

Signed

419



Old Central Zoo Authority

Diary No. 92

Date 19/4/13

**Rajiv Gandhi Zoological Park and
Wildlife Research Centre,
Pune Municipal Corporation,
Pune**

Master Plan

2011-2031

Year of Submission - 2013

Prepared in collaboration with
Institute of Environment Education and Research,
Bharati Vidyapeeth University,
Katraj - Dhankawadi, Pune - 411 043.

Certificate

O/o Central Zoo Authority

Diary No. 22

Date 19/4/13

This is to certify that The Master Plan for Rajiv Gandhi Zoological Park and Wildlife Research Centre- Pune, has been planned for 20 years which is being submitted to Central Zoo Authority, New Delhi.

The Master Plan is prepared by the following as per the revised check list provided by Central Zoo Authority in 2012.



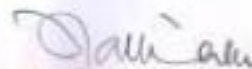
Deputy Garden Superintendent(Zoo)
Rajiv Gandhi Zoological Park
and Wildlife Research Center,
Pune Municipal Corporation,
Pune.



Chief Garden Superintendent
Pune Municipal Corporation, Pune.



Additional Municipal Commissioner (G)
Pune Municipal Corporation, Pune.



Municipal Commissioner,
Pune Municipal Corporation,

19/05/2013
(Dr. Bijal Kishor Gupta)
EMO
CIA

19/04/2013
B. S. BONAL
Member Secretary
Central Zoo Authority
(Ministry of Environment & Forests)
Govt. of India, New Delhi



GOVERNMENT OF INDIA
MINISTRY OF ENVIRONMENT & FORESTS
Central Zoo Authority



THROUGH EMAIL/ SPEED POST

F. No. 21-2/2003-CZA(418)(Vol.II)(M)/545

DATE: 29.08.2011

01/9/11

✓ To

The Zoo Director
Rajiv Gandhi Zoological Park
and Wildlife Research Centre,
Katra,
Pune - 411 046 (Maharashtra)

Sub:- Preparation of Master Plan of Rajiv Gandhi Zoological Park and Wildlife Research Centre, Pune - Regarding.

Ref:- This office letter even Dated 03.05.2010, 27.12.2010 and 26.04.2011.

Sir,

This has a reference to the presentation delivered by Dr. R. Jadhav, In-charge, Rajiv Gandhi Zoological Park, Pune on the compliance of suggestion made by the Expert Group on Zoo Designing of Central Zoo Authority before the members of the Expert Group on Zoo Designing of the Central Zoo Authority in its meeting held on 2nd August, 2011 and the following observations were made and apprised to him by members:-

- (i) Existing number and proposed animals should be mentioned in the Master plan.
- (ii) Elephant should not be shown in zoo collection plan and kept away from display.
- (iii) Proposed Conservation Breeding Centre for Lesser cat & King cobra should not be near to the burial ground.
- (iv) Burial, Post-mortem and incinerator should be moved from existing location to other site as discussed and shown on Master (layout) plan.
- (v) Size of enclosure will be taken up on case to case basis after submission of designs to CZA for approval.
- (vi) Leopard enclosure may be shifted to Raptor enclosure location.
- (vii) Walk through leopard enclosure is not approved.

...2/-

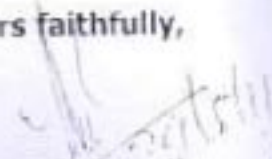
श्रीमती/श्री
- 01/09/11

- (viii) Prioritize the species to be taken up in coming year in phases mode, may be 4 phases in 20 years at the gap of 5 years.
- (ix) Give the table of sanctioned, existing & proposed post.

The committee desired that the zoo should incorporate/ rectify aforesaid observation and submit the revised draft Master plan by the end of month of September, 2011 to CZA, so as to examine by the concerned members of "Expert Group on Zoo Designing" for final recommendation.

You are therefore, requested to do needful accordingly.

Yours faithfully,


(B. S. Bonal)
Member Secretary

Copy to:-

1. The Chief Wildlife Warden, Government of Maharashtra, Nagpur for favour of information & necessary action.
2. Shri A. S. Dogra, Coordinator (Sub-group D) of Expert Group on Zoo Designing of Central Zoo Authority for favour of information.



सर्वो हारिकाली।
सर्वो सुशालनी।।



GOVERNMENT OF INDIA
MINISTRY OF ENVIRONMENT & FORESTS
Central Zoo Authority



THROUGH EMAIL

DATE: 13.04.2012

Speed Post

F. No. 21-2/2003-CZA(418)(Vol. III)(M) / 620

To
The Zoo Director
Rajiv Gandhi Zoological Park
and Wildlife Research Centre,
Katraj, Pune - 411 046 (Maharashtra)

**Sub:- Revised Master (layout) Plan of the Rajiv Gandhi Zoological Park, Pune
- Regarding.**

Sir,
Please refer to your letter dated RGZP-445 dated 07.03.2012.

The revised Master (layout) Plan submitted for the long-term development of the Rajiv Gandhi Zoological Park and Wildlife Research Centre, Pune was scrutinized by the members of the Expert Group on Zoo Designing of the Central Zoo Authority and following observations were made for rectification at your end:-

The comments sent by CZA vide letter No. 21-2/2003-CZA(418)(Vol. II)(M) dated 26-04-2011 and 29.08.2011 have not been complied. Therefore, should submit a compliance report on the same.

The observations made by expert group during presentation by Director, Rajiv Gandhi Zoo on 2-8-2011 and communicated vide this office letter No. 21-2/2003-CZA(418)(Vol. II)(M)/545 dated 29.08.2011/ 01.09.2011, need to be reflected.

Kind attention of the zoo authority is recalled that the guidelines on the layout plan and display of animals as prescribed by CZA should be strictly adhered.

In-view of the above, the Rajiv Gandhi Zoological Park is advised to group animals for display in terms of broad family groupings such as felidae -large cats and small cats, canidae, herbivores, avian fauna, reptiles etc and consider remodeling of enclosures where required.

- This would require relocation of few species of animals. The details can be seen in the enclosed layout plan of your zoo.
- Animals of the canidae family (Dhole, hyena and fox) may be located in the area between leopard and lesser cats at the south-western end by realignment of the visitors path, if required.

...2/-

Enc. master plan comments of subgroup D to the enclosure

- while locating enclosures due regards needs to be given to the contours in the area. Enclosures should, as far as possible, be aligned along the contours not across them. Again, the visitor must be placed at a place where his line of sight is either at the same level as the displayed animal or slightly below it not above it. The same principle applies for animal houses.
- Animal collection plan may first be prepared as per the enclosed proforma

Species				Proposed collection				Animals to be acquired or removed				Remarks
M	F	U.S.	Total	M	F	U.S.	Total	M	F	U.S.	Total	

Other observations/comments are as follows.

The post mortem room should be close to the veterinary hospital. These facilities should be located outside the zoo's display area. The kitchen should also be close to the veterinary hospital for proper supervision and monitoring of animal feed.

- Rabbit is a domestic animal and should not be kept in the zoo. Moreover, the Elephant needs to be housed as off display.
- The number of species of raptors to be displayed should be mentioned to enable us to assess their area requirement.
- If possible, the zoo authority may prepare a sub-loop connection for visitor between Barking deer, Nilgai enclosure joining to one and of aquatic birds, joining the existing main road.
- Visitors circulation be indicated boldly.
- Master plan should be prepared as per Check-list.

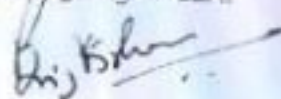
Keeping in view of the above, you are requested to submit the three amended copies of the Master (layout) Plan to this Authority for its approval.

Yours faithfully,
sd/-
(B. S. Bonal)
Member Secretary

End. As above.

Copy for favour of information to:-

1. The Commissioner, Pune Municipal Corporation, Pune.
2. The Deputy Commissioner, Pune Municipal Corporation, Pune.
3. Sh. A. S. Dogra, Punjab, (Coordinator), Expert Group on Zoo Designing of CZA.



(Dr. Brij Kishor Gupta)
Evaluation and Monitoring Officer



GOVERNMENT OF INDIA
MINISTRY OF ENVIRONMENT & FORESTS

Central Zoo Authority



जहाँ है इतिहासी।
वहीं है सुलझासी।।

THROUGH REGISTERED POST

F. No. 21-2/2003-CZA (418)(Vol. III)(M) / 1824

DATE: 22.10.2012

To
The Zoo Director
Rajiv Gandhi Zoological Park and Wildlife Research Center,
Pune-Satara Road, Opp. Katraj Dairy,
Katraj, Pune - 411 046 (Maharashtra).

Sub:- Master (layout) Plan of the Rajiv Gandhi Zoological Park and Wildlife Research Center, Katraj, Pune.

Ref:- (i) This office letter No. 21-2/2003-CZA(418)(Vol. III) (M)/ 1265 dated 26.07.2012.
(ii) Your office letter dated RGZP-178 dated 16.08.2012.

Sir,

Reference is invited to the above cited correspondence.

Submitted revised Master (layout) Plan of Rajiv Gandhi Zoological Park and Wildlife Research Center, Katraj was scrutinized by the Expert Group on Zoo Designing of the Central Zoo Authority. Subsequently, the Master (layout) Plan was placed before the 62nd Meeting of the Technical Committee of the Central Zoo Authority held on 5th July 2012. The committee members approved the Master (layout) Plan of the Rajiv Gandhi Zoological Park and Wildlife Research Center, Katraj, Pune in principal subject to incorporation of suggestions, if any, made by Expert Group. You are requested to ensure that the all the development activities in the Rajiv Gandhi Zoological Park and Wildlife Research Center, Katraj, Pune must be in conformity with the approved Master (layout) Plan.

Three copies of the duly signed and approved Master (layout) Plan of the Rajiv Gandhi Zoological Park and Wildlife Research Center, Katraj, Pune is being sent herewith. You are requested to return two copies to the undersigned after affixing your signature & consultants and office seal for our records.

In the meantime the master plan submitted by you is being scrutinized by members of the Expert Group on Zoo Designing. The observations on the same shall be communicated to you in due course of time.

Yours faithfully,

(B. S. Bonal)
Member Secretary

Encl: as above

Copy for favour of information and necessary action to:-

1. The Chief Wildlife Warden, Government of Maharashtra, Nagpur.
2. The Commissioner, Pune Municipal Commissioner, Pune, Maharashtra.

(B. S. Bonal)
Member Secretary

श्री. राजीव गांधी प्राणि लक्ष्मणालय
पुणे महानगरपालिका

बाबक क्रमांक - २०१०/१२/४२४

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**The Master Plan for
Rajiv Gandhi Zoological Park
and Wildlife Research Centre– Pune**

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Acknowledgment

I take this opportunity to express my sincere thanks to Shri Mahesh Pathak Hon'ble Commissioner, Pune Municipal Corporation for entrusting his faith in me to prepare and give the final shape to the Zoo Master Plan for next 20 years development.

I express my sincere gratitude to Shri Rajendra Jagtap Additional Municipal Commissioner, Pune Municipal Corporation for his valuable inputs in preparing the final phase of Master Plan.

I am very thankful to Shri Naresh Zurmure, former Additional Commissioner and Shri Ashok Ghorpade Chief Garden Superintendent, Pune Municipal Corporation for their constant support and guidance on various aspects of Master Plan which helped me to work out the project in a planned manner.

I am indebted to Dr Erach Bharucha, Director, Bharati Vidyapeeth Institute of Environment education and Research, Pune and his team especially Dr. Kranti Yardi, Assitant Professor for their sincere efforts in planning and completing the Master Plan report. Without their involvement the document will not have taken up the appropriate shape. I appreciate the time spent in writing and finalizing the complete document and it was a great pleasure in working with them.

I am obliged to Shri B. S. Bonal, Member Secretary, Central Zoo Authority and Dr. Brij Kishor Gupta, Evaluation and Monitoring Officer for their time to time expert advice until the completion of Master Plan Project.

I would like to make special mention to Dr Kazwin Umrigar former Director of Zoo for her diligent efforts in planning the earlier phase of Master Plan which made my job very easy to take the project to the final stage. I am thankful to Dr. Navnath Nighot Veterinary Officer, Mr. Digambar Bangar, Sub engineer and Ms. Ashwini Shitole, Educational Officer who have contributed largely in finalizing the Master Plan in their own fields.

My Sincere thanks to my Livestock Supervisors, Mr. Dipak Dhumal and Mr. Manoj Jadhav, Head Animal Keepers, Mr. Kaushik Kashikar and Mr. Shamrao Khude, office assistant Datta Shelar, zoo keepers, other zoo staff members, administrative staff who were involved directly or indirectly in preparing this comprehensive plan.

Dr. Rajkumar V. Jadhav
Deputy Garden Superintendent(Zoo)
Pune Municipal Corporation

Preface

The Rajiv Gandhi Zoological Park and Wildlife Research Centre is visited by more than 18 lakhs visitors every year. I am privileged to submit this master Plan of the zoo for the next twenty years development . It is one of green areas of the city and houses more than 375 animals of 67 different species including mammals, birds and reptiles. The master plan is designed based on the norms of Central Zoo Authority and is facilitated with lot of new visitor amenities. The future animal collection plan has been prepared and new animal enclosures are planned which will be developed in a phased manner The new enclosures will be designed with better environment enrichment for animals conducive to their behavioral biology. The walk through bird aviary is proposed for the aquatic avifauna which will be the major attraction for the visitors .

The off display section is planned to initiate the ex-situ conservation breeding programme for giant squirrel and other identified endangered species which will help in conservation breeding of the state animal which is not been done anywhere else in the country.

New service road is proposed to cater the better and timely services to the various animal enclosures. The visitor education is one of the key objective of the zoo and it will be achieved through a planned education programme for students and visitors. An interpretation facility is proposed in the Master Plan in the first Phase with a interpretation centre and followed by the interpretation exhibits for the zoo. Place to carry out the education programmes will help in increasing the educational value of the zoo.

I take the privilege to submit this Master Plan to Central Zoo Authority for their final approval. I would like to thank all those who were involved in making of the master Plan a big success,

Mahesh Pathak
Municipal Commissioner
Pune Municipal Corporation

Foreword

The Rajiv Gandhi Zoological Park and Wildlife Research Centre has several very distinctive features among Indian Zoos. It has a history of rapid development along the guidelines of the CZA. I have been associated with the old zoo at Peshwa Park as a member of its Committee since the 1970's. However, I was always unhappy about the enclosures. With the zoo's shift to the present location a huge stride was made to develop and manage a modern zoo facility that could house animals in large hygienic and natural enclosures. The zoo also initiated an educational program and our students from BVIEER were given an opportunity to take up studies for their Masters Dissertations on different aspects of zoo management. This also led to documentation and studies on enclosure enrichment and suggestions for management of the vegetation both within and outside the enclosures.

The snake park has been a longstanding attraction for the citizens of Pune city and the rescue center has housed a variety of unfortunate animals in comfort and good health. The management plan is an outcome of efforts from the BVIEER faculty, especially the efforts made by Dr. Kranti Yardi, and in equal enthusiasm by zoo officials Dr. Kazvin Umnigar and Dr. Rajkumar Jadhav. Their efforts have led to many interesting and innovative ideas for the development of the zoo that has already been initiated while we awaited the CZA's approval. Much effort has gone into landscaping of enclosures with a view to providing natural habitat conditions within all the enclosures..

We would like to appreciate the inputs we have had from the CZA. It has delivered more than a regulatory function by giving us much needed advice on better management. We hope to continue to dwell into their expertise in future.

I am sure this zoo will continue to excel in keeping its mandate of care for its animals wellbeing, the safety and satisfaction of its visitors and its collaborative research with BVIEER.

We at BVIEER wish the zoo, all its staff and its animals well and hope it achieves even greater success as a modern zoo.

Dr Erach Bharucha
Member, Technical Committee,
Central Zoo Authority

**THE MASTER PLAN FOR
DEVELOPMENT OF
RAJIV GANDHI
ZOOLOGICAL PARK AND
WILDLIFE RESEARCH CENTRE
PUNE
TWENTY YEARS**

Chapter 1

Introduction



Sambar Enclosure

CHAPTER 1

INTRODUCTION

The ‘master planning exercise’ of RAJIV GANDHI ZOOLOGICAL PARK AND WILDLIFE RESEARCH CENTRE , PUNE , will fulfill the zoo’s future needs keeping in mind a level of flexibility to realign the zoo’s growth towards the new and emerging roles that the zoo must fulfill. The new Master Plan has to be overlaid on the existing infrastructure which one cannot wish away. The objectives of creating conservation awareness and breeding of endangered species that have not been achieved will be over the next few decades. An emphasis on the need for creating a scientifically managed ex-situ breeding facility that can prevent rapid extermination of several threatened species of the region has brought in the need for including new design elements both as an integral part of the zoo and one that includes the specific off visitor facility for implementing a successful breeding programme for selected local endangered species.

The Master Plan focuses on prioritizing the needs of the zoo by developing a ‘realistic’ plan. This plan thus fulfills the following aspects through a comprehensive approach detailed for a twenty year provision that should be reviewed after ten years or more frequently if necessary. It has dealt with the zoo’s development, upgrading its facilities and infrastructure and building capacity to fulfill its newly emerging roles as an integral part of its operations and management.

The plan focuses attention on:

1. The needs of the animals and their health, well being and supporting natural behavior patterns.
2. The needs of the management, including veterinary care, exsitu breeding of endangered species and visitor safety.
3. The needs of visitors especially related to education and generation of awareness.

In terms of animal welfare the new exhibits will be housed in adequate sized enclosures with natural habitat conditions and a comfortable environment. The enclosures will focus on the animal's health and wellbeing with as little disturbance from visitors as possible. The enclosures will not only provide for their food and shelter but prevent undue psychological stresses which are frequently a neglected part of the lives of caged wild animals.

The overall layout of the zoo will be designed so that management is made as efficient as possible. This includes aspects such as cleaning, feeding, health care, drainage and safety features.

Separate movement pathways for service delivery staff and visitors must be an important consideration of the new Master Plan. The ability of zoo personnel to monitor, capture and restrain animals in need of veterinary care is a key aspect of zoo enclosure design.

From the visitors perspective being able to see the animal especially in a simulated natural habitat is a key to a real exciting live zoo experience.

HISTORY

The Pune Municipal Corporation developed Peshwe Park as a zoo, in 1953 on approximately 7 acres of land, at the base of the Parvati hills. This was an ancient site where the Peshwas had a menagerie in 1780. The zoo was in the heart of the city and the animals were housed in small concrete cages with iron bars. There was a need therefore to establish a modern zoo with bigger, better and natural enclosures, in accordance with the Central Zoo Authority guidelines. A new zoo site was thus selected at Katraj and its development was initiated in 1997.

The zoo was re-named the Rajiv Gandhi Zoological Park and Wildlife Research Centre, and inaugurated on the 14th March 1999. The zoo area was to be 165 acres but expansion of the highways surrounding it, has reduced the zoo land to 130 acres which also encompasses a water body popularly called Katraj lake. This is a tank developed by the Peshwas to supply water to Shaniwarwada and the surrounding settlements. This is now silted up partly and thus holds less water. The zoo is recognized and categorized as a medium sized zoo by the Central Zoo Authority and houses a total of 67 different species of mammals, birds and reptiles of the Western Ghats and the Deccan. The animal collection and the zoo premises are cared for by a dedicated work-force of around 70 personnel.

Several of its animals were shifted here from the old Peshwe Park zoo that was one of Pune's attractions for visitors for several decades. The setting of the new zoo at the fringe of Pune was a foresighted vision of the Pune Municipal Corporation (PMC) as land was becoming scarce as Pune had begun to grow rapidly during the last few decades. Today the zoo is a vital green belt within the rapidly growing area that is known as Katraj. The zoo's 130 acres includes a lake of 29 acres. This bund built in the Peshwa period forms a tank that supplied Pune with water during the height of the Maratha Empire. It is a heritage structure and forms a unique waterscape that is now preserved as one of Pune's important historical sites. As it is surrounded by the zoo and its green belt it is now well protected.

The Rajiv Gandhi Zoological Park and Wildlife Research Centre (hereon called as the Rajiv Gandhi Zoo) is currently visited by 17-18 lakh visitors annually. It is a favorite destination for school students and is a potential site for educational excursions. This is rapidly becoming a tradition with many schools for their annual school outing .

There are several features apart from the historical lake that gives the zoo a unique status. It has several modern well maintained moated enclosures most of which are larger than required for both endangered and other animals. The zoo has an exceptionally high tree cover with 113 species of trees. The overall canopy cover is close to 85%. See satellite image (Map 7. Google Image).



Map 7- Google image showing the thick canopy cover of the Rajiv Gandhi Zoo

This provides shade that decreases the local temperature and provides a natural setting for animals and visitors. This high density vegetation cover attracts 61 species of avifauna and more than 20 species of butterflies that can be used as a 'nature experience' for visitors. The lake also attracts both migrant and local species of aquatic avifauna.

A major attraction for visitors is the collection of reptiles that has made a name for itself over several decades. It has 29 species of reptiles and is known as a major rescue center for snakes for the western region of Maharashtra. Most enclosures of the zoo have natural settings and most of the animals can be viewed with only a moat between them and the visitor. Each enclosure has been specially designed to suit the needs of individual species. The zoo has a layout that permits the viewer to appreciate that the species on display represent specific habitats found in Maharashtra. Thus the exhibits are grouped as forest animals, grassland animals and will in future house aquatic bird species. The zoo layout can also be used to explain prey – predator relationships and the 'web of life' of different ecosystems of Maharashtra. The future long term planning and development strategy focuses on strengthening these identified strengths to make the zoo a major attraction with a nature education facility not only for the citizens of Pune but for visitors from all over India and abroad.

The zoo's close spatial proximity to Bharati Vidyapeeth Institute of Environment Education and Research (BVIEER) which is well known for training Post Graduates, Graduate college students and school children on biodiversity conservation has led to a long term collaborative set of activities with the zoo. This provides opportunities for training in research and interpretation through a strong long term partnership in the future. Collaboration with Kranti Sinh Veterinary Science of Nana Patil College at Shirval has been encouraged by the zoo authorities which has resulted in wildlife research outputs which has been published in peer reviewed journals.

The Rajiv Gandhi Zoo is now in existence for the last thirteen years. The master plan that was developed in 1996-97 by Pushpa Kumar has been adhered to during the last decade. However with the growing requirements of the zoo and the need for new thrusts, the zoo has now developed a new Master Plan for a period of twenty years in collaboration with Bharati Vidyapeeth Institute of Environment Education and Research through several

discussions that were aimed at creating a detailed plan for the next two decades. The new needs of the plan were discussed by the Zoo Advisory Board appointed by the Pune Municipal Corporation to assist and advise the zoo management. It is aimed at upgrading facilities, improving the infrastructure, proposing acquisition of selected species and augmenting its interpretation and ex-situ conservation section. The new plan thus includes a set of priorities that would enable the management to bring the zoo to a high level of efficiency through a state of the art master plan.



Golden Oriole in tree canopy

A) The Vision: The Rajiv Gandhi zoo will use this unique facility to build conservation consciousness among the citizens of Pune that will assist in creating a pro environment lobby force for protecting biodiversity of our unique state with its diverse ecosystems that include the bio-rich Western Ghats, the semiarid grasslands of the Deccan, and the aquatic ecosystems, along with the region's diverse range of plant and animal species

B) The Mission: To develop a state of the art zoo with a focus on contented animals and conservation education for visitors, through a proactive interpretation approach.

C) Strategy of the zoo: The zoo's prioritized objectives include enhancing the wellbeing of its exhibits, supporting visitor education and augmenting wildlife conservation through ex-situ measures.

The specific objectives to be achieved during the next two decades include:

- To develop an ecosystem approach to the zoo's plan and layout as an educational facility.
- To provide enrichment based enclosures to support animal welfare.
- To redevelop the services section and its layout for better management.
- To develop a major modern ex-situ breeding facility for selected species.
- To create a state of the art Interpretation Center and vandal proof external signage.

The objectives of the zoo will be focused on creating additional well designed large moated enclosures that would be in accordance with the norms of the CZA, with a major thrust on the wellbeing of its animals by creating a natural environment. The zoo over the years has become a verdant green space that surrounds a tank on three aspects. Its ecosystem approach will be consciously maintained in future. It is a well wooded landscape and provides the visitor with a wealth of exciting nature experiences. The future tree species selection will be based on local species to enhance biodiversity through a major eco-restoration plan. This will be augmented by providing a state of the art interpretation center, as an educational facility for school and college students as well as the public at large.

D) The Objectives

The objectives of the zoo are embedded in the Mission, the Vision and the Conservation Message that the zoo expects its visitors to appreciate and thus will bring about a proactive conscious effort for biodiversity conservation among the people of Pune. The objective of the zoo is to display and conserve the important species of Maharashtra that include those of the Western Ghats and the Deccan semi arid ecosystem. The objectives that the zoo has currently envisioned include:

- i)** Captive breeding and an attractive display of common and endangered species of the Western Ghats and Deccan Plateau.
- ii)** Educating the zoo visitors on the role of modern zoos in wildlife conservation through appropriate signage and interpretive exhibits in a state of the art interpretation center.
- iii)** Conducting research on the behavioral, biological and veterinary aspects of wildlife.
- iv)** Maintaining a life time care facility.
- v)** Initializing an ex-situ breeding program on scientific lines for important local endangered species.

E) Physical features

Topography

The general topography can be seen in the map provided (See Contour Map -6). The area has a moderate slope towards the central lake. The enclosures have been designed to use the slope so that animals can be seen by visitors across the moats. The undulating topography provides a more natural habitat for the animals.

The soil has been protected by afforesting the zoo so that the siltation load into the lake has been arrested. However over several decades the lake has become heavily silted and is

extremely shallow thus has restricted the species composition of wild aquatic bird life mainly to marsh birds. During summer especially in drought years the lake water drains away leaving part of the floor exposed and invaded by weeds. De-silting the lake would facilitate holding a larger quantity of water and provide better water quality which would act as an ideal habitat for waders as well as migrant and local ducks.

F) Geology

The rock found in the zoo area is mainly Basalt rock or Deccan trap. The colour of the rock varies from grayish green with lighter or deeper shades. Basalt rock is composed of fine grained mixture or a ground mass of feldspar or augite. Besides these abundant plagioclase prisms and sometimes large tubular crystals of clear glassy orthoclase as phenocrysts in the ground mass are seen. Primary accessory minerals like apatite are few; however secondary materials like calcite and quartz are abundant.

