Sheet

Stock register S.No.....Housed in .....

Name	Scientific Name
Sex	Vernacular name
Distinguishing mark	Habitat
Percentage	

Acquisition	Disposal
1. How and from where acquired	1. How & where disposed of
2. When acquired	2. When disposed of
3. Age on arrival	3. Age at disposal
4. Size & weight on arrival	4. Size & weight
	5. Pathological findings in case of death

Normal temperature	Gestation period	Other information

Date	Observation	Observer	Date	Observation	Observer

Ahmedabad Municipal Corporation

Kamaia Nehru Zoological Garden Kankaria, Aamedabad.

POST MORTEM REPORT

No. _____ Date : _____

Species Sex _____ Age _____

1. Time & Date of Death –
2. Time & Date of Post Mortem examination –
3. Place of post Mortem examination –
4. Short history of illness (if any) –
5. General description of carcass –

6. Organwise desription of sections –
   - A) Head & Neck
     - a) Skull & brain
     - b) Cervical vertibrac
   - B) Thorax
     - a) Lungs
     - b) Heart
     - c) Ribs
   - C) Abdomen
     - a) Liver
     - b) Stomach
     - c) Intestine Kidney
     - d) Spleen
   - D) Pelvic girdle
     - a) Uterus & Ovaries
     - b) Bladder
     - c) Genital Organs
   - E) Limbs
     - a) Fore limbs
     - b) Hind limbs
   - F) Bacteriological Tests
   - G) Opintons :

Place : _____ Signature : _____

Date : _____ Name : _____

Kamla Nehru Zoological Garden

Kankaria, Ahmedabad.

INDIVIDUAL ANIMAL HISTORY CARD OR INDEX CARD

1. Class _____ 2. Order _____
3. Family _____ 4. Species _____
5. Common Name _____ 6. House Name _____
7. Sex : Male _____ Female _____ Undetermined _____
8. Identification mark, if any _____
9. Date acquired/received _____
10. Age [estimated or actual] _____
11. Animal stock register/inventory no. and page no. _____
12. Stud book no. if any _____
13. Where kept [enclosure number or name] _____
14. Acquisition details :
    (a) Date of acquisition _____
    (b) Name and address of peraon/agency/intitution from whom acquired _____
    (c) Mode of acquisition by birth. donetion, exchange, purchase. breeding loan _____
    (d) Weight and general condition of animal on receipt _____
15. Qurantine date :
    (a) Date of arrival in quarantine _____
    (b) Tests conducated :
    Temp fecal/urine/pathological and results _____
    (c) Treatment given, if any _____
    (d) Date of release from quarantine _____
16. Date. record of observations regarding behaviour. reproduction health. treatment etc. _____
17. Disposal :
    (a) Exchanged
    (b) Sold
    (c Donated
    (d) Breeding loan

    } Date. name and address of person/agency/ institution to whom given.

    (e) Death. cause of death, postmortem findings and postmortem report no.
18. Disposal of carcass : by burial, cremation, any other.
19. Whether any organ or parts removed' skin. claws, skelton, tusks etc.
20. Whether any organ or parts given to museum, educational institution if so name and address of person/agency/institution and mode of transaction. [donation or sold]

Kamla Nehru Zoological Garden

Kankaria, Ahmedabad.

Proforma For Veterinary Case History/Index Card

Out door or indoor patient.