G) Rock and soil- Basalt rock when subjected to constant stress and strain from temperature, water, air, plants and animals gives rise to black soil. The colour of the soil is black due to the combination of base salts (Sodium and Calcium) humus and montmorillonitic clay mineral. Soils found in the zoo are low in organic matter. See Appendix 1 – Details of Soil Characteristics.

H) Flora and fauna

There is a good diversity of plant life that has been nurtured across the open space, as well as within the enclosures. The list of trees in the zoo has been included in Annexure IIIB. The current tree cover is 85% of the terrestrial area. There is however an over abundance of exotic Subabul (*Leucaena latisiliqua*) and Glyricidia (*Gliricidia sepium*) trees which will be thinned and substituted with local indigenous species along with shrubs and climbers to restore the area to mimic the natural habitats seen in Maharashtra. (See Appendix 14 List of selected indigenous trees and shrubs.)

Before the zoo was established in 1999, the land around the zoo was being used for multiple purposes. The natural vegetation of the area was a semiarid thorny scrub and grassland ecosystem that is found in semi arid areas in the Deccan plateau. The grass cover was present only during the monsoon. The main trees to be found growing naturally in the

area were Babhul (*Acacia nilotica*), Khair (*Acacia catechu*), Hivar (*Acacia leucophloea*) Sandalwood (*Santalum album*), Shrubs of *Lantana camara* covered a part of the area reducing its endemic component. Neem (*Azadirachta indica*), Ipomea, Red silk cotton (*Bombax ceiba*), Ber (*Zizyphus jujuba*) and Palash (*Butea monosperma*) were less common.

Because there were not many trees, the Pune Municipal Corporation started an afforestation programme in the year 1984 and planted around 2 lakh saplings of Glyricidia, Eucalyptus (*Eucalyptus globulus*), Cassia (*Cassia siamea*) and Karanj (*Pongamia pinnata*). Glyricidia and Eucalyptus species grew rapidly and the entire area was covered with mostly exotic tree species. The entire area had a green look. Subabhul spread and as the area was protected and had water, its seeding created a dense Subabhul exotic plantation which spread rapidly in response to the plentiful supply of water, its seeds also took root and certain areas became a dense Subabhul jungle.

A part of the zoo land, around 20 acres was leased out to the Social Forestry Division which planted various other trees besides Eucalyptus. They had planted different patches with an Ashok grove (*Polyalthia longifolia*), Jamun Grove (*Syzygium cuminii*), Champak Grove (*Magnolia campbelli*), etc. They had planted other Indian forest trees like teak (*Tectona grandis*), apto (*Bahunia racemosa*) kanchan (*Bahunia variegata*) guava (*Psidium guajava*), etc. which added to the diversity of trees in the future environment of the zoo.

The list of trees found area wise is listed in Appendix 10. Since there are over 10,000 Subabhul trees in the total area of the zoo, there is need to reduce their number and increase the number of indigenous varieties. Several Subabhul trees have been cleared after taking permission from the tree authority and indigenous species like Vad (*Ficus benghalensis*), Pipal (*Ficus religiosa*), Karanj, Jamun, Mango (*Mangifera indica*), Karmal (*Dillenia indica*), Arjuna (*Terminalia arjuna*), Neem, Wild fig (*Ficus racemosa*), Bamboo (*Bambusa indica*), Shisham (*Dalbergia sisoo*), Mahogany (*Sweitenia mahogany*), Wild almond (*Terminalia catappa*), Bael (*Aegle marmelous*), Palash (*Butea monosperma*), Laburnum (*Cassia fistula*) etc. have been introduced over the years.

A variety of free living wild fauna are found in the zoo as a response to availability of food, diverse flora and the presence of the water body. The various mammals, birds, reptiles, fish, and butterflies found in the zoo have been provided in Annexure III. Due to the variety of aquatic plants, crustacean, worms and fish found in the lake, aquatic avifauna both migratory and resident use this as an ideal habitat. Several water birds both migratory and resident are seen in the zoo premises. The abundance of flowering trees and shrubs invites a number of butterflies and nectar feeding birds, which in turn attracts insectivorous birds which adds to the biodiversity of the area. Planting of more indigenous flowering and fruit trees is a part of the future agenda in order to increase the number of birds visiting, nesting or roosting in the zoo premises.

I) Climate

Temperature: The winter temperature over the last 3 years has had a minimum of about 4 to 8 degree Celsius. The summer maximum temperature has been 33 to 36 degree Celsius.

Prevailing winds: Wind speed varies from 1 to 9km/ hr. the wind direction is frequently from the East. The wind is usually stake with only occasional gusts.

More climatic data of the Pune city has been tabulated in Appendix II.

J) Rainfall: The annual rainfall during the last few years varies from about 700mm to 1200 mm. Pune gets rain from around 15th of June. Only a few days of heavy showers occur during the year.

K) Seasons: The summer season extends from March till May, rainy season from June to October and then winter starts in November till February. In summer season when temperatures rise water sprinklers help in maintaining the cool climate for the animals.

L) Approach

The Rajiv Gandhi Zoo is 12 km. from Pune railway station and 20 km. from the Pune Air Port. The Mumbai – Bangalore NH by pass around 1 km from the gate. Swargate which is a major bus stand in Pune city is 5 km from the zoo.

The approach to the zoo is from the main Satara Road which runs along the western boundary of the zoo.

M) Demography of surroundings

The Katraj and Dhankawadi area in South Pune is a rapidly expanding zone of Pune city. The zoo is situated on the edge of the main South bound arterial road which goes to Satara, Belgaum and to Karnataka. The Western aspect of the main Satara road, opposite the zoo, consists of the Bharati Vidyapeeth University complex which is a modern set of educational institutions set in large open gardens. Next to this complex are a dairy, a bus station, and a PMC garbage collection area. Behind this complex is the unplanned urban sprawl of four story tenements built along narrow roads with no set back, with poor amenities, as the urbanization process occurred in Dhankawadi village before the Development Plan of Pune could be operationalized . This gives the area a high population density, both from the residents and the students of the Bharati Vidyapeeth University who are both day scholars and residents in its four hostels. For this large population of people there is no common recreational area except the zoo with its good tree canopy and attractive waterscape. The zoo thus has a positive effect on the lifestyle and quality of life of the local inhabitants. See Appendix 9. To the East of the zoo there are new housing societies which overlook the green space of the zoo. It is said that prices of flats are higher as the flats overlook the lake and its afforested surrounds. Along the Northern aspect of the zoo lies the old stone bund on the small river course that has been in existence from the Peshwa period. The strip of land below the dam if made available in the zoo's possession will make the pathway network more efficient and the circulation easier by using it to complete the circulation loop of visitor's pathway. The zoo master plan however includes the option of constructing a bridge across the lake. This could also form a viewing area for water fowl.

The Southern boundary of the zoo borders on the Katraj-Kondhwa Road for which a part of the zoo's land will be used for road widening. This land has already been ear-marked for this purpose.

As the zoo is a large green space it is a key environmental asset for South-Pune. The surrounding area is a rapidly developing sector of Pune and is continuing to grow. Its population density which is already high will continue to increase during the next decades.

The zoo is thus a great asset for the people living around it, as no alternate open space is available for this newly developed sector of the city.

N) Legal status

A major part of the land belongs to the PMC and has no encumbrances. A small Section with MTDC will be reverted back to the zoo. The land acquisition papers have been attached as Annexure VII.

O) Sources of pollution

The two nalas which enter the lake pass through the zoo. As these were fed by rain water from the adjoining Katraj Ghat valley, the water was essentially clean when the zoo was conceptualized and was potable till two decades ago. The rapid urbanization and alteration in surface run off during the last decade led to a large amount of sewage and storm water run off into the lake leading to serious levels of eutrophication. After 2005 the sewage has been diverted and most of the waste water and sewage from the surrounding urbanization has been diverted into a new drainage system which passes through the zoo and is shown in Map 4.

Records of the water analysis of the lake, done by BVIEER over the years has shown a drastic decline in pollution and the water can now be considered fairly potable. (See Appendix 5. Study of Katraj Lake in Rajiv Gandhi Zoo using physico – chemical parameters over the last 13 years.)

The main source of air pollution is from the major Pune – Satara highway. Air pollution is also generated from the bus terminal/depot. There is less water pollution than in the past. However, upstream organic pollution still makes the lake eutrophic which has a heavy algal growth, pistia and hyacinth that creates a breeding ground for mosquitoes. While the PMC has created a drainage and sewage system for upstream residential complexes the lake water is still unsatisfactory. The incoming water will be treated through a biological water treatment facility situated on the nala course. Noise pollution (see appendix 5) is a major concern and comes from the main road that runs along the Western edge of the zoo.



Residential complexes surrounding the lake

9. PRESENT GROUND SITUATION

Description of Facilities

I) Layout

The current layout is essentially a simple U-shaped main pathway with enclosures on either side. The plan has not considered the needs of an ideal zoo layout with a separate service pathway. There are no pathways for visitors to walk along the picturesque lake shore, or sit and watch the bird life of the lake. There are very few specific well planned sit outs or covered sheds for people to rest on the lakeshore to take in the landscape. The seating capacity which has already been increased will have to be increased further by selecting shady areas for visitors to rest. The shape of the layout is inappropriate as visitors (especially older people) must walk back about 2 km to the entry gate. Due to a single main gate with entry and exit, the to and fro movement of visitors crowds the central road which should be reserved for electric vehicles that have been recently introduced. Sub-pathways or loops that are present are not adequate and serve little purpose. In some cases the to and fro visitors clash with each other as the main pathway is a two way roadway which becomes congested with visitor movement. Creating alternate unidirectional pathways with clearly defined enclosure viewing points and raised viewing platforms would ensure a smoother decongested circulation. Due to the inadequate layout the zoo is crowded and does not provide a peaceful experience.



Single main gate with entry and exit

Layout of facilities- The animal section is a major strength of the zoo as it is arranged in a zoogeographic context that can be used as an educational asset. It provides visitors with an appreciation of the geographical range of several wild animals of Maharashtra and their habitat needs in the Western Ghats and Deccan grasslands. This is an opportunity for visitors to appreciate the complexities of these ecosystems and impacts on their long term viability in the wild. The zoo has however not been able to create a vibrant absorbing learning experience for its visitors.

The enclosures are of adequate size for the exhibits, and viewing them across the moats is easily possible. There has been an attempt to create a conducive habitat for specific species and attempts have been made to green the enclosures with indigenous plants. The list of enclosures with the perimeters as a walled barrier, and / or wire mesh barrier is provided in Appendix 15. The current number of night shelters and feeding cells is mostly adequate with drop gates and drainage systems (see Table 9). If the number of the predators is to be increased, the isolation shelters are inadequate and should be increased in number and designed appropriately for the needs and comfort of the species.



Adequately sized moated enclosure for sambar

II. Water:

Clean drinking water is made available for all enclosures via either a tanker or through a pipeline. Water for gardening is pumped from the Katraj Lake. Networks for distribution of drinking water as well as lake water are being designed which will soon be implemented in order to provide an uninterrupted source of water to all enclosures and facilities. The existing layout of the water distribution lines have been depicted in map 4.

III. Electricity: The zoo is electrified through a connection from the Maharashtra State Electrical Board. Street lights along the entire length of the internal road are already installed and electric supply to the night houses has been arranged for. However, there are a lot of voltage fluctuations and this issue needs to be addressed in order that the electrical equipment in the zoo may be used without problems. A step down transformer will be installed in order to reduce voltage fluctuations. The electrical layout of the zoo has been depicted in Map 4.

IV. Manpower: As the zoo expanded in size and its collection grew, more people were required to manage the zoo. The PMC has created several more posts and present organizational chart has been attached as Annexure IV.

Description of existing infrastructural facilities

Rajiv Gandhi Zoo has been designed as a modern zoo from its conceptual stage and has adhered to its initial plan through its partial development over the last ten years. Its current thrust is to redesign its new development options keeping in mind current trends in zoo design focused on animal welfare, improved habitat conditions, enclosure enrichment based on the animals behavior needs, enhancing visitor satisfaction and creating a plan for better smoother and more efficient management and service delivery. The status of the current collection and the proposal to acquire new animals is provided in Tables 1 A, 1B, 1C and Annexure 2. This has been based on the fauna of Western Maharashtra.

The area of the zoo has been surveyed and the present amenities, their size and location were evaluated as per CZA norms, Table 7. The sizes and specifications of the existing enclosures have been found to be adequate to meet current requirements of the collection. There is however a need to increase the number of night houses in some enclosures where more individuals are to be housed (see Table 6). A new initiative of running battery operated cars for visitors, has been started and its management discussed by the Zoo Advisory Board. This has been beneficial to visitors and has already become a popular facility. The need to develop an interactive Interpretation Center and aesthetically designed interpretive material, which is currently a serious lacuna, has been discussed and its implementation has been agreed upon by the Zoo Advisory Board.

The phasing and selection of new animals has been planned. The budget provisions that the PMC should allocate for zoo up-gradation has been discussed with the Chief Garden Superintendent. See Budget section.

The lake has till recently been used for boating and fishing. This has been stopped and plans are being developed for creating a large walk through aviary for aquatic birds. This has been considered by the Zoo Advisory Board so that the natural asset of the large water body can be optimally utilized. Suggestions for dredging of the existing silted up lake and developing islands for wild birds to roost on has been discussed.

Discussions with zoo executives have demonstrated gaps in pathway design that will be rectified in the new plan. There is a general lack of amenities for visitors. The existing

reptile section is found to be too small to house all the exhibits. This would need up-gradation and a complete redesigning and relocation of this section has been planned.

The off visitor section needs to be physically excluded from the visitor section by a barrier and the whole section will be upgraded to include an ex-situ conservation breeding facility.



Off visitor section

The zoo is well managed from the view point of its expertise and manpower. It has however not been able to bring about a strong interpretation and educational component. The zoo has recently employed an Education Officer and plans to set up a state of the art Interpretation Center and upgrade its external enclosure signage. Currently it has no endangered species breeding program. The veterinary services are of a high level of competence and the animals are maintained in excellent health. Some work needs to be done to increase habitat needs of animals in a few enclosures to keep them in good physical

as well as psychological health. Efforts need to be made for enclosure enrichment through innovative approaches.

A design element that should be reviewed is the need for a better and functional pathway layout both for managers, frontline staffers and visitors. Informal visitor feedback indicates they would like to see a greater variety of species see Appendix IV. This however may not be feasible beyond a sustainable level as the zoo's strength lies in its relatively large and well maintained moated enclosures with open viewing points. As the zoo hopes to acquire a few more species and create a larger stock of some of its existing species these enclosures will require a few more night houses and resting chambers.

The zoo has not used its potential capabilities for setting up an ex-situ breeding facility for endangered species which should be initiated in a separate section of the zoo.

CHAPTER 2

APPRAISAL OF THE PRESENT

ARRANGEMENT AND CONSTRAINTS

CHAPTER 2

Appraisal of the present arrangement and constraints

Overall Summary

The Rajiv Gandhi zoo Master Plan will develop a clear zonation which would include space for the exhibits. The off visitor section which will be separated from the display section. This will include the Veterinary and other Service section and the ex-situ breeding section. The Life Care and Rescue Center will form a part of the 'off-display' section of the zoo. Map 5.

The zoo currently has fauna which represent the species from the Western Ghats and the Semi arid grasslands of Maharashtra. See Annexure 2.

The Collection Plan envisions housing 106 species. See Table 1A, 1B, 1C.

The animals are housed in mainly moated enclosures. The size and relevance to CZA norms are provided in Table 7. At present there is a major disparity between the collection plan and the existing stock position. There are still several new enclosures that have to be constructed.

The proposed expansion in the plan will have moated viewing facilities. Their approximate proposed sizes are indicated. The details are provided in Part II. The present Interpretation Center is too small to be used.

The proposed Interpretation Center will be created in 15,000 Sq. ft. of space. The existing unused and dilapidated open – air amphitheater will be renovated and closed with a roof for Audio-Visual shows.

The need for better visitor circulation has been considered and options to create a continuous loop so that visitors do not need to walk back through the same over crowded pathway have been suggested. Sub-pathways and seating areas will be altered. See Map 3. Suggested alterations in pathway layout include completing the road around the lake or have a bridge. The zoo's off visitor facilities will be upgraded and isolated from visitors.

The greatest constraint is the lack of an adequately planned circular pathway for visitors, lack of sub-pathway loops and absence of a path to view the waterscape. The common central pathway for visitors and service delivery is a major problem which needs to be addressed in the new master plan. Open spaces and viewing areas over the lake are inadequately planned. The number and nature of amenities for relaxation, toilets, eating places are grossly inadequate for the current load of visitors. Thus the carrying capacity for visitors has already been exceeded. At peak visitor time and on holidays this has become a problem for both the managerial staff and the visitors themselves. The popularity of the zoo has thus become a constraint in itself. Alternate deer and leopard safari parks should be developed in Pune to reduce the load on the zoo.

Enclosure enrichment has not been addressed sufficiently and several new innovative techniques are being tried recently which should form a continuous strategy and support for a growing research activity to keep animals in good psychological health. At present the zoo is only a tourist destination site, as it has no educational infrastructure.

An important aspect to be developed is a state of the art Interpretation Center with a focus on ecosystems and species displays on Western Maharashtra's unique wilderness and the threats to its integrity. A number of interactive exhibits should be used to address this need.

Reducing the current subabul plantation and enriching the zoo flora with a mix of indigenous evergreen and deciduous trees is necessary. The addition of local shrubs and climbers should enhance habitat quality and act as an attraction for birds, butterflies and reptiles. Appendix 14 gives the list of trees and shrubs to be planted in the zoo.

An important aspect is the ecological orientation given to the layout in the zoo that makes it a potential learning experience if adequately interpreted. The animals are healthy well kept and in most cases psychologically content. Recent attempts have been made to experiment with enclosure enrichment, Appendix 7. This aspect will be strengthened on a regularly planned basis.

a) i) **Animal Section**

See appendix 15 for details of each animal enclosure and Annexure I for the existing enclosures of the zoo.

1. **Black buck Enclosure:** The zoo presently has 31 blackbucks. The blackbuck enclosure is moated and is 3878 sq. meters in size. It has been provided with some enrichment more of which could be carried out by giving the animals a more natural habitat. The possibility of using palatable grass grown on patches on changeable mattings could be attempted. A few *Acacia arabica* (Babul) trees could also be introduced to give the enclosures a more semiarid thorn forest appearance. The collection plan suggests housing 6 males and 14 females. The seven extra animals thus have to be translocated elsewhere so that the enclosure will be sufficient to maintain them in good condition. A majority have been vasectomized. The enclosure should replicate their habitat needs and focus the visitor's attention through a visual signage depicting its interesting biological behaviour as mixed herds, bachelor herds and territorial bucks. The Sanctuary for Black Buck at Rehakuri in Karjat taluka, and Nanaj in Solapur District should be shown in visuals and the route from Pune to these two nearby habitats displayed on a map.



Black buck Enclosure

2. **Chausingha Enclosure** : The Chausingha enclosure is suitable for the species. It could however be planted with a few more forest tree species. There are currently 5 males and 7 females. The area of 4167 sq. m. is sufficiently large for 20 individuals proposed in the collection plan. Currently it has 12 Nilgai in the same enclosure, which does not appear to lead to any inter species problems.



Nilgai at Rajiv Gandhi Zoological Park

The Nilgai will be shifted to a new moated enclosure in due course. The need for a renewable grassy plastic sheet of growing grass could be tried or grass seeds could be sowed to bring naturalness for the animal's habitat and a more visually appealing environment in the enclosure.

3. **Chinkara Enclosure**: This enclosure will include 6 males and 14 females according to the collection plan. The total of 20 chinkaras will be housed in an enclosure of 3100 sq.m giving an average of 155 sq. m. per individual. The display board must stress its seriously endangered status in Maharashtra and provide information on the Supe Wildlife Sanctuary where it can be seen 80 Km from Pune. The route should be displayed in a map where its in-situ conservation has been implemented. At present the zoo has no males and only 2 females. Two barking

deer are presently being exhibited in the same enclosure till their proposed enclosure will be constructed.



Chinkara Enclosure

4. **Spotted Deer Enclosure:** The collection plan proposes 6 males and 14 females. There would be 20 animals suggested for the 4278 Sq. meter enclosure which would be 223 sq meter per individual. Shade trees should be increased within the enclosures. The zoo currently has 20 Cheetal, in the enclosure and vasectomies on the males are being carried out to keep the population under check.

5. **Sambar Enclosure:** The collection plan suggests 6 males and 14 females. The 20 animals would be housed in 8218 sq. meters giving each individual 411 Sq. m of space. The enclosure requires a few more evergreen trees to be transplanted in it to provide shade for the species. Sambars require a large wallowing area which exists as part of an enclosure enrichment plan. The numbers of Sambar at present include 5 males and 18 females of which few will be released in the wild.



Water pond in the Sambar enclosure

6. **Jackal Enclosure:** At present the new large moated enclosure for Jackal has one male and 4 females. The enclosure of 1164 sq. m. could house 4 males and 6 females i.e. a total of 10 animals. The animals have created their own den site which may induce breeding in future. Jackals feed on specific fruits such as Ficus species these will be introduced as a part of an enclosure enrichment plan. The enclosure is currently devoid of sufficient tree cover.
7. **Wolf Enclosure:** The newly developed moated enclosure currently has 1male + 2 female wolves. The collection plan envisions housing 4 males and 6 females. The enclosure is 3368 sq. m. which is much larger than required, providing each individual with 1100 sq. meters of space. The increase in number of individuals would require at least 2 more shelters as males could get into serious fights.



Wolf Enclosure

8. **White tiger Enclosure:** The collection plan envisions housing 4 males and 6 females. The 10 individuals would thus require 3000 Sq. meters per individual for meeting CZA requirements. As only 1 or 2 individuals are on display by rotation this gives sufficient space for each animal in the present 2620 sq. meter enclosure. The water through can be provided with a flush system which can be operated periodically to keep the animals drinking water clean. The enclosure has large and natural looking ponds for the animals to submerge themselves in summer as a part of enclosure enrichment.



White Tiger Enclosure

9. Leopard Enclosure:



A male leopard seen snoozing in its cage

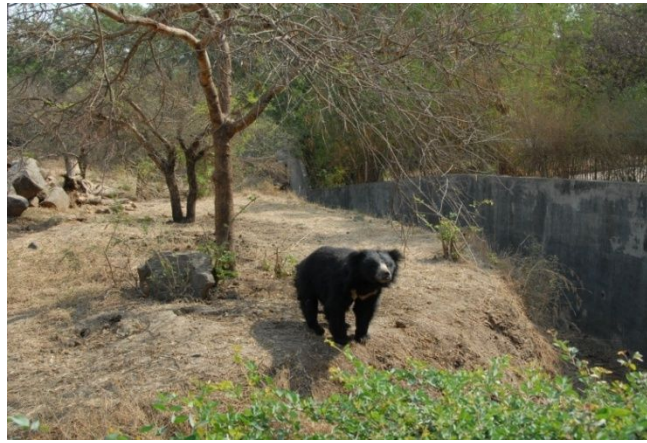
The zoo currently has 3 leopards. The collection plan suggests housing 1 male and 2 females. The requirement would be 640 sq. meter by CZA norms. The 6 animals would individually have 106 sq. m. of space but could be displayed in rotation so that the zoo could display 10 animals. The current enclosure (851 sq.m) has a natural wooded appearance. An assessment of behaviour patterns has been made and measures have been suggested for enrichment.

10. Tiger Enclosure: The tiger enclosure is 3629 sq. meters in size. At present there are 1 male and 3 females for display. The total of 4 individuals should have 1500 sq. m by CZA norms. By rotation if 1 or 2 are released in the display area this is more than adequate.



Tiger resting in naturalistic enclosure

11. Sloth bear Enclosure: The sloth bear enclosure is an ideal habitat for this species as it has irregular gullies ravines and thick undergrowth. There are hiding places for the animals to rest and digging areas for roots. The collection plan envisions 1 male and 2 female. There are at present 4 individuals. A behavior enrichment experiment has been instituted which has seen reasonable success.



Sloth bear Enclosure

12. Rhesus macaque Enclosure: The enclosure is 745 sq. meter. For 5 animals or 4 males and 6 females there should be 660 sq. m. The 10 individuals would each have an area of 66 sq. meters, which is adequate. The animals show natural behavior patterns and enrichment of their habitat has been done by using swings and ropes which are constantly in use.



Enclosure for Rhesus macaque

13. Bonnet Macaque Enclosure : The enclosure is 722 sq. meters which should house 4 male and 6 females. The enclosure will have 72 sq. meters per individual. The enclosure enrichment consists of ropeways and dead trees with plenty of scope for the animals to play. The zoo currently has 4 individuals.



Enrichment provided in the Bonnet macaque enclosure

14. Indian elephant Enclosure: It plans 1 male + 2 females as per collection plan of which it already has 2 females at present. The enclosure has a wealth of vegetation cover and as several of the branches are out of reach the enclosure will remain wooded unless the animals begin to uproot trees. The current enclosure size is 21198 sq. meter.



Elephants being given their bath

- 15. Gaur enclosure:-** The newly modified gaur enclosure currently has 2 male and 1 female. The collection plan envisions housing 2 male and five female animals. The enclosure area of 6027 sq.m. can provide the space of 861 sq m. per individual which is much larger than required.



Gaur enclosure

- 16. Porcupine enclosure:-** The existing porcupine enclosure of 254 sq.m is housing only one individual. The species is omitted from the proposed collection plan and the enclosure will be dismantled where new reptile park will be developed.

a. Veterinary facilities

The veterinary facilities consist of a hospital section of 297.88 sq. m. This includes an operation theater 22.48 sq. m. laboratory 27.77 sq. m. It has close observation cages for leopards, tigers, herbivores and small carnivores. The hospital complex consists of a conference room, library, offices for the veterinary officer and assistants, store room for medicines, X-ray room and dark room and laboratory for analyzing samples. The hospital has been provided with a ramp for the ease of movement of animals and is located in the off visitor area which is well shaded. The zoo is having staff strength of two veterinary officers and two livestock supervisors to render the services. A list of buildings other than enclosures is provided in annexure VI.

Administrative section

The Administrative Offices of the Zoo Director and support staff is well laid out.

It is correctly situated close to the gate on one hand and the off visitor section on the other.

The offices however need to use the walls for pictures of the animals etc. as this adds value to the zoo. The office section includes rooms for the following personnel.

1. Director

2. Administration staff

3. Deputy Garden Superintendent (zoo)

4. Veterinary Officer

5. Junior Engineer / Horticultural Supervisor

6. Horticultural Mistree



Administrative Block

It also has a small conference hall, stores and toilet facilities attached.

Ticket counter

The ticket counter is of adequate size but manpower needs to be upgraded during peak hours and holidays when long queues are formed. The layout of the ticket counter will be altered as the road widening has affected the entrance to the zoo.



A crowd of visitors at the ticket counter

Store

There are two store rooms, one for dried grass, and one for cages equipments etc. The store section for cages is an open garage in the off visitor section. This needs to be enlarged and a part of it should be enclosed and lockable. A parking area has been set aside for the battery operated visitor carts.

Kitchen facilities

The kitchen complex comprises of a cleaning and chopping area for vegetables, two preparation rooms, one granary, a store room for equipment and an office for the store clerk. There are adequate deep freezers for storage of beef and chicken and a fridge to store other extra vegetable items. There is staff strength of five keepers for the processing of food and one livestock supervisor to monitor the work.

Staff housing

The staff housing consists of the Zoo Director's residence and an apartment type quarters for other zoo staff as per their posts. The quarters are at one end of the zoo in the off visitor section and have a separate entrance. The staff quarters already have a separately walled section so that unauthorized personnel cannot enter the zoo through the staff area.

Sanitation

The sanitation measures are of a good standard and are organized systematically.

Maintenance

The enclosures are well maintained and the zoo is in a good state of repair.

Security

The current security measures need to be upgraded as in the recently the area as well as the number of enclosures open to public have been increased. At present security work is being managed by 45 security guards. The zoo proposes to set up a CCTV facility and a public address system for better monitoring the zoo visitors and other intruders.



A security person at the zoo

Disposal of solid waste and sewage

Solid waste and sewage disposal is currently adequately managed. A new drainage system has been developed for the area which was completed in 2008. This has reduced the level of pollution in the lake. All the vegetative waste material from the enclosures are used for composting. All carnivore night houses are connected to the drainage line. Left over bones are disposed by taking them out of the zoo premises. Garbage segregation is carried out and all paper and plastic waste is collected and disposed off by the ward office.



Visitor amenities provided at the zoo

viii) Visitor interaction area and information center

There is a building of 100 sq. m. which is inadequately designed and has no interpretive material. The building of the Interpretation Center will have to be increased in size and designed through an environment friendly concept. There is no visitor center or sales outlet for the zoo. The sales outlet should be placed near the gate. There is an unused open air amphitheater. This should be closed so that A- V shows and talks can be given to groups of visitors and school students.

ix) Visitor amenities

The gate is currently inconspicuous. The ticketing facilities are not adequate and will be modernized to give the entry point both a more functional aspect as well as a face lift. There is a felt need of the visitors to increase ticketing facilities during peak times.

In general visitor amenities have been created for a limited number of visitors. This includes toilets, resting sheds, drinking water outlets and a canteen. However as the number of visitors is increasing every year and new animals are being displayed this will require up-gradation. The current carrying capacity is already saturated (See appendices 6 and 12). Additional space available below the dam would be a welcome asset to complete the circuit around the lake.



Resting facility for visitors

The toilet and resting facilities for visitors are inadequate. The interpretative value of the zoo is grossly inadequate. Currently there are only 5 toilets and 7 resting sheds for visitors. However additional seating has been provided near the new enclosures along the central main pathway. The current signage consist of descriptions of species on the enclosures and

have not considered issues such as awareness generation, aesthetics, vandal proofing that must form a part of the mandate of a modern zoo.

x) Lawns and garden – landscape



Seating facility for visitors

The lawns and garden section has a natural look. The total number of benches is 82 and has a seating capacity of 4 or 5 visitors per bench. This is currently inadequate. The lawns are well maintained. The tree cover is thick and offers good shade for visitors. The lake view is spectacular but visitors are not given an opportunity to use this natural asset. Creating a new loop-pathway along part of the lake would give an opportunity to sit on the edge of the lake and enjoy the view.

Parking – Cars / Two wheelers

The space available for parking is inadequate for the current load of visitors.

It includes parking for 8 Buses, 320 for 2 wheelers, and 55 for 4 wheelers.

There is an urgent need to expand the parking facilities as the zoo is on a major road where no parking is available. The zoo should expand the parking mainly for buses.

Barriers:

Due to the large number of poorly disciplined visitors the zoo has barriers present in every area for visitor viewing, either in the form of a railing, a hedge or double wire mesh fencing for some enclosures such as the leopard and raptors. The zoo thus has an adequate barrier system. As most of the enclosures are moated there is no need for barriers in these enclosures, however to prevent a mishap the moat wall has been provided with a set back. Leopards have wire mesh enclosures surrounded by barriers to keep visitors a safe distance from the animals in the enclosures. The white tiger enclosure is provided with a small cabin with a glass viewing window which is popular with visitors who want to see the tiger.



Barrier in front of the leopard cage

b) Collection plan

The current collection plan that has been proposed is adequate to meet present requirements of the zoo. It is based on the species of the Western Ghats and Deccan grasslands of Maharashtra. The plan envisions alterations for the reptile section and developing a new aviary and an aquarium to enhance its collection. A review has shown that the zoo can augment its species as well as the number of individuals in several enclosures. There is also a surplus of some animals which can be used for exchange.

The collection plan is according to prescribed norms of the CZA.

However, the Collection Plan should be based on providing visitors with a more comprehensive display of the fauna of Western Maharashtra. The collection follows an ecological approach. It thus should represent a greater diversity of species of the Western Ghats, the Deccan grasslands and the aquatic (river and lake) ecosystems of the region. There should be a plan to breed local endangered species and provide these for display.

The plan for collecting the residual species not present in the zoo should include mammals, birds and reptiles so that a visitor can appreciate the diversity of taxa of this region.

The current species their number and sex ratio is attached in Annexure II. The surplus and required animal lists the zoo have been given in Tables 2 and 3.

c) General Zoo Administration

The zoo is managed by the Pune Municipal Corporation through its Garden Department. It is assisted by a Zoo Advisory Board of selected experts which is chaired by the Municipal Commissioner.

The zoo's CEO and Administrator is the Director under whom the executive functions are carried out on a day-to-day basis. The Director is assisted by a Deputy Garden Superintendent, Veterinarian, Education officer, Horticultural supervisor, Zoo animal keepers and cleaners.

There are no major management issues as the zoo has adequately trained personnel. The zoo administrative section has sufficient space and facilities. Housing for its staff is within easy reach. The zoo has computer facilities for its official work, accounting and other

purposes. Soft skills for dealing with specific visitor concerns such as providing information on the animals could be developed further for its frontline staff. Most of the keepers are committed to the welfare of their animals. Altering pathways and initiating the infrastructure for interpretation would also facilitate providing visitors with the essential 'do's-and-don'ts' while viewing the animals. It would also facilitate better visitor management.

The housekeeping, hygiene, healthcare services are at present adequate to meet all the zoo's requirements. However with the envisioned growth plan the PMC will have to add to the current staffing pattern See Annexure V. Special expertise will also be required once the ex-situ breeding center is established. The Rescue Center facilities may be shifted under the Forest Department at a different site. This would facilitate development of the lifetime care facility and the research wing. This will add to the area provided for up-gradation to house the animals in comfort and seclusion.

The current single cafeteria is not ideally situated and is inadequate for meeting the needs of the growing visitor pressure. It also requires more hygienic surrounds and better quality of food and beverages. The security services are adequate.

A review of the administrative functions of the zoo has revealed that:

- i. The zoo has an excellent record in terms of up keep, health care of its animals and has been adequately planned for local climatic conditions for its collection.
- ii. Records of birth and death are maintained.
- iii. The cost of upkeep is adequately provided by the PMC. However, there are occasional bureaucratic hurdles.
- iv. The theme for the zoo is well defined and is related to the ecosystems of Western Maharashtra.
- v. Several local endangered species have been identified for ex-situ conservation.
- vi. There are several species that have been breed and reared at the zoo which can be used for exchange. See Table 4 and 5.

d) Research

While the zoo is run on a scientific basis, the PMC has not provided funds or the infrastructure to undertake formal research work. In the recent past two research activities have been carried out:

- Enrichment strategies for selected species
- An assessment of wild biodiversity values of the zoo

Both these projects have been undertaken as part of the Masters Dissertations of BVIEER students and have been actively supported and directed by the Director of the Zoo. Veterinary and Architecture students also take up related issues for their dissertation work.

The zoo currently does not have a formal research program. However the Director is keen to take up research projects and actively assists M. Sc. Environment science students of BVIEER who are undertaking thesis work on various topics related to the zoo. An MoU Between the Kranti Sinh Nana Patil college of Veterinary science and the Maharashtra forest Department was initiated by the zoo on the guidelines of the CZA for KNP Veterinary college Shirval to be appointed as the nodal centre for veterinary wildlife investigations. The matter is still pending with Chief wildlife warden office, Nagpur.

A list of veterinary research work carried out in the zoo is provided in Appendix 11.

e) Conservation breeding

Plans have been made to breed the Malabar Giant Squirrels, King cobra and mouse deer of the Western Ghats. All the lesser cat species of Western Maharashtra such as the Jungle cat, Leopard cat, and Rusty Spotted cat. Aquatic birds such as ducks, pelicans, and spoonbills, will be housed in the proposed large aquatic aviary that has been planned and will have a secluded section for breeding.

While there are plans for conservation breeding of endangered species this has yet to be initiated. Acquiring these species is a major hurdle for the zoo administration and would require the support and help of Central Zoo Authority.

f) Education and awareness

The zoo has recently employed an Education Officer with experience in wildlife and nature interpretation. It will thus be in a position to initiate a program with school students on a more regular basis if a well designed Interpretation Center is developed. The zoo in collaboration with BVIEER has been conducting awareness programmes in wildlife week for the last ten years. New possible initiatives are to be indicated to involve school students with the zoo and initiate an ethos of conservation. The proposal for implementing an education and awareness programme is provided in Appendix-3

As education and awareness has not been given sufficient attention this aspect will be given a major thrust in the following decade. The appointment of the trained and experienced Education Officer will make an outreach and extension facility possible. The education and outreach activity has been recently outsourced so that it can be rapidly initiated. The zoo plans to set up a modern interactive Interpretation Facility with a focus on the ecosystems and species displayed in the zoo from the Western part of Maharashtra.



Education and awareness

g) Unique features

The zoo's bio-geographic layout plan provides excellent opportunities for visitors to appreciate the wilderness ecosystems that are threatened around Pune. The green cover provides an opportunity for visitors to spend long hours in the open natural surroundings that are available nowhere else in South-Pune. A nala course that is dry around most of the year can be made perennial by recycling lake water to provide an example of a stream ecosystem.

The lake is a unique feature whose potential has not been fully recognized. It should form a place to relax as well as provide historical information on the construction of the bund and Pune's dependence on its water in the past. This information can be attractively displayed to interpret its heritage value.

A unique feature of the zoo is its overall eco-restorative strategy for the area. Its habitat now includes a well forested tract surrounding an aquatic body which provides South – Pune with a green space of great ecological and biodiversity value.



Shady place for visitors

PART II

Chapter 3

FUTURE OBJECTIVES, MISSION STATEMENT AND THEME OF THE RAJIV GANDHI ZOOLOGICAL PARK AND WILDLIFE RESEARCH CENTRE – PUNE

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RAJIV GNADHI ZOOLOGICAL PARK AND WILDLIFE RESEARCH CENTRE – PUNE

The Pune Municipal Corporation, and the Zoo Advisory Board as well as visitors have a desire to create a state of the art zoo for Pune city within the next two decades. The objectives and theme of the zoo provide the framework for the expansion and the guidelines for the enhancement of its infrastructure.

Future Mission Statement

To develop a state of the art zoo with a focus on contented animals; a comprehensive conservation education facility for visitors through a proactive interpretation approach; a dynamic research programme and a new ex-situ conservation breeding facility.

The Future Mission

The enhance new mission expresses a sense of deep sensitivity to animal welfare, caring for animal rights, as well as using the zoo as an opportunity to educate the people of Pune and its surrounds on the needs of biodiversity conservation through both in-situ and ex-situ measures. The zoo will set up a new ex-situ breeding center and research facilities for animal behaviour studies.

Future Objectives

1. Enhancement of the animal collection
2. Creating a unique conservation education outreach program through a state of the art Interpretation Center
3. Developing an ex-situ conservation breeding and research center.

The thematic aspect of zoo design has been initiated as a faunal display related to Western Maharashtra's ecosystems and its important species. This will be consciously maintained as a part of its future policy and for implementation of its expanded layout.

The mission statement strongly supports National and State level efforts to conserve species that are endangered in the region. The visitor awareness strategy will focus on demonstrating linkages between the species in the zoo to food chains, food web and ecosystems in the wild and attempt to reduce the impact of human activities in the degradation of Maharashtra's residual wilderness ecosystems.

The zoo will collaborate with college biology and environment departments, and develop linkages with wildlife conservation research institutions for action oriented research. It will develop an innovative nature education outreach program to school and college students. The zoo will act as a major educational center where students from different educational levels can experience at first hand what is learned in the classroom as information on biodiversity, fauna and flora of the region.

Theme

The thematic framework for Rajiv Gandhi Zoo is to develop its enclosures and layout through an ecosystem approach.

This will include the forest ecosystem species related to the Western Ghats, the Deccan grasslands and aquatic ecosystems. A state of the art Interpretation Center with ecosystem displays and interactive audiovisual exhibits will be implemented with a focus on the distribution of local faunal diversity and wild animal behavior in relation to their habitat. The thematic organization will also be supported by habitat restoration of the forest ecosystem around the enclosures using Western Ghats species of trees and shrubs and the development of a grassland and thorn-scrub habitat for the surrounding area of the enclosures for species of the Deccan Plateau.

A special effort will be made to attract birdlife and butterflies by planting species of plants that are food sources of caterpillars of local butterflies and moths, and nectar producing flowers for the adult insects. Visitors will be able to walk and observe the local plants, birds

and insects in the simulated wild habitat. This will further add to the thematic aspect around each of the enclosures.

Thus the zoo will attempt to bring about a change in visitor perception of the zoo from its current picnic destination to one that provides a wealth of attractively displayed conservation education facilities.

d) Strategy of the zoo: The zoo's prioritized objectives include enhancing the wellbeing of its exhibits, supporting visitor education and augmenting wildlife conservation through ex-situ measures.

The specific objectives to be achieved during the next two decades include:

- To develop an ecosystem approach to the zoo's plan and layout as an educational facility.
- To provide enrichment based enclosures to support animal welfare.
- To redevelop the services section and its layout for better management.
- To develop a major modern ex-situ breeding facility for selected species.
- To create a state of the art Interpretation Center and vandal proof external signage.

The objectives of the zoo will be focused on creating additional well designed large moated enclosures that would be in accordance with the norms of the CZA, with a major thrust on the wellbeing of its animals by creating a natural environment. The zoo over the years has become a verdant green space that surrounds a tank on three aspects. Its ecosystem approach will be consciously maintained in future. It is a well wooded landscape and provides the visitor with a wealth of exciting nature experiences. The future tree species selection will be based on local species to enhance biodiversity through a major eco-restoration plan. This will be augmented by providing a state of the art interpretation center, as an educational facility for school and college students as well as the public at large.

Chapter 4

FUTURE ACTION PLAN

CHAPTER 4

FUTURE ACTION PLAN

The Rajiv Gandhi zoo has been able to develop a high standard of comfortable and amiable enclosures for its species which exceed the minimum requirements of the CZA. The size, habitat needs and seclusion required for its animals will continue to be given the highest level of attention in the coming years. The new focus of the plan will enhance both ecological and behavioral enrichment. See Appendix 7. The zoo plans to create facilities to breed selected species as a self sustaining population of genetically healthy animals for species such as Giant squirrel, lesser cats, Mouse deer and king cobra. The zoo will initiate an endangered species breeding program in an off visitor section of the zoo with adequate space, health care and breeding facilities to create a viable population of the locally relevant animals with a view to (in the long term) rehabilitate them in the wild if feasible.

The health care facilities will be further enhanced and a facility for in vitro fertilization etc, for endangered species will be created in the long term. The zoo's layout plan is based on the ecosystems in which the animals live in the wild. The new enclosures will be designed so that the animals have natural surrounds congenial to their specific behaviour patterns and feeding resting and sleeping conditions.

The new enclosures will pay special attention to redistribute visitor pressures on the enclosures by creating sub loops in the circulation to safeguard the well being of the animals. The size and shape of the enclosures will be designed to reduce noise and other nuisance from visitors so that human presence does not affect the animals' peace and wellbeing. Visitors will however have an unobstructed view of the animals from across the moated enclosures. A plantation program to enhance naturalness both within and outside the enclosures will be initiated using local species of trees and shrubs (See Appendix 14).

The new initiatives introduced through this planning process will focus on developing a comprehensive nature and wildlife interpretation facility with a major interactive and visitor display on ecosystems that will bring home the ecological linkages in nature that

support mankind and towards developing a compassion for animal life among Pune's citizens.

The zoo will continue to maintain the highest standards of hygiene, health and sanitation and provide the zoo staff with all the infrastructural needs to facilitate animal welfare. Visitor amenities and services will be enhanced as the displays that have been recently opened to visitors in the new section of the zoo now surround the whole lake.

The zoo will evolve and develop a protocol management system. This will document all contingencies and disaster management issues.

A comprehensive strategy that will enhance the zoo's thematic appeal has been evolved and the number of specimens to be housed decided upon giving due consideration to space and habitat needs of the collection. The plan will conform to all the requirements of the CZA. The Rajiv Gandhi Zoo will then be given the status of a large sized zoo. The collection plan envisages displaying a regional group of species. The plan takes into account the species seen in the wild in Maharashtra with only a few species from other states of India. Currently the zoo does not foresee the need to acquire exotic species. However, a small separate section for 10% of the exhibits may be developed in future. The zoo has the expertise and financial support to house all its animals in excellent health and in good breeding condition.

The Action Plan discussed with zoo management envisions additional species to be introduced once enclosures are designed and constructed within the existing open spaces as indicated in Map 1. A completely redesigned and upgraded reptile section will be implemented. A major walk in aviary for water birds with a natural environment at the edge of the lake and its aquatic habitat will be created. A modern aquarium will be developed. The zoo will begin acquiring the species mentioned in Table 3.

a) PROPOSED ANIMAL COLLECTION PLAN AND POPULATION SIZE WITH JUSTIFICATION FOR ENDANGERED SPECIES

The proposed collection plan has been detailed in table 1A, 1B, 1 C. The collection plan emphasizes species of the Western Ghats. The total numbers of species, proposed in the collection plan, are 27 mammals, 36 birds and 40 reptiles amounting to a total of 103 species. The amphibians will be reared separately in the off display enclosure and includes 3 species. The detailed collection plan has been further discussed species wise in the description of the layout plan.

The collection plan for the new Master Plan has been based on an analysis of the needs of the local bio-geographic region and focuses on a few important species with adequate numbers rather than a mixed collection of animals with non-viable numbers. It has also been planned to undertake a major breeding program. The collection plan is thus based on conservation needs to fulfill this vital function of a modern zoo.

The endangered species to be collected for the newly proposed ex-situ breeding facility which will mainly focus on local species in need of urgent capture breeding programmes as they are increasingly threatened in their wild habitats.

Endangered Species-

- i.** Malabar Giant Squirrel - The local colour variations of the Malabar Giant Squirrel are now under great pressure due to habitat loss, degradation, fragmentation and poaching. While these animals will be housed in an off visitor section of the zoo, once they have been bred successfully, four of these animals will be exhibited. If a sufficient stock is built up a reintroduction program into their wild depopulated habitats will be considered in Protected Areas of the Ghats.
- ii.** The Lesser cats are a key group of species in need of ex-situ breeding. The regional lesser cats include the jungle cat, leopard cat and rusty spotted cat. A plan to breed these species through a scientific breeding program along with a research project to study their behaviour patterns could help provide indicators of why these are being seen less frequently in the wild in this region. A linkage will be developed with Frankfurt Zoo which has been successful in breeding the Sri Lankan Rusty Spotted Cat. The zoo will

display one pair of each of the species. The rest of the animals will be housed in the ex-situ breeding facility.

iii. Aquatic avifauna - The aquatic birds in the large proposed walk through aviary will also be used for a carefully monitored breeding programme. Suggested species include flamingo, pelicans, storks, ibis, spoonbill, ducks etc. Several of these species are known to breed in captivity and form an attractive display for aviaries. Their wild populations are being rapidly depleted in Maharashtra. Local varieties of ducks such as dab chicks, spot bill, brahminy ducks, will also be housed in the aviary. The species to be collected include those provided in Table 1B.

iv. Gaur : The Gaur (*Bos gaurus*) is a key stone large bovid of the region and is under threat in the wild in Maharashtra. It is also of special conservation significance in Maharashtra as it is our largest mammal. Most people have never observed this great animal in its wild state. This would attract a large section of the public to the zoo who would have an interest in wildlife. The animal will breed in the zoo, providing the zoo with an important species for exchange within a few years. The Gaur enclosure will house 2 males and 5 females.

v. Lion: This is a felt need of visitors to the zoo. Its glamour value and conservation is of importance. Placing it at the terminal end of the zoo will inspire visitors to cover the distance to the opposite end of the zoo.

vi. The zoo has several species for which it requires pairs or additions for ex-situ breeding. It is also advisable to exchange animals on a regular basis to see that inbreeding does not occur.

Note: An attempt to increase the number of individuals is based on creating a viable stock with good genetic characters and for exchange of animals with other zoos as a long term investment to maintain the number and range of animals for the zoo's exchange programs. This is the only way for the zoo to grow in accordance to the CZA's rules.

b) DESCRIPTION OF THE LAYOUT PLAN

The Description of the new layout plan is provided in the following sections:

1. Detailed features of the Layout Plan
2. Enclosure Development Plan
3. Redesigning the visitor circulation plan.

1. Detailed Features of the Lay Out plan

The newly designed layout plan has been developed for visitors to appreciate the thematic groups based on an ecosystem approach. This will stress on Maharashtra's forest ecosystems - Sector A, the Deccan grassland ecosystem – Sector B and the Aquatic ecosystem – Sector C. The zoo will develop its off visitor section with a new ex-situ breeding centre (Map-5). The functional design element is a major change to a dual separate pathway layout plan for visitors and service delivery systems. As the zoo has now spread across the lake there is a need to develop a complete circuit around the lake to reduce visitor walking distance and preventing the crossing of incoming visitors and those returning to the exit gate.

The zoo management is thus planning a road around or a bridge across the lake as there is currently no other alternative short return route.

The layout plan suggests the locations of new moated enclosures as indicated in Map 1. The proposed sizes of these enclosures are provided in Table 10. The suggested sizes may be altered marginally while creating the final drawings.

As the layout is essentially thematic, it will explain the ecosystem and its species at relevant sub-interpretation centers and on columns at the access points to the relevant section.

Within each of the sectors the external signage will be displayed on vandal proof material. These will explain the layout and the interrelationship of the species to the ecosystem of the animal in the concerned section.

The new layout stresses on the need for two new walking pathways and other specific loops to view the animals which will permit better circulation and a smoother flow of visitors.

The plan envisions an off visitor road wide enough for a truck, that will be made at the periphery of the zoo for service delivery systems, shifting animals for veterinary care and food delivery.

At present visitors have very little opportunity to view the lake and its water scape. A path will be created at the waters edge in selected parts of the shoreline with adequate signage on the species that a visitor may opportunistically view during winter and summer seasons at varying depths and in the varied habitats such as open water, marsh, floating vegetation and mud banks. The three islands that will be developed for roosting of wild birds will be viewed from seating along this lakeside loop. The plan envisions de-silting of the lake, using the silt to develop the islands which will be afforested with water tolerant trees and by transplanting large trees. The islands will have a pitching of natural undressed rock to prevent erosion below the water line. The islands will be planted with water tolerant trees shrubs and grasses before the monsoon. The trees that will be used include Babul, Ficus, Jamun etc.

Old dead trees will also be provided as roosts and platforms for possible nesting on the islands. The lake will be de-silted to a required graduated depth and the islands will be developed with sloping edges for wild aquatic birds to roost peacefully away from visitor intrusion.

The layout plan envisions developing a visitor center with a gift shop, cafeteria services, an Interpretation Center and refurnishing and enclosing the existing amphitheater. All these facilities will be accessed by new loops in the layout plan. The layout plan has a major off visitor sector for veterinary facilities, a convalescence and rehabilitation section with four enclosures, an ex-situ breeding facility, with eight enclosures a rescue center and a lifetime care section. These will be laid out so that the animals get sufficient privacy and seclusion as they may be over-sensitive to visitor interference and disturbance from outside the area.

The layout suggests the location of the walk in aviary for aquatic avifauna so that it can hold water at varied depths and includes a variety of micro habitats best suited for the collection. The site has been approved by the agency selected to build the facility. The loop in the layout plan will be finalized after discussions with the aviary consultant.

The current location of the Interpretation Center is appropriate but will require major extensions to house all of the exhibits essential to provide a comprehensive nature education and enjoyable experience.

The layout plan has open areas designated for sit-outs and undercover seating. These will also be linked to three specified picnic places, two cafeterias and toilet facilities. This will prevent picnickers from sitting all over the zoo and leaving garbage strewn around the environment which makes cleaning extremely difficult at present. Once these specific eating locations are specified the ability to clean up only these specified areas will become more efficient. The need for loop pathways will facilitate access to enclosures as well as reduce congestion on the existing major route which gives access to the far side of the zoo.

An attractive shop for nature related artifacts and conservation literature will be developed near the new main gate of the zoo. A major part of the lay out is to separate a section of the zoo for important 'off-visitor' facilities which will remain inaccessible to visitors. This includes sections year marked for (a) Ex-situ breeding facilities, (b) Rescue Center and Life Time Care Facility, (c) Hospital of quarantine area for animals. See Map 1 and 5.