Date of hospitalisation _____

Date of discharge from hospital _____

Date : _____

1. Common name _____

   Scientific name _____

   Age/date of birth _____ Sex _____

2. Complaint/tentative diagnosis _____

   Temperature _____ Weight _____

3. History of the case _____

   Area/enclosure where located _____

4. Clinic/lab examination result _____

   X-ray no./Lab test no. _____

5. Recommended diet/treatment after discharge from hospital _____

   _____

   _____

6. Diagnosis and treatment _____

   _____

   _____

   _____

   _____

   _____

   _____

Signature of Veterinary Officer

Annexure – IV C

_____ Zoological Parks

ANIMAL HISTORY CARD

Vernacular (local) name & Common Name :	Scientific name of the species :
House name and ID number of the animal :	Sex: M/F:
Distinguishing mark:	Type of marking – Transponder / Ear tag / Ring/ Others:
National Studbook number of the animal	International Studbook number of the animal
Sire : (Name and National Studbook number)	Dam : (Name and National Studbook number)
Date of Birth (dd:mm:yyyy)	When and from where acquired
Physical health check-up details	Genetic health check-up details
Date of death or other mode of disposal (dd:mm:yyyy)	Remarks

Ahmedabad Municipal Corporation

ZSD/ Dt.

Office of the Zoo Superintendent
Kamala Nehru Zoological Garden,
Kankaria, Ahmedabad-380 008.

To,

The Head
Department of Pathology/Microbiology
Anand Veterinary college,
ANAND.

Sub : Histopathological/Microbiological/Post-mortem Examination.

Dear Sir,

I am sending herewith the following materials carcass for the Laboratory/Post-Mortem examination, kindly let me know the result & oblige.

Sr No.	Name of the Animal/Bird	Time & Date of Death	Nature of the specimen	Remarks

Thanking you,

Yours faitifully,

(Dr. R. K. Sahu)
By Zoo Superintendent

નં.ઝેડ.એસ.ડી.
ઝૂ સુપ્રિ-ટે-ડે-ટશ્રીનો કચેરી
કમલા નહેરુ ઝૂઓલોજીકલ ગાર્ડન
કાંકરીયા, અમદાવાદ
તા.

પ્રતિ,
મુખ્ય વનસંરક્ષકશ્રી (વન્યપ્રાણી)
બ્લોક નં. ૧૪, પહેલોમાળ,
સેક્ટર-૧૦, જુના સચિવાલય,
ગાંધીનગર.

વિષય : શહેરમાં ઉતપાત મચાવતા જાનવરને પકડવા અંગેની જાણ કરવા બાબત.

સંદર્ભ : આપશ્રીના પત્ર નં.વપ્રા/૨૮/બ-૫૮૩-૮૬-૯૮-૯૬ તા.૨૩-૪-૯૮.

મહાશય,

જયભારત સહ ઉપરોકત વિષય અન્વયે આપશ્રીને જણાવવાનું કે ઉપરોકત સંદર્ભવાળા આપશ્રીના પત્રને આધારે અમદાવાદ શહેર વિસ્તારમા નાગરીકો, કાઉન્સીલરશ્રીયો તથા ઉચ્ચઅધિકારીશ્રીયોની ફરીયાદના આધારે તા._____ ના રોજ_____વાગે_____ _____વિસ્તારમાંથી ઉતપાત મચાવતુ જાનવર _____ ને ઝૂની ટીમ મારફતે પકડી પ્રાણીસંગ્રહાલય અમદાવાદમાં રાખવામાં આવેલ છે. જે આપશ્રી જાણમાં લેવા વિનંતી છે.

ઝૂ સુપ્રિ-ટે-ડે-ટ
કમલા નહેરુ ઝૂઓલોજીકલ ગાર્ડન
કાંકરિયા, અમદાવાદ-૮

Here you'll see the Nicobar pigeon; the golden pheasant; pigeons with a crown; a mouse deer - much bigger than a mouse, but much smaller than a deer; the American Iguana; and more.

What sets this zoological garden apart is not only its in-house breeding facilities, but the acceptance of the same by it inhabitants, making the birth of rare species of birds and animals which is difficult elsewhere, an easy and an ongoing process here.

The zoo is a vital part of the city's commitment to environment. It is not only visited by schools, tourists, and families, but also wild life enthusiasts and conservation experts. Serene, peaceful, yet lively, the zoo is the city's most sought after destination.

PLEASE

Do not feed the animals
Do not tease the animals
Do not spit within the zoo
Do not pluck flowers
Do not bring pets, fire arms inside the zoo

Nature Catcher

A Paradise of Expressions

Kamla Nehru Zoological Garden

Kankaria, Ahmedabad

Kamla Nehru Zoological Garden

Kamla Nehru Zoological Garden

Kankaria, Ahmedabad

Timings :

March to October
8 am to 6.15 pm

November to February
9 am to 5.30 pm

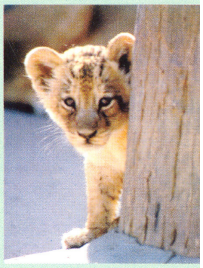
Entrance fee :

Rs.10/- Adults
Rs.5/- Child
Rs.3/- Educational Tour
(On Thursdays educational tour is free)

Every Friday the Zoo is closed to visitors

Telephone : (079) ~~246 3415~~ 25463415

Established in 1951, Kamla Nehru Zoological Garden is situated on the outer periphery of Kankaria lake and spread over an area of 31 acres.



More than 20 lakh visitors came visiting last year, and this number is only growing.

Within its confines it houses some of the rare species in the animal and bird kingdom.

What sets it apart from other zoological gardens is the personal touch by the devoted zoo staff under the able guidance of the superintendant and continued support of the Ahmedabad Municipal Corporation - making it a home away from home for its residents.

The Kamla Nehru Zoological Garden was started with a purpose. To take the visitors beyond the realms of fantasy. To enable them to get a close feel of the birds, the reptiles, and the animals.

The zoo aims at not only conservation of endangered species, but also breeding them in captivity, so as to save them from extinction - keeping the generations of the day after in mind.

The zoological garden facilitates research activities apart from creating awareness. It also maintains a full fledged in-house veterinary hospital.

બુક No. 3475

પહોંચ No. 00

અમદાવાદ મ્યુનિસિપલ કોર્પોરેશન

કમલા નહેરૂ

પ્રાણીસંગ્રહાલય

(શૈક્ષણિક પર્યટક માટે)

પ્રવેશ પત્ર (ગ્રુપ ખાતા માટે)

રૂા. 3-00

બુક No. 3475

પહોંચ No. 00

અમદાવાદ મ્યુનિસિપલ કોર્પોરેશન

કમલા નહેરૂ

પ્રાણીસંગ્રહાલય

(શૈક્ષણિક પર્યટક માટે)

પ્રવેશ પત્ર (મુલાકાતી માટે)

રૂા. 3-00

બુક No. 201

ટિકીટ No. 0000100

અમદાવાદ મ્યુનિસિપલ કોર્પોરેશન

કમલા નહેરૂ

પ્રાણીસંગ્રહાલય

કેમેરા ફી

દર રૂા. ૫-૦૦ પૈસા

બુક No. 201

ટિકીટ No. 000100

અમદાવાદ મ્યુનિસિપલ કોર્પોરેશન

કમલા નહેરૂ

પ્રાણીસંગ્રહાલય

કેમેરા ફી

દર રૂા. ૫-૦૦ પૈસા

(મુલાકાતી માટે)

બુક AS No. 8775

ટીકીટ No. 00

અ. મ્યુ. કોર્પો.

કમલા નહેરૂ

પ્રાણીસંગ્રહાલય

(૧૨ વર્ષની ઉપરની વ્યક્તિ માટે)

પ્રવેશપત્ર

દર રૂા. ૧૦/-

બુક AS No. 8775

ટીકીટ No. 00

અમદાવાદ મ્યુનિસિપલ કોર્પોરેશન

કમલા નહેરૂ

પ્રાણીસંગ્રહાલય

(૧૨ વર્ષની ઉપરની વ્યક્તિ માટે)

પ્રવેશપત્ર

દર રૂા. ૧૦/-

(મુલાકાતી માટે)

: નિયમો : .