Map 1 has been provided on a 1: 1000 scale. It shows the topography, the existing enclosures marked in black colour; the proposed enclosures in blue and enclosures to be dismantled in the reptile section in red. The locations of proposed new enclosures are depicted with the moat and night shelters.

The main visitor circulation route for electric vehicles is marked in red. The service route to be developed is shown in grey.

The following structures are included in the map: office, veterinary hospital, quarantine facilities/ isolation ward, staff quarters and store which are located in the off-visitor sector.

The Interpretation Center is marked in blue.

Map 2 depicts existing features of the zoo

Map 3 depicts pathways (proposed and existing) main road (proposed and existing) and service roads (proposed and existing) as well as the visitor amenities like toilets, resting sheds, drinking water, cafeteria, gift shop, interpretation centers etc.

A major alteration in pathway design has been suggested and depicted in Map 3. The road that acts as the central visitor distribution system is tarred and has a width of six meters. The loops and side pathways are one meter wide. The new pathways to be created are demarcated on Map 3. To prevent people walking on the road meant for the electric vehicles, a new loop will be developed on either side of the road and along part of the lake as a viewing and seating area to observe water birds in a tranquil setting.

A major circuit road will be separately developed around the periphery for the services section which is marked in blue..

Map 4 depicts the drainage line, water network and electrical network in the zoo.

Map 5 depicts different zones of the zoo as per the ecosystem in which the animals belong..

Map 6 shows the different contours in the zoo premises.

2. Enclosure Development Plan

The Enclosure development plan will go hand in hand with other developments such as visitor circulation, reorganization of pathways, open spaces and visitor amenities, and the development of the ex-situ breeding program and interpretation center.

The following new enclosures are to be developed (Table 10) and older enclosures will be provided with habitat improvement (Please refer Appendix 7).

- 1. Lion enclosure:** The proposed lion enclosure is a moated large area of 4950 sq m. for a pride of Asiatic lions at far end of the zoo. The area will have a glass plate viewing area overlooking the enclosure. The lions will be provided with night shelters with drop gate and central partitions for segregating the individuals if required. A natural thorn forest and grassland habitat will be provided within the enclosure with rocks and

a natural pool for drinking water. Plans to procure the animals from Rajkot zoo or Sakkarbaug Zoo are in process.

This has been a longstanding request from zoo visitors. The collection plan envisions including 3 males and 7 females as a pride of 10 individuals. This will be developed once the CZA accepts the proposal.

2. Malabar Giant Squirrel enclosure: The Giant squirrel is State animal of Maharashtra. The enclosure for our State animal will be developed along the lines of the species behavioral needs and a habitat that includes tall large trees. As they are essentially arboreal and territorial the enclosure will be developed around existing trees. Climbers will be planted so that the animals can cross between tree canopies without having to descend to the ground. Nesting material will be supplied for the animals to build their roof nests. The enclosure will be more than 25 feet in height. The animals will be viewed from a high platform at tree canopy level through a one way see through glass plate viewing chamber. The viewing area will contain interpretation material on the important conservation issues related to the squirrel and its evergreen forest habitat. This has been a desire of the zoo management for a long time as it is the flagship mammal of Maharashtra and is found in the adjacent Western Ghats and Sanctuaries such as Bhimashankar and Koyana where its abundance has decreased in recent times. This would form a key species for the zoos proposed ex-situ breeding facility. The zoo plans to have a stock of 3 pairs of animals in its off visitor ex-situ breeding facility. The display enclosure will house 2 to 4 individuals in 600 sq. meters of enclosed wire mesh barriers.

There are animals in some rescue centers of Maharashtra and attempts to procure them have been unsuccessful so far. Cooperation and consent from CZA and Chief Wildlife Warden of Maharashtra are required for successful animal transfers and captive breeding.

3. Lesser Cat section – This will contain separate enclosures for the three endangered cat species. Three pairs will be housed within the enclosure size of 400 Sq m for each species.

The enclosures will have wire barriers and one way see through plate glass viewing facilities. The habitat for this species will vary according to the needs of the individual species. The jungle cat requires scrub and grass cover. The rusty spotted cat is essentially arboreal and will require a tall enclosure with trees within it. The leopard cat will need a heavy tree cover of evergreen trees. Each of the three proposed enclosures will include 400 sq. meters of space and have a natural cave like secluded animal house where the animals can move away from the crowds. This will be developed in the section shown on the map which is currently an unused tree covered space. The plan envisions including 3 males and 3 females of each species.

4. Barking deer Enclosure: The collection plan envisions displaying 6 males and 14 females a total of 20 animals in 2606 sq. m of space. This is approximately 130 sq. meters per individual. The present stock of barking deer is 5 individuals.
5. Mouse Deer Enclosure: The collection plan suggests 8 males and 12 females. The twenty individuals will have an enclosure of 515 sq. meters. At present the zoo has no mouse deer. However the zoo envisions to get rescued animals from the Maharashtra Forest Department or Hyderabad zoo.
6. Indian fox Enclosure: The zoo currently has no foxes. The collection plan envisions 4 males and 6 females. At present the zoo has no foxes. The 10 animals would get approximately 993 sq. meters in the enclosure. The fox enclosure will come up in the small carnivores section with hyenas, jackals, wild dogs and wolves.
7. Striped hyena Enclosure: The striped hyena enclosure must have a rocky appearance and the viewing gallery should be on an elevated area so that the animals can be viewed behind the rocks. The collection plan envisions housing 6 individuals in 1100 sq. meters of enclosed space.
8. Wild Dog Enclosure: the zoo proposes to keep wild dogs as part of its carnivore section. The Arignar Anna Zoo in Chennai has been breeding this species in captivity and so surplus animals could be procured from there in the future. The available area earmarked for this species is 1632 sq km. the collection plan envisages having a total of 20 animals.

9. **Lion-tailed Macaque Enclosure:** The zoo hopes to acquire 4 males and 6 females for its endangered species breeding program. The special enclosure of 750 sq m. will be developed along the lines of a modern enclosure for the animals to move at the canopy level from one habitat to another which reduces intra specific competition and permits normal territorial behaviour. This also will permit the trees in the enclosure from being completely defoliated as parts of the enclosure can be periodically closed to permit the foliage to grow back. The species is breeding well in zoos abroad hence in case animals are not available in Indian zoo then Cologne zoo or San Diego zoo could be contacted.
10. **Common Langur Enclosure_:** The zoo proposes to house 10 langurs, 4 males and 6 females in an enclosure of 1126 sq. meters in size. Currently the zoo has no langurs.
11. **Nilgai Enclosure:** At the moment Nilgai are housed along with the chousingha. However once their new moated enclosure 4070 sq m will be constructed in the grassland section, the animals will be shifted in their separate enclosure.
12. **Reptile Section:** The zoo has a popular reptile section which currently lacks the appropriate required space. It thus will be relocated as indicated in the map. The zoo collection plan envisions a total of 40 species. See table 1C.

This large collection will be displayed in enclosures of different sizes. These enclosures will be glass fronted and include the specific habitat requirements of each species. The exhibits will have brief write ups on the reptile's specific characteristics, identification features and habitat requirements. The current number of individuals as against the proposed collection plan is provided in table 1. The reptiles will be mainly exhibited as per their habitat or scientific lines to enable easy management of the species. All the aquatic species will be grouped together like marsh and estuarine crocodiles, gharials, turtles, water monitor lizard and fresh water snakes. The species living in arid conditions like tortoises, earth boas, saw scaled vipers etc. will be displayed together. Forest dwelling species like king cobra, python, rat snake, trinket snake, cat snakes, whip snake, flying snakes, bamboo pit vipers will be housed in different arboreal section. Kraits, cobras other vipers, wolf snakes, will be displayed in a grass land habitat.

A separate off visitor environmentally controlled facility will be created for breeding king cobras.

- 13. Avi-fauna Section:** The zoo at present has very few birds on display. See table 1B. There is a great need to display interesting avifauna as this stimulates a general interest in bird watching, wildlife and conservation among visitors. To enhance this awareness the zoo has plans to create a large walk in aviary for aquatic avifauna. As the zoo surrounds a 30 acre lake with various habitat types, this becomes a highly valuable asset that the zoo has not yet utilized. Aquatic avifauna walk in aviary – The PMC and the Commissioner of Pune have shown a great interest in developing a large walk through aviary, constructed as a state of the art facility by Ms. Bernard Harrison of Singapore, at an estimated cost of Rs. 4 Crores. The aquatic habitat in the aviary will house an estimated 10 species. The total number of species will include approximately 88 individuals. As these species roost and breed by building nesting colonies over water, the enclosure will create optimal conditions for these species along the shore of the lake. The plan envisions creation of a major aquatic avifauna walk – in – aviary at the edge of the lake with an area of 9317 sq. m. The proposed area will be developed partly within the water and partly along the shore. It will have a raised platform for the visitors to move through the enclosure. The area will include the existing trees overlooking the water's edge in which the birds will be encouraged to breed. As the pathway along the shore and the raised platform over water will keep visitors on a specific walk through ramp this will provide the seclusion required for these birds to breed in a natural setting. The entrance to the walk in aviary will include an A-V facility for holding visitors so that a crowd does not collect within the aviary.
- 14. Raptors Enclosure:** The number of raptors in the forests and grasslands of Maharashtra has been consistently falling. The zoo needs to inform visitors of the value of these species in the ecosystem, the threats to their survival and solutions to this serious problem. The wire mesh enclosures will be high so that the birds can fly across freely. Part of the viewing area will be constructed of glass for an unobstructed view of the birds. At present the zoo has one pair of long billed vulture and one pair of Bonelli's eagles. There are 13 species selected for the collection plan that will be housed in the new 750 sq. m. Aviary



Raptor in an enclosure

15. Aviary for arboreal birds: The zoo plan will develop an aviary of 750 sq m to house 20 green pigeons, 20 emerald dove, 6 Grey hornbill and 2 pied hornbill. The birds which were once common all over Maharashtra are now rarely seen. The enclosure will contain Ficus species which forms its key habitat requirement. Further a breeding program for the pied hornbill should be considered as this glamorous species is being rapidly depleted in Maharashtra.

16. Adding an aquarium facility to the zoo: The PMC is already operating and managing a small aquarium which exhibits some fresh water fishes in Pune, at the Sambhaji Park. Due to constraint of space in the existing facility and a felt demand of the citizens of Pune to include a modern aquarium in the Rajiv Gandhi Zoo, it has been planned to shift the aquarium to a new facility in the zoo premises. The aquarium would exhibit fresh water and marine water specimens. Thus the aquarium will focus on three aspects:

1. Regular fresh water exotic fish
2. A marine fish and invertebrate exhibit section
3. An exhibit area focusing on endemic fresh water fish, crustaceans and amphibians of India.

The current growing interest in marine fauna has been fostered by the large number of televised programs on marine organisms seen on Discovery, National Geographic and Animal Planet programs that have fascinated especially young people. This provides a strong linkage through which this growing interest in Natural History can be fostered by the aquarium.

Note:

1. All new enclosures will meet all CZA norms and be designed to replicate the animal's wild habitat.
2. The various experiments designed to enhance habitat and behavioral enrichment are provided in Appendix 7.
3. Habitat enrichment through plantation program and eco-restoration of the zoo environment is provided in Appendix 8.
4. A major design element in several of the moated enclosures is that the height is unsuitable for children as the wall is too high. This should be corrected by creating plate glass windows at a viewing height that is suitable for 2 to 10 years old children.

3. Redesigning the Visitor Circulation Plan

The current circulation plan will be altered considerably by carefully redesigned segregated pathways for visitors and service personnel. Sub loops to view animals by streaming of visitors so that the current two way congestion is avoided and zoo security is enhanced is an important part of the new zoo layout plan. See Map 3.

A major proposed development is to provide a connecting road or bridge across the lake at an appropriate site so that visitors and service personnel can have a single one way circuit around the zoo without having to reverse and retrace their steps all around the expanse of the zoo. The area that is below the bund should be used so that it can act as the pathway around the zoo. This area could be developed as a butterfly habitat as a part of future long term development.

This new Circulation Plan will prevent visitors from moving back and forth haphazardly in different directions as they will move along a main road with several side loop circuits that will bring them back in the general direction of the main road around the lake. The junction points will be identifiable on road map displayed at major intersections with prominent instructions on where to access amenities and visitor service facilities. A new service road will be constructed at the periphery of the zoo which will connect to the animal shelters. See Map 3.



Visitors at the zoo

c) PROPOSAL TO ADDRESS INADEQUACIES

Major Current Strengths, Weaknesses, Opportunities and Threats for the Rajiv Gandhi Zoo

<p>Strengths</p> <ul style="list-style-type: none"> • Large green area with good enclosures. • Enormous popularity as a visitor destination. • Only large green space in south – Pune. • High level of expertise at managerial level from Garden Superintendent / Director. 	<p>Weakness</p> <ul style="list-style-type: none"> • Inability to spread further because of peripheral urban growth. • Absence of a Conservation Education Program and Interpretation Facility • Ex-situ breeding facility not yet started. • Lack of a researchers and lack of research facilities. • Inadequately planned circulation and segregation of visitors and service pathways. • Inadequate staff.
<p>Opportunity</p> <ul style="list-style-type: none"> • Using its Conservation Educational opportunity which has been underutilized. • Presence of the lake which has not been ecologically restored as a habitat for wild avifauna. • Proximity to BVIEER for planning and implementing conservation education programmes. • Use of BVIEER and other expertise for research. 	<p>Threat</p> <ul style="list-style-type: none"> • Limit to carrying capacity of visitors. • Waste water from surrounding housing as a pollution source in future. • Illegal garbage dumping around the zoo.

The Rajiv Gandhi zoo has several new initiatives that will be implemented within the next two decades. The zoo has a clearly defined path to bringing these into fruition. This has been discussed with zoo authorities.

- The existing numbers of enclosures are inadequate for zoo visitors and more enclosures and walk in aviary is proposed. Visitors felt that the number of species exhibited and their numbers are too small. The zoo's collection plan will be implemented to increase the number of species and individuals

- without compromising on their spatial requirement or habitat needs.
- The important inadequacies include a lack of visitor education facilities; the absence of an outreach conservation education plan; the absence of an ex-situ conservation breeding center. This will be addressed by outsourcing a one year's education programme to a reputed agency that is proficient in implementing this activity.
- A review of the older plan shows that there was a plan to build a separate access road around the rear sections of the enclosures for service personnel to attend to the animals especially in emergency situations. The road which will be able to take a truck to the enclosures will be developed. This will be implemented in near future.
- Security for the large area especially at night with only 12 watchmen is inadequate. Installing CCTV cameras to address this inadequacy as been proposed.

The absence of a proactive conservation education initiative has been initiated by appointing a trained conservation education officer and planning of a major education initiative with an Interpretation Center with interactive exhibits for students and a major outreach initiative to schools.

Current school attendance is satisfactory but is not supported by a proactive education plan. See Appendix 3.

Approach road to the zoo:

The zoo is approached directly from the main Pune – Satara highway through a large gate. At present this is in the process of a major road widening and Bus Rapid Transport expansion. A major concern has been the rapid proliferation of food and beverage stalls around the gate. The PMC has agreed that no new licenses will be given for this purpose.



Food and beverage stalls around the gate

Entry Gate:

There is a single entry / exit gate at the moment. The gate and access to the zoo will be redesigned. A separate entry gate for service vehicles will be made available. The present combined entry and exit gates for visitors will be separated. A separate area will be created for the food stalls so that they are not crowded around the entrance to the zoo. This will also enhance hygiene and reduce flies.

At the moment there is a single ticketing office with several windows. However, usually only a single window is functional. There is usually an over crowding of people at the gates waiting for tickets. The gate will be completely redesigned to create a separate entry and exit for visitors and a separate service gate for vehicles. The PMC plans to increase the price of the ticket and provide tickets at various outlets across Pune so that visitors need not form queues at the gate. Other proposals to improve the infrastructure have been listed in Table 6.

High Visitor Rate: Due to the availability of limited spaces for the citizens of Pune to take their families for outings, it has been decided to construct two new facilities in Pune city to decongest the zoo on peak visitation days like Sundays and holidays (See appendix 4). The facilities include starting a butterfly garden / park at Aryaneshwar and a leopard safari

which will come up in collaboration with the Maharashtra Forest Department as the department has many leopards in captivity at their rescue centers.



High visitor rate in the zoo

1. Butterfly Garden at Aranyeshwar:

PMC is in the process of developing a butterfly park at nala park at Aranyeshwar, Sahakarnagar about 2 km from zoo. It is an extension activity of Rajiv Gandhi Zoo. The area of the park is around one acre in which the host plant species as well as the suitable nectar yielding plants will be maintained. Half of the park will be created as natural habitat for butterflies while in the other half there will be three netted enclosures in which 18 species of butterflies will be bred and maintained (See details in appendix 16). The size of the netted enclosure is 40X 30X 30 feet with wall, wiremesh sides and nylon net at the top. Interpretation facilities including signage will be developed. The plan of the park has been submitted in map 8.

2. Proposed Leopard Safari:

There are plans to create a leopard safari at Pachagaon parvati or at Chandani Chowk within an area of 100 acres. It will be a joint venture between forest department and PMC.

The leopard safari will be developed on the lines of the one that already exists in West Bengal at South Kherabari. Talks have been initiated with the Forest Department and a separate detailed plan will be made available to the Central Zoo Authority for developing the safari once this proposal has been accepted by them. It is hoped that with the creation of these two facilities, the overload of visitors at the zoo will be considerably reduced and will become more manageable.

Special off display issues

The special off display issues include the following which will be created through a time base action plan :

1. Ex-situ breeding facility.
2. Capacity building for rescue center activities.
3. Circular road for service delivery to enclosures.
4. Interior up-gradation of office space for special information and visitor information center.

1. Ex-situ breeding facility

This is now accepted as an important role that all zoos of medium and large size should be able to take on as several in situ efforts are on the brink of collapse for certain endangered species. This Noah's Ark approach is of importance as there may be many more unseen threats to species as has been experienced with the Vulture population decline due to veterinary use of Diclofenac.

The zoo has selected locally important threatened species for its ex-situ breeding facility.

- Malabar Giant Squirrel
- Three species of lesser cats
- Mouse Deer
- King Cobra

2. Rescue center activities

This has been a well known strength of this zoo with a special focus on reptiles. As this is an important function of protecting animal rights it requires further support for training volunteers and infrastructure development. However, this is an added burden on zoo management and the PMC may hand these animals over to the Forest Department at a location outside the zoo. This will provide the necessary space for the zoo's proposed research and ex-situ breeding program. The zoo personnel would however continue to assist the Forest Department with its expertise.

This activity may thus be returned to the Forest Department which is normally expected to play this important role, as the zoo has only a limited capacity and space to house rescued animals, especially those requiring life time off display care. The zoo personnel would be happy to help the Forest Department in running their center if it is established in proximity to the zoo.

3. Circular road for service delivery to enclosures

This is a lacuna in the zoo which is now being corrected. It would facilitate servicing the enclosures and providing patrolling especially at night, in the periphery while animals are in their night shelters.

4. Interior up gradation of office space as a special information and visitor information center.

The Directors office requires better seating and display boards on the number of species and individuals, visual display of its important species and photo documentation of special events. This is important as special information required by press and visitors who wish to meet the Director, inspections from CZA and other dignitaries should be provided with a better first impression of the zoo as a professionally organized institution.

Conservation breeding

No modern zoo can be complete without taking a part in the Nations ex-situ conservation effort. The Rajiv Gandhi zoo plans to develop and house a new conservation breeding initiative in a separate section for which an area has been set aside in the off display section of the zoo. This is about 3600 sq. meters in its extent and is a safe location isolated from disturbance and is covered with trees. These conditions are essential for breeding the selected species such as the threatened Malabar Giant Squirrel, lesser cats etc. Breeding of avifauna will be done in the large walk in aviary which will have an inaccessible part that will provide seclusion and nesting platforms for its avifauna close to the waters edge.

Chapter 5
PERSONNEL PLANNING

CHAPTER 5

PERSONNEL PLANNING

The zoo organization chart has been depicted in Annexure 4.

According to CZA norms the personnel strength is reasonably adequate.

A new appointment of an education officer has been made. However the scope is limited due to absence of an Interpretation facility thus under utilizing this potential for conservation education.

Master Plan envisions appointment of the following personnel

1. **The Curator - 1**
2. **Research Officer – 1**
3. **Zoo Educators - 2**
4. **Guides - 5**
5. **Interpretation Center Attendant - 1**
6. **Librarian – 1**
7. **Animal keeper – 6**

Upgrading expertise:

The zoo will undertake periodic training programs on interpretation for its zoo staff so that they know what to say to visitors when asked about their animals. The zoo will train its staff for record keeping and computerizing its data for the ZIMS program. The zoo will develop its expertise in ex-situ breeding of endangered species.

Out sourcing:

Currently the zoo has outsourced its security, it's parking facility, canteen, labour supply to a certain extent and will continue to do in case permanent staff will not be made available from the Pune Municipal Corporation.

DUTIES OF DIFFERENT EXECUTIVES OF RAJIV GANDHI ZOOLOGICAL PARK

I. Director

Director / In-Charge of the zoo shall be responsible for smooth functioning of the zoo, proper housing upkeep and health care of the animals, proper visitor management and ensuring their safety. For discharge of these functions, he should assign responsibilities and duties to all the zoo personnel. The directions issued by the zoo Director should be binding on all zoo personnel.

- 1) The Director is the Chief Executive Officer of the Zoo and shall work as the Head of the zoo with overall administrative and financial management control of the affairs of the Zoo under the general direction and guidance of the Chief Garden Superintendent of the PMC and the Zoo Advisory Board nominated by the PMC and chaired by the Commissioner PMC.
- 2) All financial powers rest with PMC and are under the executive control of the Pune Municipal Corporation.
- 3) The Director under the guidance of the Chief Garden Superintendent shall prepare the Revised Estimates for the current financial year and the Budget Estimates for the next financial year and submit the same to the Chief Garden Superintendent who will forward it to the Municipal Commissioner to be placed before the General Body of the PMC
- 4) It shall be the duty of the Director to ensure that all the accounts are kept in proper order as laid down in the account rules in force in the PMC.
- 5) The Director shall prescribe the duties of all the Officers and staffs of the zoo and shall exercise such supervision and disciplinary control as may be necessary.
- 6) The Director will co-ordinate and participate in the National and International Zoo deliberations for animal exchanges, re-introduction of the species and technical pursuits concerning wildlife conservations.
- 7) It shall be the duty of the Director to guide, co-ordinate and exercise general provisions for overall Scientific Research, Management and other activities of the park Society.

- 8) It shall be the duty of the Director to organize/conduct Zoo Advisory Body meetings and symposia, seminars, trainings etc.

II Deputy Director

- 1) Deputy Director being second in command will be responsible for the Management of the Zoological Park in absence of the director.
- 2) The Deputy Director is directly responsible for the day to day management of the zoo.
- 3) To supervise and guide the sub-ordinate staff of Animal and Garden Sections.
- 4) To ensure proper maintenance of live stock and other inventories of Zoo animals.
- 5) To plan and conduct basic and applied Research Studies n the nutritional and breeding aspects of important indigenous species.
- 6) To maintain law and order in the Zoo.
- 7) Any work assigned by the Director.
- 8) To curb vandalism and take preventive measures to safeguard Zoo property and safety to visitors.
- 9) To check entry of vehicles and regulate the gate entry tickets by posting necessary ticket collectors/darwans and adopt methods deemed fit to avoid mal practices at the main gate.
- 10) To keep liaison with the police authorities in maintaining law and order problems in the zoo.
- 11) To entertain public complaints on any matter take follow up action and submit progress report to the Director.

III. Veterinary Officer

Frequent visits to animal enclosures and assessing general health condition of animals, assessment of the adequacy of the feed being supplied to the animals, having a regular check on the quality of feed and water being supplied to the animals and timely screening of animals for parasitic loads. Preparation of disinfection schedules, prophylactic treatment schedules and ensuring the implementation of the same. Taking steps for timely restraining and treatment of sick animals, maintenance of record of the treatment provided to animals in prescribed formats, conducting postmortem of animals that die in the zoo for arriving at

logical conclusions regarding the reasons of death and device strategies for keeping the mortality of zoo animals.

- 1) To plan and establish adequate veterinary facilities in the zoo hospital and submit the details of requirements accordingly.
- 2) To study specific causes of morbidity and mortality and accordingly formulate and adopt measures to prevent diseases among zoo collections.
- 3) To undertake the operation of chemical immobilization of animals as and when required and to handle surgical and obstetrical problems.
- 4) To supervise the sub-ordinate staff of Veterinary Section, Commissary Section and Sanitation Section.
- 5) To prescribe and check the routine animal diet articles and drinking water quality.
- 6) To visit daily, the zoo animals to check up health problems and dispense necessary medications.
- 7) To treat sick animals in the enclosures or Zoo hospital and conduct pathological and microbiological examinations for specific diagnosis of etiology of the condition.
- 8) To conduct post mortem examination and to collect specimens for Laboratory investigations.
- 9) To maintain records regarding medical history (In-patient Register, Out-patient Register, Treatment Cards, PM register and Reports) of animals and disease investigations.
- 10) To procure, maintain and keep records of equipments and medicines, vaccines, reagents and chemical etc related to the Veterinary Section.
- 11) To conduct basic and applied research in the field of Wildlife health.
- 12) To maintain the live stock inventory register and ISIS data.

IV. Scientific Officer (Research)

- Making observations on the behaviour and biology of animals, assessing the compatibility of animals in groups/herds and maintaining meticulous record of the same, ensuring their upkeep and welfare including provision of special diet for pregnant females, nursing mothers, new borns / new arrivals, infirm and sick animals.
 - Genetic management of animal groups / herds particularly the endangered species including putting identification marks on the newly acquired and new born animals and facilitating timely exchange of animals with other zoos.
 - Enrichment of animals Enclosures.
 - Recommending regulation of movement of visitors in such a manner that its impact on animals is minimum.
 - Maintenance of animal history cards and studbooks as stipulated in Recognition of Zoo Rules.
 - Gathering up to date information on behavioural biology and reproductive aspects of zoo animals and use the same for refinement of protocols for animals' housing, upkeep and conservation breeding programme.
- 1) To conduct fundamental and applied research studies on ecology, physiology and animal biology and behavior.
 - 2) To guide and supervise any research carried out by the animal, Education and Garden Sections.
 - 3) Any other work assigned by the seniors.

V. Horticultural Supervisor

- 1) To ensure proper management of stumps, dead and fallen wood materials and to obtain permission for cutting green trees.
- 2) To ensure security in the Zoo premise round the clock along with Deputy Director.
- 3) To undertake the land scaping of the zoo premise, maintain the nursery, glass house for the greenery of the Park.
- 4) To establish and maintain a nursery of exotic and indigenous trees, shrubbery and grasses required for plantation in the zoo premises.
- 5) To maintain all the pumps and garden implements in working condition.
- 6) To maintain all the relevant expenditure records and inventory of the garden section.

VI. Education Officer

- Preparation of brochures, booklets, CDs and other interpretative material on behaviour biology and ecology of various species housed in the zoo for their further dissemination.
 - Designing and upgrading the signages at various enclosures and developing appropriately designed direction boards and appropriate warning signs for regulating movement of visitors.
 - Providing orientation and guidance to the visitors for having educative and rewarding experience at the zoo.
 - Making arrangements for conducted visits of organized groups.
 - Assisting in redressal of the difficulties and grievances of visitors.
 - Training the zoo personnel to deal with the visitors in courteous and polite manner without compromising with zoo ethics.
- 1) To create general awareness and sensitivity in Public about the preservation of wildlife by providing literatures, zoo guide books, handouts, leaflets and organizing audio visual shows, films, exhibitions and competition and teaching lectures about exhibits in insitu.
 - 2) To conduct periodical surveys and analyze the visitors behavioural patterns and teaching method of educating visitors about wildlife.
 - 3) To assist in various periodical training programmes, workshops, seminars, symposia on wildlife management organized by the zoo.
 - 4) Co ordination with other sections of the Zoo for publishing annual reports, bulletin, treatise etc.
 - 5) Taking rounds in display areas and educating the public not to tease Zoo animals, throw stones and food articles into the enclosures.
 - 6) Arrange smooth running of Nature Interpretation Centre in the Zoological Park.
 - 7) To plan and design standardized signage system giving complete description of the exhibits.

- 8) Maintenance of Zoo library. Procuring catalogues and maintaining books, periodicals, scientific documents etc. in the zoo library. Issue and receipt of library books.
- 9) To maintain records and files, photographs, TV/VCR, slides, documents, proceedings and reports.
- 10) Conceptual planning, development and execution of interpretative educational programmes and interpretation centre.
- 11) To plan and design standardized signage system giving complete specific description of exhibits.
- 12) To assist the Management in organizing various wildlife trainings, seminars, symposia, workshops and practical orientations and expositions.
- 13) To procure audio visual aids, required for documentation and production of various scientific and technical events store information and data to help wildlife management and education.
- 14) To produce various publications like Zoo guide books, brochures, handouts, leaflets, annual reports, magazine and management plans etc.
- 15) To promote educational programmes in wildlife and environment conservation

Chapter 6

**DISASTER AND CRISES
MANAGEMENT PLAN**

CHAPTER 6

DISASTER AND CRISES MANAGEMENT PLAN

The possible untoward events in the Rajiv Gandhi Zoo have been considered. In case of an electrical failure it is proposed to fix a generator unit that runs on Diesel. Emergency equipment will be maintained readily available.

Equipment:

The Emergency store will have a ready stock of ropes, spot lamps, emergency lights, chains, bolts, nets, tarpaulin Sheets, electric saw.

Consumables:

The zoo will maintain stored water, diesel etc in case of an emergency.

The Emergency Management Plan will constitute a well defined and documented line of command which includes Zoo Directors, Veterinarian, Zoo keepers on the premises.

Training is an essential component of any Emergency contingency plan. Periodic mock drill for animal escape, fire, injury to visitors will be known to all personnel.

Linkages to Emergency Hospitals Services Fire, Police and Forest Department will be maintained through periodic liaisons.

‘EMERGENCY CALLS’

Easy access to important phone numbers are maintained on a display board at the entrance to the zoo office – Office, Residence, Mobile Numbers

CMO – BV Medical college Hospital

Emergency ambulance services

Police station

Municipal Commissioner

Garden Superintendent

Zoo Director

Forest Department

‘EMERGENCY PROTOCOL’

A set protocol will be created for providing for information regarding security lapses to Police Department, Zoo Management Director, Garden Superintendent up to the level of the PMC commissioner.

List of possible untoward security lapses and their immediate actions will be put in a protocol and placed in a Zoo Management Manual accessible to all personnel in English and Marathi.

Currently the zoo does not have a written disaster management protocol for emergencies at the moment. The potential disasters include the following for which measures will be kept in readiness.

The Disaster and Crises Management Plan for Rajiv Gandhi Zoo

- 1) Epidemic
- 2) Preventive health
- 3) Animals rescued
- 4) Animal escape
- 5) Visitor negligence causing injury
- 6) Surveillance and maintenance
- 7) Alternate water supply

Disaster Management:

- 8) Alternate food supply
- 9) Fire
- 10) Flood
- 11) Law and order situations and security lapse
- 12) Cyclone

Surveillance and preventive maintenance of enclosures and cages

Preventive maintenance is only possible through constant surveillance. A weekly record system of inspecting all enclosures in detail will be maintained. Zoo keepers will be given instructions to immediately inform the Director of any breakdown in the enclosures, the barriers, gates etc.

Alternative potable water supply and supply of cleaning water for Enclosures

Alternate drinking water for animals in case of an emergency shutdown requires overhead tank and auxiliary pumps to lift water from tankers.

Water for house keeping requires a contingency plan through which water can be pumped from the lake.

Drought and water scarcity

The zoo will have a documented emergency water supply plan based on a tanker system for drinking water for the animals. For washing enclosures the contingency plan should include a pump and hoses that can be used to lift water from the lake.

Food strike of food and meat emergency provision

In the unlikely of a food strike the zoo will develop a linkage to alternate food suppliers. A small stock of meat could also be refrigerated for emergency use. This has serious limitations as the electrical supply for this area of Pune is extremely unpredictable. The contract with the food supplier stipulates that in case of a transport strike the supplier will take the responsibility of getting timely food stocks to the zoo.

Fire

Call the fire brigade as soon as possible which is just opposite the zoo. Stay on scene. Secure area and stop people entering the area. Animal keepers and veterinary team should go to the location.

Flood

While chances of flooding are few there is a possibility of the tank above the zoo near Katraj village giving way and leading to a down stream disaster that could flood the low lying parts of the zoo. Low lying enclosures may be flooded and dry moats may fill with water. Animal rescue operations may become urgently necessary with help from agencies such as the Fire Department, Forest Department or the Army Sappers. However the landscape has a slope which could permit water to drain off rapidly downstream over the bund wall.

Security lapse, theft and animal release

The telephone number of the nearest police station should be recorded and prominently displayed. An FIR must be recorded in case of any theft or a miscreant who tries to release an animal.

Law and order situations and Security lapse

The zoo management should be in regular touch with the Police officers posted in the nearby Bharati Vidyapeeth Police Chowky. Once a year a meeting should be held with police personnel to ensure a good working relationship during a law and order collapse. Rapid action through a locally designed protocol and responsibilities set for personnel and staff in such situations should be available and reflected on during regular staff meetings.

- The possible break downs in law and order include will full damage to exhibits or enclosures
- Theft of zoo property and /or exhibits
- Molestation and harassment of animals
- Fights between the visitors

- Theft, robbery, rape of visitors in isolated sections of the zoo
- Vandalism of zoo interpretation boards with safety
- Loss of a visitor's child through abduction.

Chapter 7
CONTINGENCY PLAN

Chapter 7

Contingency Plan

1. Animal rescued from the wild

Various steps to be taken include

1. Contact Forest department.
2. Go to venue with appropriate equipments.
3. The zoo has a pneumatic blowpipe with sufficient tranquilizer drugs for all its animals. The animal rescue squad has trained personnel.
4. Catch the animal and bring it to rescue centre.

2. Escape

1. The zoo has a tranquillizer gun with the necessary stock of tranquillizer syringes. Staff will be trained to tranquilize all zoo species. The chance of escape of animals is low

3. Monkey and dog menace

1. Inform Veterinarian

In case of Monkey menace

1. Shoo away the animals if they are migratory troops of langurs who don't cause any problems.
2. Dart the animal if it poses a danger to people / zoo animals.

In case of dogs

1. Locate the dog.
2. Call the veterinary officer.
3. Snare the dog and hand over to PMC dog squad.
4. Arrangement of food in case of supply (non supply by contractor)

Alternate Food Supply

1. Buy the food from the market / local shops at market rates.
2. Ask the contractor to foot the bill.

5. Snake bite

A stock of Anti Snake Venom is constantly maintained and the staff at the reptile section is trained in its use. Pinak herbal tablets are available in the market which can be given to the person till one reaches the hospital.

In case of a Venomous snake bite:

1. Sit the person down on the floor and ask him/her to remain calm.
2. Keep the area of the bite wound slightly below the heart level.
3. Immediately rush the patient to Sasoon hospital.

6. Visitor injury

1. A well stocked First Aid Box and Emergency kit should be maintained in the office which will be readily accessible at all times. In case of minor injuries it will be used.
2. The injured visitor will be taken to the nearest Bharati Hospital (1 km dist.)

7. Fighting amongst animals

The zoo has dealt effectively with animal fights.

1. Inform the veterinarian.
2. Separate the animals by using noise, bait or jet spray.
3. Provide treatment to any injuries that may be immediately after separation.

8. Epidemics

No epidemics have been seen in the last 7 years.

1. Keep a track of epidemics in the area
2. Seal all zoo borders to outside animal /birds.
3. Start preventive medication.
4. Control disease symptoms with effective treatment.
5. All staff should undertake all precautionary measures of personal hygiene etc.

Preventive health care and minimization

Veterinary services are available on a full time basis at the Rajiv Gandhi Zoo. Records will be computerized and constantly maintained on immunization schedules for all the animals. Dietary schedules and hygiene of a high level in the feed will be constantly monitored as a preventive health measure.

Zoo personnel should be on a constant surveillance mode for newly emerging conditions, anthrax, bird flu etc.

9. Animal rescued from the wild

Facilities for keeping rescued animals found in and around Pune city already exists. Currently these animals are housed in an off visitor enclosures. However this is becoming an increasing problem and the PMC plans to ask the Forest Department to look after such animals as release permission is not been given in time leading to overcrowding.

10. Animal escape

Escape of animals from an enclosure is less likely as the moat walls are sufficiently high and thus not conducive for animals to escape. The animal may however escape due to the negligence of the zoo keeper. At that time, the contingency plan includes a system for informing visitors to leave the zoo without causing a panic. Closure of the main entry gate in order to prevent the animal from straying out of the zoo premises should be carried out. Capture equipment and tranquilizer gun will be maintained in case of an emergency.

11. Visitors negligence causing injury or accidental death.

Visitors could get injuries if they do not follow instructions to not cross barriers or try to touch animals through the fences. Visitors could carelessly fall into a moated enclosure. In this event the zoo would have to have first-aid kits to prevent further injury which includes antiseptics, sterile bandage material, anti- tetanus injections and splints to immobilize suspected fractures. The zoo should be able to call medical specialists from a nearby hospital and a link in case of such a possibility should be made with the Casualty Department or surgical departments. The ambulance number of the closest hospital must be prominently displayed in the office.

12. Staff Strike

The PMC has categorized the zoo under emergency services and therefore the zoo workers are not entitled to go on strike.

13. Monkey and dog menace

There is very little monkey and dog menace. While this is a common feature of several zoos it has been observed infrequently in Rajiv Gandhi Zoo. The PMC has a squad to catch dogs for sterilization which would have to be called in if the stray dogs begin to be seen in the zoo frequently.

Chapter 8
CAPACITY BUILDING

Chapter 8

CAPACITY BUILDING

The zoo requires capacity building in the following sectors of its operation.

1. Conservation education
2. Ex-situ breeding program
3. Computerization and animal record keeping
4. Disaster and rescue operations

The zoo personnel require regular training programs through workshops, seminars and research meetings. While some of these are organized through the CZA there are other avenues for training. The zoo can also run its own training programs with like minded organizations so that capacity is built through an exchange of ideas.

1. Conservation education

The zoo requires building up its infrastructure manpower and expertise in conservation education. This potential has been underutilized. The zoo has only recently appointed a Education Officer. The Master Plan envisions expanding its single room Interpretation Center into a full fledged structure to cater to all its thematic areas – forest, grassland, aquatic ecosystems of Maharashtra. It will also explain the threat to the wilderness, the possible conservation measures and details of both the species present in the zoo as well as other less known species that the zoo does not include in its collection. The plan envisions making this center as interactive as possible using visuals, bird calls and A-V films. To be able to use this facility and maximize its infrastructure zoo personnel should undergo specific training so that guards, keepers and other front line personnel can express themselves through authentic information and knowledge of the behaviour, habitat needs etc., of their animals.

The Master Plan will increase its outreach facilities to schools using pamphlets, booklets and artifacts at low cost to give the zoo image of a real life learning center. The zoo will

also liaison with college students who will be trained to provide information and act as volunteer guides at the zoo. Training for zoo keepers as interpreters will form a major part of the zoo's capacity building program. New granite vandal proof sign boards will be used for each enclosure. At specific locations maps will indicate the sitting of different enclosures. However, the most popular method of transferring conservation education to the visitors is through a one on one interaction between zoo staff and visitors. This is only possible if the zoo keepers are repeatedly trained to answer queries knowledgably. An in house capacity building program will be organized in collaboration with an appropriate training facility at least once in six months.

2. Ex-situ breeding program

Capacity building for the ex-situ breeding program for selected species will be done by deputing the Director and the Veterinary Surgeon to centers where ex-situ breeding of selected or associated species is being carried out. The capacity development will include exposure to expertise in breeding selected endangered species, using modern techniques of artificial insemination and in vitro fertilization for resistant species. The Director will visit LaCones , Hyderabad, to enhance knowledge of genetics and other allied hi-tech institutions both in India and abroad.

3. Computerization and animal record keeping

The Master Plan envisions training zoo staff in the scientific tools of animal record keeping. One training program by CZA has already been done at BVIEER in collaboration with the Rajiv Gandhi Zoo where zoo staff were exposed to Zoo Information Systems its needs and methodology. The Zoo Advisory Board has agreed to providing funds for the zoo to upgrade itself in this regard. Joining the ZIMS and other International Organizations will upgrade zoo management to international standards. The animals will have micro chips so that their genetic makeup can be traced and better scientifically designed exchange programs can be instituted.

4. Disaster and rescue operations

Disaster and rescue training will require zoo staff at various levels to be provided with the capacity to deal with a variety of emergency situations that are likely to arise and threaten the safety of its animals and visitors. This will be an ongoing yearly practical training program such as fire drills, rescue simulation, animal escape management training and tranquilization provided by experts in these fields.

All staff will attend in house and other training programmes organized by other zoos and CZA at the national and international levels in order to keep them updated in the techniques of zoo management.

Chapter 9

E-GOVERNANCE

Chapter - 9

E-GOVERNANCE

The Pune Municipal Corporation has already computerized most of its departments and has supplied computers to all its offices along with an internet connection in order to decentralize its processes and reduce paperwork. Most correspondence is done via email and it is hoped that further correspondence with the Central Zoo Authority will also be done only by e-mail.

Rajiv Gandhi Zoo has developed its own website and all information about the timings, activities and education programmes of the zoo has been put up on the site. In future the zoo website will also include the volunteer activities and celebrations of a particular animal's birthday or celebrations of various important "green events" to inform and educate the public especially children about the importance of conservation.

The Central Zoo Authority has sponsored the Rajiv Gandhi Zoo's membership to the ISIS. All animals will be gradually micro - chipped and its day to day records will be maintained as per the ISIS software.

The Rajiv Gandhi Zoo hopes to achieve an international status in the next decade. This will require a strong database on its day-to-day activities, its health care information and an ability to keep a track of its animals during exchange programs. A key to this is to be able to interact with other zoos in India and abroad. The zoo thus will become an active member of ISIS and ZIMS. ISIS is the global database for the zoological community, linked to zoo management containing information on 2 million animals – almost 15,000 taxa/10,000 species. ISIS provides its members with the world standard zoological data collection and sharing software, used by 825 zoos and aquariums in 76 countries. ISIS members use the basic biologic information (age, sex, parentage, place of birth, circumstance of death, etc.) collected in the ISIS system to manage genetic and demographic programs for their animal collections.

Today, zoos and aquariums are leaders in the effort to breed endangered animals. Aquariums and zoos are the "gene bank" of the web of life. Some species have been rescued from extinction, bred in zoos and returned to the wild. This work takes a great deal

of scientific expertise, genetic research, coordination, cooperation - and all of this relies on collecting and exchanging accurate animal data. Breeding and population management rely on knowing information about animals across the region, especially pedigree history and demography (births and deaths). Accurate record keeping is essential for managing endangered species in a collection or across several collections. ISIS software has long been recognized as the world standard best practice for zoological record keeping.

ISIS records are accepted and preferred by international regulatory bodies like CITES.

Several Regional Associations seek ISIS membership for their members.

ISIS software products which would be extremely useful to the Rajiv Gandhi Zoo include:

1. Animal Record Keeping Systems(ARKS):

The Animal Records Keeping System (ARKS) software is used for institutional animal record keeping. ARKS is distributed to all ISIS members upon acceptance of membership.

The ARKS software allows members to conveniently contribute their data to the pooled ISIS database by e-mailing or mailing this information to ISIS. This data is then available to members through the ISIS Web site.

ARKS is a PC-based application (which will only work in a Windows environment) that produces numerous powerful reports based on member's own records. ARKS is multi-lingual

2. Medical Animal Records Keeping System(MedARKS)

The Medical Animal Records Keeping System (MedARKS) software supports veterinary medical records keeping and collection management. MedARKS is distributed to ISIS members upon request. MedARKS is DOS-based software that is in use by hundreds of zoos worldwide.

3. Regional Animal Species Collection Plan (REGASP)

The Regional Animal Species Collection Plan (REGASP) product is DOS-based collection planning software, which is distributed to ISIS members upon request under

license from the Australasian Regional Association of Zoological Parks and Aquaria (ARAZPA).

Institutions using REGASP have direct access to plans from other collections, which allows users to contact institutions to arrange placement or acquisition of specimens in advance.

4. Single population analysis and record keeping system (SPARKS)

Single Population Analysis & Records Keeping System (SPARKS) software supports studbook management and species analysis. SPARKS is DOS-based software used by hundreds of studbook keepers worldwide.

5. ZIMS - Zoological Information Management System

ZIMS is expected to make a quantum leap forward in information management for the thousands of professionals whose collections include living creatures. ZIMS is a unified global database on animal health and well-being - the first such database in the world. The 825 ISIS member institutions across the world will enter their data directly into this web-based global database. Any ISIS member (and others with permission) will be able to search the database and retrieve information they need (with appropriate security protections) for myriad purposes. ZIMS' state-of-the-art, web-based design will revolutionize the zoo and aquarium world, and inspire new research.

With ZIMS we will be able to exchange core data of an animal, and also all kinds of information about husbandry, veterinary care and behavior in a way that is very easy and less time-consuming than now. And all the data we find will be current. This will make life so much easier! Instead of writing e-mails and phoning colleagues we can search for this kind of information in ZIMS. The new ZIMS will be adopted by every institution that is serious about contributing to the preservation of animals.

Chapter 10

BROAD BUDGET ANALYSIS

Chapter 10

BROAD BUDGET ANALYSIS

Budget Plan

The Plan Budget required to operate the new Management Plan and its strategies for future developments are only indicative. Each scheme will be drafted in detail before implementation with complete understanding of the content of each development which will be in general in line with the long term plan. The long term vision and understanding of the specific needs of the Rajiv Gandhi Zoo's architecture, local assets such as the existing Peshwe tank must be sensitively dealt with. If environmental friendly consultations with specialized skills are available or experts are needed this will be subcontracted. All new development projects will be submitted to the CZA leaving scope for flexibility and up-gradation in future.

a) Construction and development: Up to 2011, every year the municipal corporation has been investing between Rs. 1 – 2 crores for infrastructure development in the zoo, with grants from the Central Zoo Authority, Govt. of India which gives 100% financial assistance for selected developmental projects related to animal enclosures and animal health care. It is proposed to further develop the zoo as detailed in the Management Plan. The zoo will also be applying for a 50% share on other infrastructural developmental works which are provided by the CZA. In addition to this, 50% share of the above infrastructural work will be provided by the PMC. Planning a yearly budget well in advance will make it possible for the zoo to meet its targets specified in the Master Plan.

The plan requires the budget estimate over its entire period of implementation, considering the long time frame. This is currently indicative of only the next few years as costs of construction are likely to escalate the final cost cannot be budgeted beyond the next few years. However the major projects and their estimated costs are provided as a basic projection of the cost in the future.

The detailed works to be taken up phase wise from 2011-2031 have been described in the tables in the management plan.

Construction and phasing

The new enclosures will be constructed in a phased program over the next 20 years (2011-2031). The enclosure construction work for Nilgai, Lion, Barking Deer, Jungal cat, Leopard Cat, Rusty spotted cat and Giant squirrel will be undertaken in the first phase. The new reptile facility will also be established in the first phase. The construction of Interpretation Facility will be given priority in the first phase and it is phased out for next three years. The ex situ conservation breeding facility will also be established in the first phase for the identified species.

The conceptual plan of the Interpretation Center will be developed as a center that uses natural lighting and wind power for cooling. It will also provide a vantage point to view surrounding enclosures and the lake. The center will include a video library and viewing facilities. Office space for the Education Officer, visitor services and a cafeteria are also proposed to improve the infrastructure for the public.

The aviary design is being discussed with M/s Bernard Harrison and Friends who are experts in this field and its construction will be carried out at a cost of approximately 4 Cr. This will be a state of the art walk in enclosure for aquatic avifauna. The aviary will also be used for breeding endangered birds. The project is planned in the second phase of master plan soon after the lake is drained for de-silting. The Gaur enclosure and its night shelter will be redesigned to hold a small breeding herd and their habitat in the moated enclosure will be sensitively planned.

The zoo's infrastructural development is planned from first phase which includes lot of activities like construction of changing room for staff, two toilets and four resting sheds for visitors, the wing wall for bridge and compound wall, and parking shed for Battery operated vehicles. The other developmental work includes construction of Kraal and

squeeze cage for bear and tiger enclosures. The list of activities to be conducted in a phased manner are given below.

Phase I- (Year 2011-2016)

Sr. No	Item of work
1)	Construction of changing room for staff
2)	Construction of two toilets and four resting sheds for visitors
3)	Painting of office premises and enclosures
4)	Construction of Kraal and squeeze cage for Bears and Tigers
5)	Constructing the wing wall for bridge and compound wall
6)	Fixing the HDPE waterline networking system
7)	Construction of Parking shed for Battery operated vehicles
8)	Constructing the ferroconcrete resting sheds inside the herbivore enclosures
9)	Construction of new enclosure for Nilgai
10)	Construction of new enclosure for Barking Deer
11)	Construction of Interpretation centre for educational activities
12)	Establishing the ex situ conservation breeding centre for the identified species
13)	Construction of enclosure for Lion
14)	Extension of parking
15)	Development of new Reptile section
16)	Enclosure for Giant Squirrel
17)	Enclosure for Jungle Cat
18)	Development of Aquarium
19)	Remodelling of Bird aviaries
20)	Refurbishing the main road within the premises
21)	Construction of cloak room for the visitors
22)	Enclosure for Rusty spotted cat
23)	Enclosure for Leopard cat
24)	Construction of new entry gate

In the phase two which is from 2016 to 21 includes developing new enclosures for mouse deer, bird aviaries and remodeling of enclosures of leopard, sambar, spotted deer, and gaur. Development of service road to all the enclosures is also planned in this phase. The activities to be done in the second phase are given in the table below.

Phase II - Year 2016 – 2021

Sr. No	Item of work
1)	Enclosure for Mouse deer
2)	Eco restoration and de silting of lake
3)	Construction of service road to the enclosure
4)	Construction of walk through aquatic bird aviary
5)	Construction of aviary for raptors
6)	Construction of aviary for terrestrial birds
7)	Remodeling of Leopard enclosure
8)	Extension of parking
9)	Construction of bridge to make the circular main road
10)	Remodeling of Spotted Deer enclosure
11)	Remodeling of Sambar enclosure
13)	Remodeling of Gaur enclosure

De-silting the lake and building roosting islands for avifauna

A major activity planned for the historical Peshwa tank is a de-silting operation with funds from JNNURM. At present the lake is completely silted and eutrophic. Once its water holding capacity is restored and islands are created the lake will begin to attract aquatic local and migrant waterfowl. The islands will form ideal nesting and roosting areas where the birds will get a sense of security because the fishing and boating are discontinued.

The cost of the works will be carried out by the PMC as a part of the JNNURM activities.

Major milestones

1. Emptying the lake
2. Bulldozing silt
3. Pitching by using rocks for islands
4. Filling lake and restoration of habitat
5. Enhancing bird diversity – feeding, roosting sites transplanting trees on islands and edges
6. Introducing Typha – the aquatic plant

The details of funding have been outlined in the section Broad Budget analysis.

The next phase gives the list of activities to be conducted from the year 2021 to 2026. The work includes developing enclosures for wild dog, fox and hyena. This phase also includes refurbishing enclosures of sloth bear, rhesus and bonnet macaque. The table below gives the list of activities to be done in the third phase.

Phase III - Year 2021 – 2026

Sr. No	Item of work
1)	Enclosure for Wild dog
2)	Enclosure for Fox
3)	Enclosure for Hyena
4)	Remodeling of Sloth Bear enclosure
5)	Remodeling of Rhesus Macaque enclosure
6)	Remodeling of Bonnet Macaque enclosure
7)	Refurbishing of roads

In the fourth phase all new enclosures will be completed and after this phase only refurbishing work will continue in the zoo. The enclosures for langur and lion tailed macaque will be constructed. The refurbishing work of chinkara, Chausingha, blackbuck and tiger is planned in this phase.