૧. કૃપા કરી સ્ટાફની કોઈપણ વ્યક્તિ સાથે ઝગડો કરવો નહિ.

૨. અસભ્ય વર્તન કરનાર અગર તો જાનવરોને હેરાનગતી કરનાર વ્યક્તિને આ ટિકિટનો ઉપયોગ બંધ કરવાની ફરજ પાડવામાં આવશે.

૩. જરૂરના પ્રસંગે કોઇ પણ સેકશન બંધ કરવાની સત્તા ઝુ. સુપ્રી. ની રહેશે.

૪. કોઈપણ અકસ્માત માટે મ્યુ. કોર્પોરેશનની જવાબદારી નથી.

: તારીજો :

તારીખ

બુક ટીકીટ નં. થી

બુક ટીકીટ નં. સુધીની

કુલ ટીકીટ ના

રૂા. પૈ.

અંકે રૂપિયા

ચીલન નં. તા. થી

જમા કરાવેલ છે.

ઝુ કલાર્ક ઝુ સુપ્રી. રિસિટ કલાર્ક

નિયમો

(૧) કૃપા કરી સ્ટાફની કોઈપણ વ્યક્તિ સાથે ઝગડો કરવો નહિ.

(૨) અસભ્ય વર્તન કરનાર વ્યક્તિને આ ટિકીટનો ઉપયોગ બંધ કરવાની ફરજ પાડવામાં આવશે.

(૩) જરૂરના પ્રસંગે કોઈપણ સેક્શન બંધ કરવાની સત્તા ઝુ સુપ્રી.ની રહેશે.

(૪) કોઈપણ અકસ્માત માટે મ્યુ. કોર્પોરેશન જવાબદાર નથી.

બુક નં. 117 ટિકિટ નં. 1

અમદાવાદ મ્યુનિસિપલ કોર્પોરેશન

કાંકરીયા

પ્રાણી સંગ્રહાલય

મુવી કેમેરા ફી

દર:-રૂા. ૦-૫૦ નયા પૈસા

મુવી કેમેરા ફી રૂા. ૨૫/-

બુક નં. 117 ટિકિટ નં. 1

અમદાવાદ મ્યુનિસિપલ કોર્પોરેશન

કાંકરીયા

પ્રાણી સંગ્રહાલય

મુવી કેમેરા ફી

દર:-રૂા. ૦-૫૦ નયા પૈસા

મુવી કેમેરા ફી રૂા.

બુક નં. 117 ટિકિટ નં. 1

અમદાવાદ મ્યુનિસિપલ કોર્પોરેશન

કાંકરીયા

પ્રાણી સંગ્રહાલય

મુવી કેમેરા ફી

દર:-રૂા. ૦-૫૦ નયા પૈસા

મુવી કેમેરા ફી રૂા.

બુક P No. 7500

ટીકીટ Nº 000100

અ. મ્યુ. કોર્પો.
કમલા નહેરુ
પ્રાણીસંગ્રહાલય
(૧૨ વર્ષથી અંદરના બાળકો માટે)
પ્રવેશપત્ર
દર ₹૧. ૫/-

બુક P No. 7500

ટીકીટ Nº 000100

અમદાવાદ મ્યુનિસિપલ કોર્પોરેશન

કમલા નહેરુ

પ્રાણીસંગ્રહાલય

(૧૨ વર્ષથી અંદરના બાળકો માટે)

પ્રવેશપત્ર

દર ₹૧. ૫/-

(મુલાકાતી માટે)

નિયમો :

૧. કૂપન ફક્ત સ્ટાફની કોઇપણ વ્યક્તિ સાથે ડાયરો ફેરવો નહિ.

૨. અસામાન્ય વર્તન કરનાર અજાણ્યા બીજાવ્યક્તિને ઓળખાણની કૂપનાર વ્યક્તિનને આ ટિકિટનો ઉપયોગ બંધ કરવાની કૂપજ પાડવામાં આવશે.