Phase IV - Year 2026 – 2031

Sr. No	Item of work
1)	Enclosure for Langur
2)	Enclosure for Lion tailed macaque
3)	Remodeling of Chinkara enclosure
4)	Remodeling of Chausinga enclosure
5)	Remodeling of Black Buck enclosure
6)	Remodeling of Tiger enclosure
7)	Remodeling of Elephant enclosure

b) Day to day maintenance

The day to day maintenance of the zoo includes providing budgets for the following heads:

1. Salaries
2. Maintenance of enclosures
3. Food Supply
4. Publicity material development and printing
5. Maintenance of vehicles
6. Maintenance of buildings
7. Roads, walls and Garden maintenance
8. Research Center

The budget for day to day maintenance is provided by the Pune Municipal Corporation. The major budget head is salaries (1.39 crore) and animal feed. Rs. 70 lakhs has been earmarked for salaries of the zoo staff (year 10-11) and 36 lakhs for maintenance which includes feed, medicines, contingency etc. Every year a 10% increase is recommended in the budget plan to accommodate the rise in prices. The annual income of the zoo through gate collections and battery operated vehicle tickets are deposited directly into the treasury of the PMC. The PMC provides the entire finance asked for to run the zoo, no matter the amount of revenue the zoo collects. Since 2008 when the ticket rates have been increased, the zoo gate collection is able to match the annual maintenance costs. See Table 11A and 11 B.

PART – III

Chapter -11

MANAGEMENT PLAN

CHAPTER 11

Management Plan

The management plan for the Rajiv Gandhi Zoo provides a detailed road map of activities to be taken up through a prioritized set of actions and the year wise works with funding for major development.

It details the procedures to be adopted and the individuals responsible for implementing the core activities.

The Activities detailed in the Management Plan include the following priority actions that are the milestones that will bring about a phased and focused development of the zoo.

- 1) Development of a site specific zoo management manual.
- 2) Development of a computerized animal management plan.
- 3) Creating linkages with research and academic institutions.
- 4) Developing a public image as a place of environment education and conservation awareness.
- 5) Upgrading skills of frontline staff, keepers and middle level management.
- 6) Formulating a training program for breeding endangered species in collaborations with selected foreign and Indian zoos where expertise in ex-situ conservation is available and for exchange of animals and expertise.
- 7) Setting up a state of the art interactive conservation Interpretation Center.
- 8) Develop an outreach plan for Municipal schools.
- 9) Create strong media support through regular proactive contact sessions.
- 10) Strengthen Disaster prevention and management.

SCHEDULE OF OPERATION

Phase I- (Year 2011-2016)

Sr. No	Item of work	Cost estimate
1)	Construction of changing room for staff	10 lacks
2)	Construction of two toilets and four resting sheds for visitors	50 lacks
3)	Painting of office premises and enclosures	10 lacks
4)	Construction of Kraal and squeeze cage for Bears and Tigers	10 lacks
5)	Constructing the wing wall for bridge and compound wall	10 lacks
6)	Fixing the HDPE waterline networking system	42 lacks
7)	Construction of Parking shed for Battery operated vehicles	10 lacks
8)	Constructing the ferroconcrete resting sheds inside the herbivore enclosures	10 lacks
9)	Construction of new enclosure for Nilgai	70 lacks
10)	Construction of new enclosure for Barking Deer	50 lacks
11)	Construction of Interpretation centre for educational activities	3 crore
12)	Establishing the ex situ conservation breeding centre for the identified species	1.5 crore
13)	Construction of enclosure for Lion	1 crore
14)	Extension of parking	3 crore
15)	Development of new Reptile section	3 crore
16)	Enclosure for Giant Squirrel	40 lacks
17)	Enclosure for Jungle Cat	30 lacks
18)	Development of Aquarium	10 crore
19)	Remodeling of Bird aviaries	25 lacks
20)	Refurbishing the main road within the premises	1.8 crore
21)	Construction of cloak room for the visitors	5 lacks
22)	Enclosure for Rusty spotted cat	30 lacks
23)	Enclosure for Leopard cat	30 lacks
24)	Construction of new entry gate	15 lacks

Phase II - Year 2016 – 2021

Sr. No	Item of work	Cost Estimate
1)	Enclosure for Mouse deer	40 lacks
2)	Eco restoration and de silting of lake	5 crore
3)	Construction of service road to the enclosure	1.5 crore
4)	Construction of walk through aquatic bird aviary	5 crore
5)	Construction of aviary for raptors	60 lacks
6)	Construction of aviary for terrestrial birds	60 lacks
7)	Remodeling of Leopard enclosure	25 lacks
8)	Extension of parking	2 crore
9)	Construction of bridge to make the circular main road	10 crore
10)	Remodeling of Spotted Deer enclosure	20 lacks
11)	Remodeling of Sambar enclosure	20 lacks
13)	Remodeling of Gaur enclosure	20 lacks

Phase III - Year 2021 – 2026

Sr. No	Item of work	Cost Estimate
1)	Enclosure for Wild dog	90 lacks
2)	Enclosure for Fox	70 lacks
3)	Enclosure for Hyena	70 lacks
4)	Remodeling of Sloth Bear enclosure	25 lacks
5)	Remodeling of Rhesus Macaque enclosure	15 lacks
6)	Remodeling of Bonnet Macaque enclosure	15 lacks
7)	Refurbishing of roads	2 crore

Phase IV - Year 2026 – 2031

Sr. No	Item of work	Cost Estimate
1)	Enclosure for Langur	90 lacks
2)	Enclosure for Lion tailed macaque	80 lacks
3)	Remodeling of Chinkara enclosure	25 lacks
4)	Remodeling of Chausinga enclosure	25 lacks
5)	Remodeling of Black Buck enclosure	30 lacks
6)	Remodeling of Tiger enclosure	30 lacks
7)	Remodeling of Elephant enclosure	40 lacks
	Total expenditure for phase I to IV	62.75 crore

PRIORITIZATION

A set of priorities has been selected based on the recent discussions in the Advisory Board of the zoo.

1) Creating new enclosures

- 1) A number of new enclosures have been planned. See Table10
- 2) Development of a state of the art Interpretation Center and outreach activities.
- 3) Designing a service road and multiple pathways.
- 4) Developing a new reptile section.
- 5) Initiating an ex-situ conservation breeding facility for selected endangered species.
- 6) Developing a walk in aviary.
- 7) Developing visitor amenities and Lake Beautification.

Strategy to achieve goals:

A set of priorities have been discussed with PMC officials the Chief Garden Superintendent on new initiatives that should be taken up in the zoo. These activities will be executed by PMC through a tender process. The execution will be monitored by Zoo Director and Deputy City Engineer of the garden department of PMC.

The present and proposed goals will be created through discussions with PMC officials, Zoo Advisory Board Member, experts in zoo management and wildlife researchers.

A Rajiv Gandhi Zoo Management Protocol Manual will be conceptualized, designed and used as a day to day management tool.

The zoo's image as only a recreational facility will be consciously altered towards its role in conservation education and awareness and its future role in ex-situ conservation and research will be spread to the public at large.

The priorities to develop the zoo into the next phase of growth will stress an education research and conservation breeding. With new animals on display the zoo will attract an even larger number of visitors. A major management concern will be to support the varied needs of this ever growing numbers of the general public which will soon over run the

carrying capacity of the zoo. The zoo layout plan with its new modifications is expected to diversify the routes through the zoo, create a larger number of places for the visitors to relax and walk around the zoo without feeling that the place is overcrowded.

Providing alternate activities such as the interpretation center which would also make visitors spend time in alternate locations. The aquarium, the films in the amphitheater would also help in decongesting the pathways around the enclosures.

There are several features that visitors can be encouraged to observe. The lake with its wild aquatic avifauna, the roosting colony of fruit bats and the number of birds and butterflies could attract visitors if this is initiated through a sensitive awareness program.

Zoo management would consider getting into collaborative ventures with other zoos especially for breeding and exchange of endangered species. The collection plan will be adhered to and measures taken to tag animals.

Management will develop linkages with press reporters so that a positive image of the zoo is provided in the local press and electronic media.

Once a protocol set of activities with specific time frame is created in the form of a manual for the zoo the day to day management will be streamlined.

1. Development of a site specific Zoo Management Manual.

The Rajiv Gandhi Zoo will undertake a project to develop a site specific zoo Management Manual based on a set of protocols for the following activities.

- Animal enclosure maintenance protocol
- Feeding regimes of each species
- Habitat eco-restoration of zoo surrounds
- Enclosure habitat enrichment based on ecosystem specificity
- Animal behavior support through enrichment
- Disaster protocols
- Visitor feedback analysis

- Visitor hazard protection, prevention and management
- Security
- Training programme at all levels with frequency and curriculum (including interpretation)
- Interpretive objectives and dissemination of the zoo activities.

The zoo will organize a workshop to focus attention on developing the Management protocols for the needs of the Manual. The zoo Director will outline all the day to day activities needed for protocol based actions so that there are set ways of managing the animals feeding regimes, cleaning enclosures, maintenance activities etc. The Manual will also outline those activities that require weekly, monthly and emergency measures. The PMC will select an institution with the requisite experience in the multiple aspects required for the development of a site specific manual for Rajiv Gandhi Zoo. Help may be sought from CZA in this regard. This activity should be initiated immediately and the Protocol Manual should be created tested and finalized within one year.

2. Development of a computerized animal record system:

The zoo will maintain its records for animal numbers, health, incidents, births, deaths, stereotypic behaviour. This will be facilitated since the zoo is a member of ISIS.

3. Creating linkages with research and academic institutions:

The zoo will develop linkages for research, training and outreach with institutions such as the neighboring Bharati Vidyapeeth University Institute of Environment Education and Research (BVIEER), the Pune University; Veterinary colleges in Shirval, Mumbai and Parbhani and elsewhere for supporting its collaborative research programs.

Its outreach and educational connections with BVIEER over the last ten years will be enhanced through a wider program with the zoo education officer.

The zoo will begin documenting its research activities and send papers for publication in relevant journals. This activity will be taken up by the Zoo Research Officer under the guidance of the Zoo Director. The linkages should bring out its collaborative research as papers and in the zoo's Annual Report. It is advisable to advertise the post of Research

Officer to coordinate these research projects and identify those that are useful for zoo management.

4. Developing a public image as a place of environment education and conservation awareness.

The zoo has been a popular destination for Puneites and visitors to the city. Efforts will be made to convert this casual interest into a more focused environment education and conservation based interest among its visitors.

This could be enhanced through a curriculum linked handbook for school teachers on the specific ecological and biological issues with clear linkages with school curricula so that the visits to the zoo become a greater learning experience.

The activity will be planned and executed through a collaborative exercise with the BVIEER team, its M. Sc. students and the Zoo Education Officer. The Manual for teachers will be published by the PMC and could be sold at the gate to teachers as well as the public. The booklet should be a practical guide and a reference document that enhances interpretation beyond what can be seen in the Interpretation Facility. It will contain activities that can be taken up by students during a visit to the zoo.

5. Upgrading skills of frontline staff, keepers and middle level management.

The zoo management will organize training programs to upgrade skills through focused and practical training programs for the following:

Training programs through collaborative initiatives: Training Objectives –

Possible collaborations:

- Animal behaviour documentation – BVIEER, Shirval Veterinary College
- Health profiling - Veterinary College - Shirval
- Enclosure maintenance – College of Engineering, Pune
- Interpretation – BVIEER, Pune
- Record keeping- CZA, ISIS

- Computerization – CZA, ZIMS
- Visitor interaction – BVIEER, Pune
- Media support – Major local papers
- Ex-situ breeding – Laboratory for Conservation of Endangered Species, Hyderabad
Cologne Zoo, Bonn Zoo, Frankfurt Zoo.
- Animal Welfare – Beauty without cruelty / PETA - Pune
- Twinning programme – Cologne Zoo

A training program for these specific issues will form a part of the training activities which will go towards developing the Zoo Management Manual. The zoo keepers and veterinarians will be sent for field exposures to different zoos in India and abroad. This will provide the Rajiv Gandhi zoo with a greater level of modernization, upgrading its research and setting up several ex-situ breeding programs. The Zoo Director will be exposed to a training program abroad.

Possible linkages include Frankfurt zoo, Cologne zoo, Bonn Botanical Garden with which there are possibilities for creating linkages and training programs on specific issues.

An important concern is providing motivation for the Zoo's frontline staff to be able to value their job and see the need for upgrading their expertise in modern methods of handling and breeding of their charges.

The Zoo Director will prioritize those aspects of training that would be most useful for better day to day management of the zoo.

PART IV
ANNEXURES
TO THE MASTER PLAN

Part IV

List of ANNEXURES TO THE MASTER PLAN

Annexure I- Existing layout Map (Attached in the set of map as a Map 1)

Annexure II - Present Animal numbers

IIA - Current stock position for Mammals as of 31st March 11

IIB - Current stock position for Birds as of 31st March 11

IIC - Current stock position for Reptiles as of 31st March 11

Annexure III – Free living Flora and Fauna in the zoo

Annexure IV- Organization chart of the zoo

Annexure V- Staffing pattern

Annexure VI- List of buildings other than animal enclosures

Annexure VII- Notification done for the zoo

Annexure VIII- Management Plan

Annexure-II Present Animal Numbers

II A – Current stock position for Mammals as of 31st March 2011

A	MAMMALS	Scientific Name	M	F	U	T
1	Black buck	<i>Antelope cervicapra</i>	12	12	0	24
2	Chinkara	<i>Gazella gazella bennetti</i>	3	3	0	6
3	Four- horned antelope	<i>Tetraceros quadricornis</i>	3	5	0	8
4	Jackal	<i>Canis aureus</i>	4	7	0	11
5	Leopard	<i>Panthera pardus</i>	1	2	0	3
6	Gaur or Indian bison	<i>Bos gaurus</i>	1	1	0	2
7	Macaque Bonnet	<i>Macaca radiata</i>	1	4	0	5
8	Macaque Rhesus	<i>Macaca mulatta</i>	2	5	0	7
9	Tiger Bengal	<i>Panthera tigris</i>	1	3	0	4
10	Tiger Bengal (White)	<i>Panthera tigris tigris</i>	1	2	0	3
11	Sloth Bear	<i>Melursus ursinus</i>	3	1	0	4
12	Indian Wolf	<i>Canis lupus pallipes</i>	1	2	0	3
13	Indian Elephant	<i>Elephas maximus</i>	0	2	0	2
14	Cat Jungle	<i>Felis chaus</i>	1	0	0	1
15	Barking Deer	<i>Muntiacus muntjac</i>	2	3	0	5
16	Sambar *	<i>Cervus unicolor</i>	8	14	0	22
17	Spotted Deer	<i>Axis axis</i>	10	23	1	34
18	BlueBull (Nilgai)	<i>Boselaphus tragocamelus</i>	7	6	0	13
19	Hyena	<i>Hyaena hyaena</i>	0	0	0	0
20	Porcupine Indian	<i>Hystrix indica</i>	0	0	2	2
	TOTAL MAMMALS		61	95	3	159

II B – Current stock position for Birds as of 31st March 2011

Sr. No	Species	Scientific Name				
			M	F	U	T
A	BIRDS					
1	Peafowl	<i>Pavo cristatus</i>	1	4	1	6
2	Long Billed vulture	<i>Gyps indicus</i>	1	1	0	2
3	Eagle Bonelli's	<i>Hieraaetus fasciatus</i>	0	2	0	2
4	Eagle Short Toed Snake *	<i>Circaetus gallicus</i>	0	0	0	0
5	Eagle Steppe	<i>Aquila nipalensis</i>	0	0	1	1
6	Eagle Crested Serpent	<i>Spilornis cheela</i>	0	0	3	3
7	Eagle Tawny	<i>Aquila rapax</i>	0	0	1	1
8	Great Horned Owl	<i>Bubo bubo</i>	0	0	2	2
9	Barn Owl	<i>Tyto alba</i>	0	0	4	4
10	Vulture Cinnerous	<i>Aegyptius monachus</i>	0	1	0	1
11	Kite Brahminy	<i>Haliastur indus</i>	0	0	2	2
12	Kite Pariah	<i>Milvus migrans</i>	0	0	4	4
13	Kestrel	<i>Falco naumanni</i>	0	0	1	1
14	Brown Fish Owl	<i>Ketupa zeylonensis</i>	0	0	1	1
15	Falcon Laggar	<i>Flaco jugger</i>	0	0	2	2
16	Shikra *	<i>Accipiter badius</i>	0	0	2	2
17	Painted Stork	<i>Mycteria leucocephala</i>	0	0	0	0
A	TOTAL BIRDS		2	8	24	34

II C – Current stock position for Reptiles as of 31st March 2011

C	REPTILES	Scientific Name	M	F	U	T
1	Crocodile Marsh	<i>Crocodylus palustris</i>	2	1	0	3
2	Gharial	<i>Gavialis gangeticus</i>	0	3	0	3
3	Python Indian Rock	<i>Python molurus molurus</i>	2	3	0	5
4	Turtle Indian Flap Shelled	<i>Lissemys punctata punctata</i>	1	3	0	4
5	Indian Roofed Turtle	<i>Kachuga tecta</i>	2	1	0	3
6	Cobra Monocellate	<i>Naja kaothia</i>	0	1	0	1
7	Cobra Indian	<i>Naja naja naja</i>	3	7	0	10
8	Cobra King	<i>Ophiophagus hannah</i>	1	1	0	2
9	Lizard Monitor	<i>Varanus bengalensis</i>	1	1	1	3
10	Snake Rat	<i>Ptyas mucosus</i>	6	9	0	15
11	Keelback Checkered	<i>Xenochrophis piscator</i>	14	13	0	27
12	Viper Russell's	<i>Vipera russelii</i>	2	3	0	5
13	Keelback Striped	<i>Amphiesma stolata</i>	1	1	0	2
14	Boa Common Sand	<i>Eryx conicus</i>	2	2	0	4
15	Boa Red Sand	<i>Eryx johnii</i>	2	2	0	4
16	Catsnake Common	<i>Boiga trigonata</i>	1	1	0	2
17	Keelback Green	<i>Macropisthodon plumbicolor</i>	1	1	1	3
18	Krait Common	<i>Bungarus caeruleus</i>	1	2	0	3
19	Kukri Banded	<i>Oligodon arnensis</i>	1	1	0	2
20	Racer Banded	<i>Argyrogena fasciolatus</i>	2	2	0	4
21	Snake Trinket	<i>Elaphe Helena</i>	2	2	0	4
22	Snake Wolf	<i>Lycodon aulicus</i>	1	3	0	4
23	Tortoise Indian Starred	<i>Geochelone elegans</i>	6	9	0	15
24	Tortoise Elongated	<i>Indotestudo elongata</i>	2	1	0	3
25	Viper Saw Scaled	<i>Echis carinata</i>	2	2	0	4
26	Snake Oriental Flying	<i>Chrysopelae ornata</i>	0	1	0	1
27	Indian Pond Terrapin	<i>Melanochyls trijuga</i>	1	2	0	3
28	Viper Bamboo Pit	<i>Trimeresurus gramineus</i>	1	1	0	2
C	TOTAL REPTILES		60	79	2	141

Annexure III

A. List of Fauna Found in the Premises of the Rajiv Gandhi Zoological Park

1. MAMMALS

SR NO	Common Name	Scientific Name
1	Brown Rat	<i>Rattus norwegicus</i>
2	Civet	<i>Paradoxurus hermaphrodites</i>
3	Hare	<i>Lepus nigricollis</i>
4	House Mouse	<i>Mus musculus</i>
5	House rat	<i>Rattus rattus</i>
6	Indian Flying fox	<i>Pteropus giganteus</i>
7	Large Bandicoot rat	<i>Bandicota indica</i>
8	Little Indian Field Mouse	<i>Mus booduga</i>
9	Mongoose	<i>Herpestes edwardsii</i>
10	Three striped Palm Squirrel	<i>Funambulus palmarum</i>

2. BIRDS

SR NO	Common Name	Scientific Name
1	Barn Owl	<i>Tyto alba</i>
2	Baya Weaver bird	<i>Ploceus philippinus</i>
3	Black Drongo	<i>Dicrurus macrocercus</i>
4	Blue rock pigeon	<i>Columbia livia</i>
5	Brahminy Duck	<i>Tadorna ferruginea</i>
6	Brahminy Mynah	<i>Sternus pagodarum</i>
7	Brainfever bird	<i>Hierococcyx varius</i>
8	Button quail	<i>Turnix suscitator</i>
9	Cattle Egret	<i>Bubulcus ibis</i>
10	Common Babbler	<i>Turdoides caudatus</i>
11	Common Indian Night jar	<i>Caprimulgus indicus</i>
12	Common Mynah	<i>Acridotheres tristis</i>
13	Common Quail	<i>Coturnix coturnix</i>
14	Common Snipe	<i>Gallinago gallinago</i>
15	Common teal	<i>Anas crecca</i>
16	Coppersmith Barbet	<i>Megalamia haemacephala</i>
17	Crested Serpent Eagle	<i>Spilornis cheela</i>
18	Demoiselle Crane	<i>Grus virgo</i>
19	Eurasian Spoonbill	<i>Platalea leucorodia</i>
20	Garganey	<i>Anas querquedula</i>
21	Golden Oriole	<i>Oriulus oriulus</i>
22	Great Tit	<i>Parus major</i>
23	Greater Coucal	<i>Centropus sinensis</i>
24	Green Bee-eater	<i>Merops persicus</i>
25	Grey Heron	<i>Ardea cinerea</i>
26	Grey Hornbill	<i>Ocyrceros birostris</i>
27	House Crow	<i>Corvus splendens</i>
28	House Sparrow	<i>Passer domesticus</i>
29	Indian Robin	<i>Saxicoloides fulicata</i>
30	Iora	<i>Aegithina tiphia</i>
31	Jungle Crow	<i>Corvus macrorhynchos</i>
32	Koel	<i>Eudynamys scolopacea</i>
33	Little brown dove	<i>Streptopelia senegalensis</i>
34	Little Cormorant	<i>Phlaacrocorax niger</i>
35	Little Kingfisher	<i>Alcedo atthis</i>

SR NO	Common Name	Scientific Name
36	Magpie Robin	<i>Copsychus saularis</i>
37	Night Heron	<i>Nycticorax nycticorax</i>
38	Oriental White Eye	<i>Zosterops palpebrosus</i>
39	Painted Stork	<i>Mycteria leucocephala</i>
40	Paradise Fly Catcher	<i>Terpsiphone paradise</i>
41	Pariah Kite	<i>Milvus migrans</i>
42	Peafowl	<i>Pavo cristatus</i>
43	Pied Kingfisher	<i>Ceryle rudis</i>
44	Pond Heron	<i>Ardeola grayii</i>
45	Purple Heron	<i>Ardea purpurea</i>
46	Purple Moorhen	<i>Porphyrio porphyrio</i>
47	Purple Rumped Sunbird	<i>Nectarinia zeylonica</i>
48	Red Vented Bulbul	<i>Pycnonotus cafer</i>
49	Red Wattled Lapwing	<i>Vanellus indicus</i>
50	River Tern	<i>Sterna aurentia</i>
51	Rose ringed Parakeet	<i>Psittacula krameri</i>
52	Rufous backed shrike	<i>Lanius schach</i>
53	Shikra	<i>Accipiter badius</i>
54	Spotbill Duck	<i>Anas poecilorhyncha</i>
55	Spotted Owlet	<i>Athene brama</i>
56	Tailorbird	<i>Orthotomus sutorius</i>
57	Tickell's Blue flycatcher	<i>Cyornis tickellaie</i>
58	White Breasted Kingfisher	<i>Halcyon smyrnensis</i>
59	White Breasted Waterhen	<i>Amaurornis phoenicurus</i>
60	White browed Fantail-flycatcher	<i>Rhipidura aureola</i>
61	White Necked Stork	<i>Ciconia episcopus</i>

3. REPTILES

SR NO	Common Name	Scientific Name
1	Indian Flapshell Turtle	<i>Lissemys punctata</i>
2	Monitor Lizard	<i>Varanus bengalensis</i>
3	Chameleon	<i>Chamaleon zeylanicus</i>
4	Common Garden Lizard	<i>Calotes versicolor</i>
5	Gecko	
6	Worm Snake	<i>Ramphotyphlops braminus</i>
7	Phipson's Shieldtail	<i>Uropeltis phipsonii</i>
8	Sand Boa	<i>Gongylophis conicus</i>
9	Earth Boa / Red Sand Boa	<i>Eryx johnii</i>
10	Common Trinket Snake	<i>Coelognathus helena helena</i>
11	Indian Rat Snake	<i>Ptyas mucosa</i>
12	Banded Racer	<i>Argyrogena faciolata</i>
13	Slender Racer / Gunther's Racer	<i>Coluber gracilis</i>
14	Banded Kukri Snake	<i>Oligodon arnensis</i>
15	Common Wolf Snake	<i>Lycodon aulicus</i>
16	Dumeril's Black-headed Snake	<i>Sibynophis subpunctatus</i>
17	Checkered Keelback Water Snake	<i>Xenochrophis piscator</i>
18	Striped Keelback	<i>Amphisma stolatum</i>
19	Green Keelback / Grass Snake	<i>Macropisthodon plumbicolor</i>
20	Common Cat Snake	<i>Boiga trigonata</i>
21	Condanarus Sand Snake	<i>Psammophis condanarus</i>
22	Vine Snake	<i>Ahaetulla nasuta</i>
23	Brown Vine Snake	<i>Ahaetulla pulverulenta</i>
24	Common Krait	<i>Bungarus caeruleus</i>
25	Slender Coral Snake	<i>Calliophis melanurus</i>
26	Spectacled Cobra	<i>Naja naja</i>
27	Russell's Viper	<i>Daboia russelii</i>
28	Saw-scaled Viper	<i>Echis carinatus</i>
29	Bamboo Pit Viper	<i>Trimeresurus gramineus</i>

4. FISH AND OTHER AQUATIC FAUNA

SR NO	Common Name	Scientific Name
1	Carp / Rohu	<i>Labeo rohita</i>
2	Catla	<i>Catla catla</i>
3	Grass Carp	<i>Ctenopharyngodon idella</i>
4	Giant Snake head	<i>Channa marulius</i>
5	Grey Featherback	<i>Notopterus notopterus</i>
6	Tilapia	<i>Tilapia mossambica</i>
7	Mangoor	<i>Clarias batrachus</i>
8	Indian Butter Catfish	<i>Ompok bimaculatus</i>
9	Catfish	<i>Mystus cavasius</i>
10	Razor belly Minnow	<i>Salmostoma</i>
11	Glass fish	<i>Parambassis ranga</i>
12	Cyprinus	<i>Cyprinus carpio</i>
13	Peninsular Olive Barb	<i>Puntius sarana</i>
14	Fresh Water Prawn	<i>Macrobrachium sp</i>
15	Fresh Water Crab	<i>Barytelphusa sp</i>

5. BUTTERFLIES

No	Butterfly
1	common Mormon
2	Lime butterfly
3	Tailed Jay
4	White orange tip
5	Plain Tiger
6	Striped Tiger
7	Blue tiger
8	Glassy tiger
9	Common Crow
10	Common Evening Brown
11	Common Bush Brown
12	Common Fivering

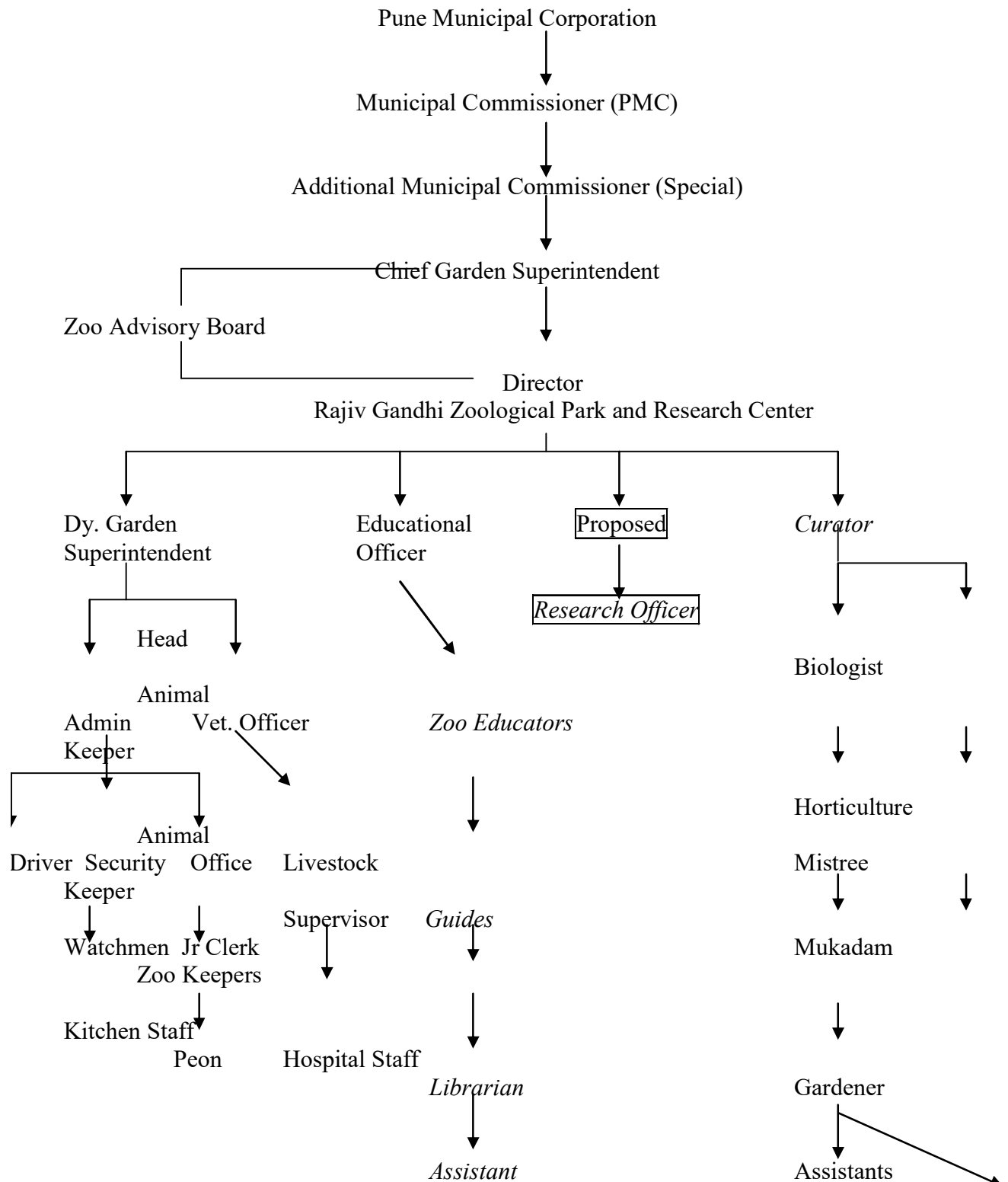
B. List of Flora found in the Rajiv Gandhi Zoo

Sr. No.	Botanical Name	Common Name	No. of trees
1	<i>Leucaena latisiliqua</i>	Subabhul	14060
2	<i>Gliricidia sepium</i>	Gliricidia	4220
3	<i>Cassia siamea</i>	Kashid	869
4	<i>Acacia leucophloea</i>	Hivar	835
5	<i>Eucalyptus globules</i>	Nilgiri	774
6	<i>Tecoma grandis</i>	Teak	586
7	<i>Santalum album</i>	Chandan	563
8	<i>Acacia nilotica</i>	Babhul	503
9	<i>Acacia chundra</i>	Lal Khair	405
10	<i>Azadirachta indica</i>	Neem	283
11	<i>Pongamia pinnata</i>	Karanj	259
12	<i>Peltophorum pterocarpum</i>	Son mohar	256
13	<i>Lantana camera</i>		219
14	<i>Millingtonia hortensis</i>	Indian Cork Tree	216
15	<i>Pithecellobium dulce</i>	Vilayati Chinch	208
16	<i>Bambusa indica</i>	Green bamboo	181
17	<i>Bambusa vulgaris</i>	Yellow Bamboo	143
18	<i>Psidium guajava</i>	Guava	85
19	<i>Dalbergia sissoo</i>	Shisham	79
20	<i>Bauhinia varigata</i>	Kanchan	70
21	<i>Delonix regia</i>	Gulmohar	59
22	<i>Ziziphus jujuba / mauritiana</i>	Ber	57
23	<i>Ziziphus xylopyra</i>	Ghati	51
24	<i>Cassia glauca</i>	Tamruj	50
25	<i>Bombax ceiba</i>	Red Silk Cotton	49
26	<i>Bauhinia racemosa</i>	Apta	48
27	<i>Erythrina variegata/suberosa</i>	Indian Coral Tree	48
28	<i>Thivesia nerifolia</i>	Bitti	47
29	<i>Swietenia mahogoni</i>	Mahogoni	42
30	<i>Jacaranda acutifolia</i>	Nilmohar	41
31	<i>Putranjiva roxburgii</i>	Childlife Tree	40
32	<i>Polyalthia longifolia</i>	Pscudo Ashok	39
33	<i>Dracena sp</i>	Dracena	37
34	<i>Ricinus cummunis</i>	Castor	35
35	<i>Acacia suma</i>	Son Khair	34
36	<i>Phoenix sylvestris</i>	Sindhi	34
37	<i>Syzygium cumini</i>	Jamun	34

Sr. No.	Botanical Name	Common Name	No. of trees
38	<i>Ceiba pentandra</i>	White Silk Cotton	33
39	<i>Acacia feruginea</i>	Pandhara Khair	31
40	<i>Khaya senegalensis</i>	Khaya	26
41	<i>Capparis grandis</i>	Pachunda	25
42	<i>Dalbergia lanceolaria</i>	Dandus	23
43	<i>Albizia lebbeck</i>	Shirish	22
44	<i>Ficus racemosa</i>	Wild Fig	22
45	<i>Ficus religiosa</i>	Pipal	22
46	<i>Prosopis juliflora</i>	Wedi Babhul	22
47	<i>Tamarindus indica</i>	Imli	22
48	<i>Cassia surattensis (glauca)</i>	Tamruj	21
49	<i>Livinstonia chinensis</i>	Fan Palm	20
50	<i>Acacia farnesiana</i>	Dev Babhul	18
51	<i>Flacourtia latifolia</i>	Tambat	18
52	<i>Casurina equisetifolia</i>	Suru	17
53	<i>Dalbergia melanoxyylon</i>	Patangi	17
54	<i>Tecoma stans</i>		17
55	<i>Ficus benghalensis</i>	Banayan Tree	16
56	<i>Terminalia catapa</i>	Wild Badam	16
57	<i>Ficus bengamina</i>		15
58	<i>Morinda citrifolia</i>	Bartondi	14
59	<i>Thespesia populnea</i>	Bhendi Tree	13
60	<i>Annona squamosa</i>	Custard Apple	12
61	<i>Butea monosperma</i>	Flame of Forest	12
62	<i>Holoptellia integrifolia</i>	Vavli	11
63	<i>Lannea coromandelica</i>	Moya	11
64	<i>Terminalia arjuna</i>	Arjun	11
65	<i>Rogstenia regia</i>	Bottle Palm	10
66	<i>Acacia auriculiformis</i>	Australian Babhul	9
67	<i>Bridelia resusa</i>		9
68	<i>Caesalpinia pulcherima</i>	Sankasur	9
69	<i>Carissa congesta</i>	Karvand	9
70	<i>Cassia grandis</i>		9
71	<i>Hibicus rosa sinensis</i>	Jaswand	9
72	<i>Plumeria rubra</i>	Lal Chapha	9
73	<i>Bougainvillea spectabilis</i>	Began vel.	7
74	<i>Jatropha curcas</i>	Mogali Erand	7
75	<i>Schebera suetainoides</i>	Mokha	7
76	<i>Gmelina arborea</i>	Shivan	6
77	<i>Spathodea campanulata</i>	Tulip Tree	6
78	Unknown		6
79	<i>Acacia longifolia / auricular formis</i>	Australian Babhul	5
80	<i>Alianthus excels</i>	Maharukh	5

Sr. No.	Botanical Name	Common Name	No. of trees
81	<i>Grewia pilosa</i>	Dhaman	5
82	<i>Michelia champaka</i>	Sonchaph	5
83	<i>Albizia amara</i>	Kansar	4
84	<i>Albizia procera</i>	Safed Shirsh	4
85	<i>Cordia sp</i>	Bhokar	4
86	<i>Kigelia pinnata</i>		4
87	<i>Pridium guajava</i>	Guava	4
88	<i>Ailanthus excels</i>	Maharukh	3
89	<i>Dolichandrone falcate</i>	Med Shingi	3
90	<i>Madhuca indica</i>	Indian Butter Tree	3
91	<i>Mangifera indica</i>	Mango	3
92	<i>Mutingia calabura</i>	Singapur Cherry	3
93	<i>Samanea saman</i>	Rain tree	3
94	<i>Tabubia sp.</i>		3
95	<i>Artabotrys odorantisimus</i>		2
96	<i>Eugenia jambolina</i>		2
97	<i>Moringa oleifera</i>	Drumstick	2
98	<i>Plumeria alba</i>	Pandhara Chapha	2
99	<i>Sterculia foetide</i>		2
100	<i>Terminalia sp.</i>		2
101	<i>Aegle marmalos</i>	Bael	1
102	<i>Artrabotrys odoratum</i>	Micro Chapha	1
103	<i>Caesalpinia bondua</i>	Sagargota	1
104	<i>Cocus nucifera</i>	Coconut	1
105	<i>Delinia indica</i>	Elephant Apple	1
106	<i>Dendrocalamus srtictus</i>		1
107	<i>Ehretia laevis</i>	Ajan Vriksha	1
108	<i>Emblica officinalis</i>	Awala	1
109	<i>Ficus elastic</i>	Indian Rubber Tree	1
110	<i>Lagerstomia sp</i>	Pride of India	1
111	<i>Parkia biglanduolsa</i>	Chenduphal	1
112	<i>Terminalia bellirica</i>	Behda	1
			26264

Annexure IV- organisation chart of the zoo



Annexure V- Staffing pattern of the Zoo

Sr.no	Designation	Sanction Posts	Existing Posts	Proposed Post
1	Director	01	01	-----
2	Dy. Garden Superintendent	01	01	-----
3	Vet. Officer	01	01	-----
4	Curator	01	-----	-----
5	Livestock Supervisor	02	02	-----
6	Research Officer	-----	-----	01
7	Biologist	-----	-----	01
8	Educational Officer	01	01	-----
9	Jr. Clerk	03	02	04
10	Peon	01	01	-----
11	Driver	03	03	13
12	Zoo Educators	-----	-----	02
13	Zoo Guides	-----	-----	05
14	Librarian	-----	-----	01
15	Librarian Assistant	-----	-----	01
16	Head Animal Keeper	02	02	-----
17	Animal Keeper	01	01	03
18	Zoo Keepers	20	20	40
19	Horticulture Mistree (Supervisor)	01	01	-----
20	Mukadam	-----	-----	01
21	Gardener	02	02	-----
22	Security Watchmen	30	30	50
23	Gardener Assistants	06	06	20
24	Garden Sweepers	08	08	15

Annexure VI

List of buildings other than animal enclosures

No	Buildings
1	Administrative block
2	Hospital complex
3	Kitchen and stores
4	Forest building to be converted to cafeteria and gift shop
5	Open air canteen (MTDC)
6	MTDC building to be converted into interpretation centre
7	Office building in old snake park Area

Annexure VIII



Table 1A
Proposed Collection Plan for Mammals

Sr. No	Mammals	Existing Stock				Proposed Collection Plan				Animals to be acquired or removed				Remarks
		M	F	U	T	M	F	U	T	M	F	U	T	
1	Blackbuck	8	12	0	20	6	14	0	20	2	2	0	4	To be acquired by exchange programme
2	Gaur	2	1	0	3	2	5	0	7	0	4	0	4	To be acquired by exchange programme
3	Nilgai	8	10	0	18	3	7	0	10	5	3	0	8	To be removed
4	Four horned Antelope	1	2	0	3	6	14	0	20	5	12	0	17	By breeding from existing stock
5	Chinkara	3	4	1	8	6	14	0	20	3	10	0	13	By breeding from existing stock
6	Spotted Deer	17	27	4	48	6	14	0	20	11	13	4	28	To be removed
7	Sambar	9	19	1	29	6	14	0	20	3	5	1	9	To be removed
8	Barking Deer	4	4	0	8	6	14	0	20	2	10	0	12	By breeding from existing stock
9	Mouse Deer	0	0	0	0	4	8	0	12	4	8	0	12	To be acquired by exchange programme
10	Jackal	3	4	0	7	4	6	0	10	1	2	0	3	By breeding from existing stock
11	Wolf	2	1	0	3	4	6	0	10	2	5	0	7	By breeding from existing stock
12	White Tiger	1	1	0	2	4	6	0	10	3	5	0	8	To be acquired by exchange programme
	Tiger	1	3	0	4	4	6	0	10	3	3	0	6	To be acquired by exchange programme
13	Indian Fox	0	0	0	0	4	6	0	10	4	6	0	10	From rescued individuals
14	Leopard	1	3	0	4	2	4	0	6	1	1	0	2	From rescued individuals
15	Lion	0	0	0	0	3	7	0	10	3	7	0	10	To be acquired by exchange programme
16	Jungle Cat	2	1	0	3	3	3	0	6	1	2	0	3	By breeding from existing stock
17	Leopard Cat	0	0	0	0	3	3	0	6	3	3	0	6	To be acquired by exchange programme
18	Rusty Spotted Cat	0	0	0	0	3	3	0	6	3	3	0	6	To be acquired by exchange programme
19	Stripped Hyena	0	0	0	0	2	4	0	6	2	4	0	6	To be acquired by exchange programme
20	Sloth Bear	2	1	0	3	1	2	0	3	1	1	0	2	To be exchanged with other zoos
21	Rhesus Macaque	4	6	1	11	4	6	0	10	0	0	1	1	To be removed
22	Bonnet Macaque	1	3	2	6	4	6	0	10	3	3	2	8	By breeding from existing stock
23	Lion Tailed Macaque	0	0	0	0	2	4	0	6	2	4	0	6	To be acquired by exchange programme
24	Indian Elephant	0	2	0	2	1	2	0	3	1	0	0	1	To be acquired by exchange programme
25	Giant Squirrel	1	1	0	2	5	7	0	12	4	6	0	10	By breeding from existing stock
26	Wild Dog	0	0	0	0	3	9	0	12	3	9	0	12	To be acquired by exchange programme
27	Common Langur	0	0	0	0	2	4	0	6	2	4	0	6	From rescued individuals
	Total (27 Species)	70	105	9	184	103	198	0	301	77	135	4	216	

Table 1B

Proposed Collection Plan for Birds

Sr. No	BIRDS	Existing Stock				Proposed Collection Plan				Animals to be acquired or removed				Remarks
		M	F	U	T	M	F	U	T	M	F	U	T	
	Aquatic Species													
1	Painted Stork	0	0	0	0	4	6	0	10	4	6	0	10	To be acquired by exchange programme
2	White necked Stork	0	0	0	0	4	6	0	10	4	6	0	10	To be acquired by exchange programme
3	White Ibis	0	0	0	0	2	4	0	6	2	4	0	6	To be acquired by exchange programme
4	Glossy Ibis	0	0	0	0	2	4	0	6	2	4	0	6	To be acquired by exchange programme
5	Spoonbill	0	0	0	0	2	4	0	6	2	4	0	6	To be acquired by exchange programme
6	Flamingo	0	0	0	0	4	6	0	10	4	6	0	10	To be acquired by exchange programme
7	Shelduck	0	0	0	0	4	6	0	10	4	6	0	10	To be acquired by exchange programme
8	Pintail duck	0	0	0	0	4	6	0	10	4	6	0	10	To be acquired by exchange programme
9	Spotbill duck	0	0	0	0	4	6	0	10	4	6	0	10	To be acquired by exchange programme
10	Grey Pelican	0	0	0	0	4	6	0	10	4	6	0	10	To be acquired by exchange programme
	Raptors													
11	Blackwinged Kite	0	0	0	0	1	3	0	4	1	3	0	4	To be acquired by exchange programme
12	Bhraminy Kite	0	0	0	0	1	1	0	2	1	1	0	2	From rescued individuals
13	Indian Shikra	0	0	2	2	2	2	0	4	2	2	0	4	From rescued individuals
14	Crested Hawk Eagle	0	0	0	0	1	1	0	2	1	1	0	2	From rescued individuals
15	Bonelli's Hawk Eagle	0	1	0	1	1	1	0	2	1	0	0	1	From rescued individuals
16	Tawny Eagle	0	0	1	1	1	1	0	2	1	1	0	2	From rescued individuals
17	Indian longbilled Vulture	1	1	0	2	1	1	0	2	0	0	0	0	
18	Indian White backed Vulture	0	0	0	0	1	1	0	2	1	1	0	2	To be acquired by exchange programme
19	Scavenger Vulture	0	0	0	0	2	2	0	4	2	2	0	4	To be acquired by exchange programme
20	Short Toed Eagle	0	0	0	0	1	1	0	2	1	1	0	2	To be acquired by exchange programme
21	Crested Serpent Eagle	0	0	1	1	1	1	0	2	1	1	0	2	From rescued individuals
22	Shahin Falcon	0	0	0	0	1	1	0	2	1	1	0	2	From rescued individuals
23	Red Headed Merlin	0	0	0	0	1	1	0	2	1	1	0	2	To be acquired by exchange programme
	Jungle Fowl													
24	Common Peafowl	1	5	0	6	2	5	0	7	1	0	0	1	By breeding from existing stock
25	Grey Jungle Fowl	0	0	0	0	2	3	0	5	2	3	0	5	To be acquired by exchange programme
26	Red Spurfowl	0	0	0	0	2	3	0	5	2	3	0	5	To be acquired by exchange programme
	Cranes													
27	Sarus Crane	0	0	0	0	4	6	0	10	4	6	0	10	To be acquired by exchange programme
28	Demosille Crane	0	0	0	0	4	6	0	10	4	6	0	10	To be acquired by exchange programme
	Pigeons													
29	Green Pigeon	0	0	0	0	6	14	0	20	6	14	0	20	To be acquired by exchange programme
30	Emerald Dove	0	0	0	0	6	14	0	20	6	14	0	20	To be acquired by exchange programme
	Owls													
31	Barn Owl	0	0	3	3	2	4	0	6	1	2	0	3	From rescued individuals
32	Great Horned Owl	0	0	2	2	1	3	0	4	1	1	0	2	From rescued individuals
33	Spotted Owlet	0	0	0	0	2	4	0	6	2	4	0	6	To be acquired by exchange programme
34	Mottled Wood Owl	0	0	0	0	2	4	0	6	3	4	0	7	From rescued individuals
	Hornbills													
35	Grey Hornbill	0	0	0	0	2	4	0	6	2	4	0	6	To be acquired by exchange programme
36	Indian pied Hornbill	0	0	0	0	1	1	0	2	1	1	0	2	To be acquired by exchange programme
	Total 36 Species	2	7	9	18	85	142	0	227	83	131	0	214	

Table 1C - Proposed Collection Plan for Reptiles

Sr. No	BIRDS	Existing Stock				Proposed Collection Plan				Animals to be acquired or removed				Remarks
		M	F	U	T	M	F	U	T	M	F	U	T	
1	Marsh Crocodile	2	1	0	3	5	15	0	20	3	14	0	17	To be acquired by exchange programme
2	Saltwater Crocodile	0	0	0	0	4	16	0	20	4	16	0	20	To be acquired by exchange programme
3	Gharial	0	3	0	3	4	6	0	10	4	3	0	7	To be acquired by exchange programme
4	Indian Pond Terrapin	1	2	0	3	25	25	0	50	24	23	0	47	To be acquired by exchange programme
5	Peninsular Mud Turtle	0	0	0	0	10	15	0	25	10	15	0	25	To be acquired by exchange programme
6	Deccan Softshelled Turtle	0	0	0	0	2	4	0	6	2	4	0	6	To be acquired by exchange programme
7	Stared Tortoise	6	9	0	15	20	30	0	50	14	21	0	35	From rescued individuals
8	Travancore Tortoise	0	0	0	0	2	4	0	6	2	4	0	6	To be acquired by exchange programme
9	Elongated Tortoise	2	0	0	2	2	4	0	6	0	4	0	4	To be acquired by exchange programme
10	Chameleon	0	0	0	0	3	3	0	6	3	3	0	6	To be acquired by exchange programme
11	Yellow Monitor Lizard	0	0	0	0	2	2	0	4	2	2	0	4	To be acquired by exchange programme
12	Monitor Lizard	1	1	1	3	2	10	0	12	1	9	0	10	To be acquired by exchange programme
13	Water Monitor Lizard	0	0	0	0	2	2	0	4	2	2	0	4	To be acquired by exchange programme
14	Indian Rock Python	2	3	0	5	2	8	0	10	0	5	0	5	From rescued individuals
15	Reticulated Python	2	1	0	3	2	2	0	4	0	1	0	1	To be acquired by exchange programme
16	Flying Snake	0	0	0	0	2	2	0	4	2	2	0	4	To be acquired by exchange programme
17	Russel's Sand Boa	0	0	0	0	2	4	0	6	2	4	0	6	To be acquired by exchange programme
18	John's sand boa	0	0	0	0	2	4	0	6	2	4	0	6	To be acquired by exchange programme
19	Whitaker's sand boa	0	0	0	0	2	2	0	4	2	2	0	4	To be acquired by exchange programme
20	Trinket Snake	2	2	0	4	3	7	0	10	1	5	0	6	From rescued individuals
21	Montane trinket	0	0	0	0	2	2	0	4	2	2	0	4	To be acquired by exchange programme
22	Rat Snake	6	9	0	15	5	15	0	20	1	6	0	7	From rescued individuals
23	Banded Racer	2	2	0	4	2	2	0	4	0	0	0	0	From rescued individuals
24	Common Kukri Snake	1	1	0	2	2	2	0	4	1	1	0	2	From rescued individuals
25	Panited Bronzeback	0	0	0	0	2	4	0	6	2	4	0	6	To be acquired by exchange programme
26	Common Wolf Snake	1	3	0	4	4	6	0	10	3	3	0	6	From rescued individuals
27	Checkered Keelback	14	13	0	27	20	30	0	50	6	17	0	23	From rescued individuals
28	Striped Keelback	1	1	0	2	4	6	0	10	1	5	0	6	From rescued individuals
29	Green Keelback	1	1	1	3	2	4	0	6	1	3	0	4	From rescued individuals
30	Cat Snake	1	1	0	2	2	2	0	4	1	1	0	2	From rescued individuals
31	Ceylon Cat Snake	0	0	0	0	2	2	0	4	2	2	0	4	To be acquired by exchange programme
32	Forstern's Cat Snake	0	0	0	0	2	2	0	4	2	2	0	4	To be acquired by exchange programme
33	Common Green vine Snake	0	0	0	0	2	2	0	4	2	2	0	4	From rescued individuals
34	Common Indian Krait	1	2	0	3	2	2	0	4	1	0	0	1	From rescued individuals
35	Indian Cobra	3	7	0	10	2	4	0	6	1	3	0	4	To be removed
36	Monocellate Cobra	0	0	0	0	2	2	0	4	2	2	0	4	To be acquired by exchange programme
37	Russel's Viper	2	3	0	5	4	6	0	10	2	3	0	5	From rescued individuals
38	Saw scaled Viper	2	2	0	4	4	6	0	10	2	4	0	6	From rescued individuals
39	Bamboo Pit Viper	1	1	0	2	4	6	0	10	3	5	0	8	To be acquired by exchange programme
40	King Cobra	1	1	0	2	1	1	0	2	0	0	0	0	-----
	Total 40 Species	55	69	2	126	168	271	0	439	115	208	0	323	

Table 1D

Proposed Collection Plan for Amphibians

Sr. No.	Amphibians	Existing Stock				Proposed Collection Plan				Animals to be acquired or removed				Remarks
1	Ornate Narrow Mouth Frog	0	0	0	0	40	60	0	100	40	60	0	100	To be acquired by exchange programme
2	Red Narrow Mouthed Frog	0	0	0	0	40	60	0	100	40	60	0	100	To be acquired by exchange programme
3	Malabar Tree toad	0	0	0	0	40	60	0	100	40	60	0	100	To be acquired by exchange programme
	Total 03 Species	0	0	0	0	120	180	0	300	120	180	0	300	

Table 2
Surplus Animal list as on dated 31.03.2011

No.	Animal	Male	Female	Unknown	Total
1	Eagle Steppe	00	00	01	01
2	Brown Fish Owl	00	00	01	01
3	Kestrel	00	00	01	01
4	Falcon Laggar	00	00	02	02
5	Kite Pariah	00	00	04	04
6	African Grey Parrot	00	00	04	04
7	Amazon	00	00	04	04
8	Sulphur Crested Cockatoo Lesser	00	00	01	01
9	Goffin Cockatoo	01	01	00	02
10	Black Buck	05	05	00	10
11	Sloth Bear	02	00	00	02
12	Barking deer	01	02	00	03
13	Sambar deer	04	08	00	12
14	Spotted deer	06	12	00	18
15	Nilgai	02	02	00	04
16	Keelback Checkered	07	07	00	14
17	Python Indian Rock	00	01	00	01
18	Tortoise Indian starred	02	02	00	04
19	Terrapin Red Eared	09	05	00	14
20	Iguana Green	00	00	01	01

Table 3
Required Animal list as on 31.03.2011

No.	Animal	Male	Female	Unknown	Total
1	Gray Jungle Fowl	5	5	00	10
2	Fowl Red spur	3	5	00	8
3	Green pigeon	5	5	00	10
4	Tiger	02	00	00	02
5	Lion	02	04	00	06
6	Wolf	01	02	00	03
7	Gaur	01	02	00	03
8	Mouse deer	02	04	00	06
9	Hyena	2	2	00	04
10	Giant Squirrel	1	1	00	02

Table 4
List of species breeding species in the zoo

Number	Species
A	Mammals
1	Sambar
2	Spotted Deer
3	Nilgai
4	Porcupine
5	Blackbuck
6	Chowsingha
7	Jackal
8	Leopard
9	Bonnet macaque
10	Rhesus macaque
11	Bengal tiger
12	White Tiger
13	Sloth Bear
B	Birds
14	Peafowl
C	Reptiles
15	Starred Tortoise
16	Red eared Terrapin
17	Trinket
18	Grass snake
19	Wolf snake
20	Striped Keelback
21	Red sand Boa
22	Banded Racer
23	Common sand Boa
24	Common cat snake
25	Saw scaled Viper
26	Cobra
27	Monitor Lizard
28	Python
29	Rat snake
30	Chekered Keelback
31	Russel's Viper

Table 5
List of Schedule I and II species

Sr. No.	Species	Schedule
	Birds	
1	Peafowl	I
2	Long billed vulture	I
3	Bonelli's eagle	II
	Reptiles	
4	Indian Cobra	II
5	King cobra	II
6	Marsh Crocodile	I
7	Gharial	I
8	Monitor Lizard	I
9	Indian Rock python	I
10	Rat snake	II
11	Indian flap shell turtle	II
12	Chekered keelback	II
13	Russel's viper	II
	Mammals	
14	Blackbuck	I
15	Chinkara	I
16	Four horned antelope	I
17	Jackal	II
18	Leopard	I
19	Bonnet macaque	II
20	Rhesus macaque	II
21	Bengal Tiger	I
22	White tiger	I
23	Sloth Bear	II
24	Indian wolf	I
25	Indian elephant	I
26	Gaur	I

Table 6
Improvements required in present animal enclosures and other infrastructure facilities.