૩. જીદ્દેનના પ્રસંગ કોઇ પણ સંજોગ બંધ કરવાની ગમતા જેમ સિક્રી નીરહેશે.

૪. કોઇપણ અકસ્માત માટે જવાબદારી નથી.

ટાફરો :

નામ
બુક ટીકીટ નં. થી
બુક ટીકીટ નં. સુધીની
કુલ ટીકીટ નં.
રૂા. પૈ.
અંકે રૂપિયા
ચીલન નં. તા. થી
જમા કરાવેલ છે.

સ્ટેટ કાર્ક સ્ટેસ્ટી. ડિસ્ટ્રિટ કાર્ક

ટિકિટ :-

ટાફરો

નામ :
પોસ્ટ ટાફરા ફક્ષિ
ફક્ષિ ટાફરા નં. ટાફરા ફક્ષિ
પોસ્ટ
ટાફરા નં.
ફક્ષિ
તા.
ટાફરો ફક્ષિ
પોસ્ટ ટાફરા નં.
ફક્ષિ

(૧) આ ટાફરો ફોરાબાદારાદે ટોરાબાબ.ક્ષ દર આપે.
ક્ષ.બાબાદે ફોરાબાદારાદે ટોરાબાબ.ક્ષ
દર આપે ફોરાબાદારાદે ટોરાબાબ.ક્ષ
આપે ક્ષ. ટોરાક્ષિ ૮ ટોરાક્ષિ આબાડ.

(૨) ટાફરો ૦૪ાબાબ.૦ ટોરાટર ટાફરા
ટોરાબાબ.ક્ષ ટોરાબાબ.૦ ટોરાટર
ટાફરા ટોરાબાબ.૦ ટોરાટર ટાફરા
ટોરાબાબ.ક્ષ ટોરાબાબ.૦ ટોરાટર
આપે ક્ષ. ટોરાક્ષિ ૮ ટોરાક્ષિ આબાડ.

(૩) ટાફરો ટોરાબાબ.ક્ષ ટોરાબાબ.૦ ટોરાટર
ટોરાબાબ.ક્ષ ટોરાબાબ.૦ ટોરાટર
ટોરાબાબ.ક્ષ ટોરાબાબ.૦ ટોરાટર
ટોરાબાબ.ક્ષ ટોરાબાબ.૦ ટોરાટર

BIBLIOGRAPHY

Books

1. Zoos in India Legislation, Policy, Guidelines and Strategy, Published by Central Zoo Authority, Delhi
2. Master Planning of Zoos, Proceedings of Training Programme on Master Planning of Zoos for Directors and Managers of Zoos in India, Published by Central Zoo Authority, Delhi
3. Adding Value to Zoo Visits: An Ideas Source book for Master Zoo Education Plan, Developed by Centre for Environment Education and supported by Central Zoo Authority, Delhi
4. Zoo Education Master Plan, Developed by Centre for Environment Education and supported by Central Zoo Authority, Delhi
5. S.H.Prater, The Book of Indian Animals, Published by Bombay Natural History Society, Oxford University Press
6. Model Disaster Management Plan, Prepared by Mr.R.Hemanth kumar, Ex.Director, Kanpur Zoological park, Kanpur
7. ISIS ARKS 4 (CMS) Training Workbook, (version 1.1)
8. Annual Report 2007-08, Published by Central Zoo Authority, Delhi
9. Z.O.O. Z.E.N., Vol. XXIV, Issue 6-7, Jan-Feb 2009, Editor Sally Walker
10. Journal of Landscape architecture, Zoological Parks, Vol. 5, Issue-4, Summer 2008

Websites

www.ahmedabadzoo.com
www.cza.nic.in
www.defenders.org
www.wikipedia.org

Maps

Google Earth