Sr. No	Animal House	Suggested changes
1	Bonnet macaque	Improve drainage flow, (squeeze gate)
2	Rhesus macaque	Improve drainage flow(Increase drainage pipe size)
3	Peacock	Change of wire mesh of enclosure (aluminum painted with black colour)
4	Pheasant aviary	Change of wire mesh or use of toughened glass
5	Lesser cats	Two sets of enclosures, night shelters to be developed
6	Tiger night house	Two night houses to be connected with a passage and a service road to be taken from below or top.
7	Bear night house	Bigger Kraal and squeeze gate (Work Completed)

List of infrastructure improvements to be developed for existing facilities

1. Footpath leading to aviary needs to be changed using granite blocks
2. New Toilet blocks to be constructed in replacement of the existing temporary ones.
3. Amphitheatre – Enclosing the open amphitheatre and improving the sitting arrangements and other facilities
4. Service circuit road to be developed and connected to the night shelters
5. Main road to be made into a complete circuit with the addition of a bridge
6. Major expansion of the Interpretation Facility
7. Existing cafeteria to be refurbished and a gift shop to be opened
8. Increase parking facilities and add space for buses
9. Renovation and painting of all enclosures and walls of the zoo

Table 7
ENCLOSURE SIZES IN RAJEEV GANDHI ZOOLOGICAL PARK

Species	Type of enclosure	Minimum prescribed sizes for outdoor enclosure, per pair, in square meters	Minimum extra area required, per additional animal, in square meters	Number of animals in the enclosure(at a time)	Minimum area required, by CZA, in square meters	Area provided by the zoo, in square meters	Deficit or excess area, in square meters
Bengal tiger	With Moat	1000	250	2	1000	3629	(+) 2629
White tiger	With Moat	1000	250	1	500	2620	(+) 2120
Leopard	Enclosed with Chain link fencing	500	60	3	560	851	(+) 291
Sloth bear	With Moat	1000	100	3	1100	2798	(+) 1698
Rhesus macaque	With Moat	500	20	5	560	745	(+) 185
Bonnet macaque	With Moat	500	20	4	440	722	(+) 182
Jackal	Part moat, Part Chain link fence	400	50	4	500	1164	(+) 664
Wolf	Part moat, Part Chain link fence	400	50	3	450	3368	(+) 2918
Spotted deer	Part moat, Part Chain link fence			18		4278	
Chinkara	Part moat, Part Chain link fence			2		3099	
Chausingha	Part moat, Part Chain link fence			12		4167	
Black buck	Part moat, Part Chain link fence			31		3878	
Nilgai	Part moat, Part Chain link fence			7		4167	
Gaur	Part moat, Part Chain link fence	1500	200	2	1500	6027	(+) 4527
Porcupine	With Moat			3		254	
Elephant	With Moat			2		21198	
Bonnellis eagle	Enclosed with Chain link fencing			1		306.36	
Long billed vulture	Enclosed with Chain link fencing			2		306.36	
Peafowl	Enclosed with Chain link fencing			11		132.64	
Sambar	Part moat, Part Chain link fence			23		8218	

Table 8 A- List of Mammals present in the rescue centre

Sr. No	Species	Stock as on 31.03.11			
		M	F	U	T
B	MAMMALS				
1	Antelope Four Horned (Tetracerus quadricornis)	0	0	1	1
2	Black Buck (Antelope cervicapra)	3	1	0	4
3	Chinkara (Gazella bennetti)	2	0	0	2
4	Civet Indian Palm (Paradoxurus hermaphroditus)	0	0	0	0
5	Deer Barking (Muntiacus muntjak)	0	0	0	0
6	Deer Spotted(Axix axis)	0	0	0	0
7	Hare Indian (Lepus nigricollis)	0	0	0	0
8	Indian Flying fox(Pteropus giganteus)	1	0	1	2
9	Jackal (Canis aureus)	2	1	0	3
10	Langur Hanuman (Semnopithecus entellus)	0	0	0	0
11	Leopard (Panthera pardus)	4	4	0	8
12	Macaque Bonnet (Macaca radiata)	2	8	0	10
13	Macaque Rhesus (Macaca mulatta)	4	13	0	17
14	Indian Wolf (Canis lupus)	0	0	0	0
15	Mongoose (Herpestes edwardii)	0	0	0	0
16	Mouse deer (Moschiola meminna)	0	1	0	1
17	Stripped Hyena(Hyena hyena)	0	0	0	0
18	Three striped Squirrel (Funambulus palmarum)	0	0	0	0
19	Porcupine Indian (Hystrix indica)	0	0	0	0
20	Sloth Bear(Melursus ursinus)	0	0	0	0
	Total	19	29	2	50

Table 8 B – List of Birds present in the rescue centre

Sr. No.	Species	Stock as on 31.03.2011			
		M	F	U	T
B	Birds				
1	Blue Rock Pigeon (<i>Columbia livia</i>)	0	0	0	0
2	Crow Pheasant (<i>Ocyrceros birostris</i>)	0	0	0	0
3	Eagle Crested Serpent (<i>Spilornis cheela</i>)	0	0	1	1
4	Grey Heron (<i>Ardea cineria</i>)	0	0	1	1
5	Indian pond heron (<i>Ardeola grayii</i>)	0	0	0	0
6	Eagle Short Toed (<i>Ciraetus gallicus</i>)	0	0	0	0
7	Koel (<i>Eudynamys scolopacea</i>)*	0	0	0	0
8	Kite Brahminy (<i>Haliastur indus</i>)	0	0	1	1
9	Kite Pariah (<i>Milvus migrans</i>)	0	0	8	8
10	Kite Black Shouldered (<i>Elanus caeruleus</i>)	0	0	0	0
11	Malabar Pied Hornbill (<i>Anthracosceros coronatus</i>)	0	0	1	1
12	Owl Barn (<i>Tyto alba</i>)	0	0	0	0
13	Owl Horned (<i>Bubo bubo</i>)	0	0	4	4
14	Peafowl (<i>Pavo cristatus</i>)	1	3	0	4
15	Parakeet Roseringed (<i>Psittacula krameri</i>)	4	3	2	9
16	Parakeet Alexandrine (<i>Psittacula eupatria</i>)	1	2	0	3
17	Puff Troated Babbler(<i>Pelloreneum ruficeps</i>)	0	0	0	0
18	Spotted owlet(<i>Athene brama</i>)	0	0	1	1
19	House Sparrow (<i>Passer domesticus</i>)	0	0	0	0
20	Grey Hornbill (<i>Ocyrceros birostris</i>)	0	0	0	0
21	Peregrine Falcon (<i>Falco perigrinus</i>)	0	0	0	0
22	Scaly breasted Munia (<i>Lonchura punctulata</i>)	0	0	0	0
23	Common Quail (<i>Coturnix coturnix</i>)	0	0	0	0
24	Carmorant (<i>Phalacrocorax niger</i>)	0	0	0	0
25	Collered Scop's Owl (<i>Otus bakkamoena</i>)	0	0	0	0
26	Purple Rumped Sunbird (<i>Nectarinia zeylonica</i>)	0	0	0	0
27	Red Vented Bulbul(<i>Pycnonotus cafer</i>)	0	0	0	0
28	Long billed Vulture(<i>Gyps indicus</i>)	0	0	1	1
29	Yellow-footed Green Pigeon (<i>Treron phonicoptera</i>)	0	0	0	0
30	Golden Oriole (<i>Oriolus oriolus</i>)	0	0	0	0
31	Night Heron (<i>Nycticorax nycticorax</i>)	0	0	0	0
32	Shikra (<i>Accipiter badius</i>)	0	0	0	0
33	White Throated Kingfisher (<i>Halcyon smyrnensis</i>)	0	0	0	0
34	Black Ibis (<i>Pseudibis papillosa</i>)	0	0	0	0
35	Common Myna (<i>Acridotheres tristis</i>)	0	0	0	0
36	Painted Stork (<i>Mycteria leucocephala</i>)	0	0	0	0
37	Sparrow Hawk Eurasian (<i>Accipiter spp.</i>)	0	0	0	0
38	Slender-billed Gull(<i>Larus genei</i>)	0	0	0	0
39	Spot-billed Duck (<i>Anas poecilorhincha</i>)	0	0	0	0
40	Green Bee Eater (<i>Merops orientalis</i>)	0	0	0	0
41	Coppersmith Barbet(<i>Megalaima haemacephala</i>)*	0	0	0	0
	TOTAL BIRDS	6	8	20	34

Table 8 C - List of Reptiles present in the rescue centre

Sr. No	Species	Stock as on 31.03.11			
		M	F	U	T
C	REPTILES				
1	Bamboo Pit Viper (<i>Trimeresurus gramineus</i>)	0	0	0	0
2	Cobra Indian (<i>Naja naja</i>)	1	5	0	6
3	Common cat snake(<i>Boiga trigonata</i>)	0	0	0	0
4	Deccan Soft shell Turtle(<i>Aspideretes leithii</i>)	0	0	0	0
5	Earth Boa (<i>Eryx johnii</i>)	1	1	0	2
6	Indian Roofed Turtle (<i>Kachuga tecta</i>)	0	1	6	7
7	Indian Terrapin (<i>Melanochyls trijuga</i>)	0	0	0	0
8	Indian Flapshell Turtle (<i>Lissemys punctata</i>)	0	6	1	7
9	Keelback Checkered (<i>Xenochrophis piscator</i>)	0	0	0	0
10	Keelback Green (<i>Macropisthodon plumbicolor</i>)	0	1	0	1
11	Krait Commom (<i>Bangarus caeruleus</i>)	0	0	0	0
12	Monitor lizard(<i>Varanus bengalensis</i>)	0	0	0	0
13	Python Indian Rock (<i>Python molurus molurus</i>)	2	0	0	2
14	Racer Banded (<i>Argyrogena fasciolatus</i>)	2	2	0	4
15	Snake Rat (<i>Coluber mucosus</i>)	2	5	0	7
16	Snake Trinket (<i>Elaphe helena</i>)	2	3	1	6
17	Snake Wolf (<i>Lycodon aulicus</i>)	0	1	0	1
18	Sand Boa(<i>Eryx conica</i>)	0	0	1	1
19	Stripped Keelback (<i>Amphiesma stolatum</i>)	0	0	0	0
20	Tortoise Indian Starred (<i>Geochelone elegans</i>)	0	0	1	1
21	Viper Russell's (<i>Daboia russelii</i>)	2	1	0	3
22	Viper Saw Scaled (<i>Echis carinatus</i>)	0	0	0	0
23	Chameleon(<i>Chamaeleo chamaeleon</i>)	0	0	0	0
24	Common Kukri(<i>Oligodon arnensis</i>)	0	0	0	0
25	Shield Tail(<i>Uropeltis phipsoni</i>)	0	0	0	0
26	Vine Snake (<i>Ahetulla nasuta</i>)	0	0	0	0
27	Gunthers Racer (<i>Coliber graclisis</i>)	0	0	0	0
	TOTAL REPTILES	12	26	10	48

Table 9. List of night cells / feeding cells for enclosures.

Rajiv Gandhi Zoological Park, Katraj
Animal House Sizes

Sr.no	Name of Enclosure	Single night house size (cu.mt.)			No of night cell	Kraal area sq.mt.	No of Kraals	No of Squeeze Cages
		L	B	H				
1	Bengal Tiger	2.35	2.05	3	7	6.30 X 8.00	2	1
2	White Tiger	2.35	2.05	3	8	6.30 X 8.00	2	1
3	Leopard	2	2	2.5	5	4.00 X 3.80	1	1
4	Bear Enclosure	2	2	2.5	5	-----	0	0
5	Black buck (New)	3	2	3	4	6.00 X 6.00	1	0
6	Wolf Enclosure	2	2	2.75	5	4.00 X 4.00	1	0
7	Jackal	2	2	2.75	5	4.00 X 4.00	1	0
8	Chinkara	2.5	2	3	3	10.50 X 5.00	1	0
9	Elephant	6.75	20	4.5	4	-----	0	0
10	Monkey (Rhesus)	2.7	7.5	2.75	7	-----	0	0
	Monkey (Bonnet)	7.5	2	2.75	7	-----	0	0
11	Nilgai	5.5	16.7	3	5	16.70 X 7.20	1	0
12	Sambar	3	2.5	3	2	7.50 X 3.10	3	0
13	Spotted Deer	3	2.5	3	2	-----	2	0
14	Gaur	5	5	3	2	7.20 X 5.30	1	0

Table 10– List of proposed enclosures with their sizes

No	Animals	Proposed enclosure sizes (sq m)
1	Nilgai	4070
2	Barking Deer	2606
3	Mouse Deer including off-display breeding facility	515
4	Indian Fox	993
5	Lion	4,950
6	Jungle Cat	400
7	Leopard Cat	400
8	Rusty Spotted Cat	400
9	Striped Hyena	1100
11	Lion Tailed Macaque	750
12	Giant Squirrel (ex situ breeding facility)	600
13	Giant Squirrel- display	600
14	Wild Dog	1632
15	Common Langur	1126
16	Reptile Section	11,266
17	Aquatic Bird Aviary	9317
18	Aviary	750
19	Aquarium	2838
20	Raptor Aviary	750
21	Ex-situ Breeding facility	3894

Table11 A- Zoo gate collection

Month	Adult	Child	Foreigner	Handi	wi week	Total	Adult Rev	Child Rev	For/ Rev	ww Rev	Total Rev
Apr-10	114408	28742	292	136	0	143578	1144080	143710	7300	0	1295090
May-10	159193	46687	260	63	0	206203	1591930	233435	6500	0	1831865
Jun-10	111165	22826	252	106	0	134349	1111650	114130	6300	0	1232080
Jul-10	82616	8410	331	36	0	91393	826160	42050	8275	0	876485
Aug-10	82546	9301	438	30	0	92315	825460	46505	10950	0	882915
Sep-10	92738	12826	387	22	0	105973	927380	64130	9675	0	1001185
Oct-10	74782	11129	366	55	1451	87783	747820	55645	9150	2902	815517
Nov-10	127912	30694	403	78	0	159087	1279120	153470	10075	0	1442665
Dec-10	135543	33938	462	56	0	169999	1355430	169690	11550	0	1536670
Jan-11	158671	37076	555	132	0	196434	1586710	185380	13875	0	1785965
Feb-11	100365	26091	432	80	0	126968	1003650	130455	10800	0	1144905
Mar-11	74965	11023	340	30	0	86358	749650	55115	8500	0	813265
Total	1314904	278743	4518	824	1451	1600440	13149040	1393715	112950	2902	14658607

**Table 11 B – Details of particulars of expenditure of Rajiv Gandhi Zoo
2007-11**

PARTICULARS		EXPENDITURE IN RUPEES			
Maintenance Works					
		2010-11	2009-10	2008-09	2007-08
1	Salary	1,39,29,142	95,25,060.46	1,00,00,000	79,48,527
2	Procurement of new animals	24,254	39,675	28,367	29,830
3	Feed for animals	56,52,112	49,00,000	45,55,084	29,99,945
4	Medicines, Instruments, etc	30,957	1,83,800	4,64,274	2,15,530
5	Enclosure maintenance	36,25,992	34,88,162.76	10,63,755	3,80,569
6	Petty cash and Education activities Miscellaneous expenses	4,93,301	3,34,272	1,41,482	3,86,688
	Total	2,37,55,758	1,96,54,532.22	1,62,52,962	1,19,61,089
New Development Works					
1	Bengal tiger enclosure	-----	-----	31,71,000	Rs 54,46,559
2	Wolf, Jackal and Blackbuck Enclosures	-----	(Strengthening of compound wall) 10,63,271.06	44,31,000	Rs 49,74,348
3	Chinkara Enclosure	-----	(Installation of new Irrigation System) 32,60,965.84	38,85,000	Rs.11,44,816
4	Visitor Amenities	-----	57,23,776.75	36,74,491	Rs.9,58,032
5	Zoo Development works	14,85,109	39,71,947.14	74,30,346	Rs.28,87,924
6	Electrification work	1,84,389	18,22,600	4,60,639	Rs.5,71,661
	Total	16,69,498	1,58,42,560.79	2,30,52,476	Rs.1,59,83,344

Appendix 1

Details of Soil Characteristics

The zoo area has three distinct soil types which differ in their characteristics from each other. The three different soil types as classified upon their colour are:

- i. **Black coloured soil** – This type of soil is found in the elephant enclosure, the area marked as Available areas I, II, III, wild dog area, jackal enclosure, wolf enclosure, new black buck enclosure, present nilgai and chowsingha enclosure. This soil type is described as deep (45-90cm) and has a clay texture. The pH of this soil type in different enclosures has been tabulated below.

Sr. No	Area	Soil pH
1	Elephant enclosure	6.8 - 6.9
2	Available area I	6.7
3	Available area II	6.7 - 6.8
4	Available area III	6.6.- 6.9
5	Wild dog area	6.4 – 6.6
6	Jackal enclosure	6.6 – 6.8
7	Wolf enclosure	6.6 – 6.8
8	New blackbuck enclosure	6.5 – 6.6
9	Nilgai and chowsingha enclosure	6.2 – 6-6
10	Area behind the nilgai enclosure	6.9

- ii. **Red coloured soil** – This soil type is found in the new chinkara enclosure and proposed nilgai and chousingha enclosure. It has a a medium depth (22.5 – 45 cm) with a silt loam texture with murum content. The soil pH is tabulated below (area wise):

Sr. No	Area	Soil pH
1	Chinkara enclosure	5.8 – 6.8
2	Proposed nilgai and chousingha enclosure	6.5

- iii. **Grayish coloured soil** – This soil is predominantly found in the area to the west of the Katraj Lake. It is found in the current blackbuck enclosure, white tiger enclosure, yellow tiger enclosure, spotted deer enclosure, sambar enclosure, bear enclosure, leopard enclosure, lawn in front of the tiger enclosure, cranes area, bear II area, proposed lion enclosure, proposed snake park area, MTDC lawn, porcupine area, lawn in front of the monkey enclosure, peacock aviary, eagle and vulture aviary, present snake park area, available areas IV and V, kitchen and hospital. This soil type has a very shallow depth as compared to others (7.5 – 22.5cm) and it has a loam texture with murum content. The pH of the soil in the different areas is tabulated below:

Sr No	Area	Soil pH
1	Existing blackbuck enclosure	6.8
2	White tiger enclosure	6.8 – 6.9
3	Yellow tiger enclosure	6.8
4	Leopard enclosure	6.2 – 6.6
5	Sambar enclosure	6.2 – 6.6

6	Spotted deer enclosure	6.0
7	Bear enclosure	6.4
8	Lawn in front of the tiger enclosure	6.0 – 6.2
9	Bear II area	6.1 – 6.8
10	Proposed lion enclosure	5.7 – 6.8
11	Proposed reptile park area	5.9 – 6.8
12	MTDC lawn	6.8
13	Porcupine enclosure	6.6
14	Lawn in front of the monkey enclosure	5.6
15	Peacock aviary	6.2 – 6.6
16	Eagle area	5.8 -6.0
17	Vulture aviary	5.8 – 6-2
18	Existing snake park	6.3
19	Available area IV	6.2 – 6.3
20	Available area V	6.3
21	Hospital and kitchen area	6.2

Appendix 2

Climate Data of Pune (Urban)

Rainfall

Oct.- Dec. 2005	96.0 mm
Jan. - Dec. 2006	1266.9 mm
Jan. - Dec. 2007	860.2 mm
Jan. - Sep. 2008	701.8 mm

Temperature

Season	Max. Temp. (°C)	Min. Temp. (°C)
Winter (Oct. - Dec. 05)	32.8	6.3
Summer (Mar. - June 06)	40.5	10.9
Rainy (July - Oct. 06)	32.7	15.1
Winter (Nov. - Feb. 06-07)	36.5	4.7
Summer (Mar. - June 07)	41.9	11.5
Rainy (July - Oct. 07)	34.3	13.4
Winter (Nov - Feb. 07-08)	35.3	8.3
Summer (Mar. - June 08)	35.6	5.8
Rainy (July - Oct. 08)	42.1	12.7
Winter (Jan. - Feb. 08)	33.2	17.7

Year	Season	T _{max}	T _{min}	Season	T _{max}	T _{min}	Season	T _{max}	T _{min}
2005	Winter *	32.8 °C	6.3 °C	Rainy	DA	DA	Summer	DA	DA
2006	Winter	36.5 °C	4.7 °C	Rainy	32.7 °C	15.1 °C	Summer	40.5 °C	10.9 °C
2007	Winter	35.3 °C	8.3 °C	Rainy	34.3 °C	13.4 °C	Summer	41.9 °C	11.5 °C
2008	Winter**	33.2 °C	17.7 °C	Rainy	42.1 °C	12.7 °C	Summer	35.6 °C	5.8 °C

DA Data not Available

* Oct to Dec.

** Jan. to Feb.

Wind speed

Summer (Mar. - June)	During 1 st fortnight of march wind speed is between 1-19 kmph , while for rest of the season wind is calm
Rainy (July - Oct.)	During 1 st fortnight of oct. wind is calm, while for rest of the season wind speed is between 1-19 kmph
Winter (Nov. - Feb.)	During 1 st fortnight of jan. wind is calm, while for rest of the season wind speed is between 1-19 kmph

Wind direction:

Eastern wind is more prevalent in Pune (urban) throughout the year.

Relative humidity:

Season	RH (%)
Winter (Oct. - Dec. 05)	38-87
Summer (Mar. - June 06)	23-78
Rainy (July - Oct. 06)	58-88
Winter (Nov. - Feb. 06-07)	20-89
Summer (Mar. - June 07)	22-72
Rainy (July - Oct. 07)	41-85
Winter (Nov - Feb. 07-08)	28-86
Summer (Mar. - June 08)	21-78
Rainy (July - Oct. 08)	61-87
Winter (Jan. - Feb. 08)	24-77

Season	RH (%)
Oct. - Dec. 05	38-87
Jan. - Dec. 06	20-89
Jan. - Dec. 07	22-86
Jan. - Sep. 08	21-87

Year	Season	RH (%)	Season	RH (%)	Season	RH (%)
2005	Winter *	38-87	Rainy	DA	Summer	DA
2006	Winter	20-89	Rainy	58-88	Summer	23-78
2007	Winter	28-86	Rainy	41-85	Summer	22-72
2008	Winter**	24-77	Rainy	61-87	Summer	21-78

DA Data not Available

* Oct to Dec.

** Jan. to Feb.

Appendix 3

ZOO EDUCATION MASTER PLAN

INTRODUCTION

Zoos play an important role in creating awareness regarding conservation issues. Zoos are perceived as a “Living Museum”. Thus when people visit zoos to see animals very few are aware of the impacts on their free living counterparts in the wild.

The average visitor is not aware that zoos can contribute towards restocking animals in the wild through captive breeding and re-introduction programmes. Zoos no longer rely on the free living wild population to re-stock their populations but depend on exchange programmes with other zoos. Therefore zoos work positively towards conservation but are still regarded negatively in the minds of some sectors of the public. A zoo education programme is extremely essential in any zoo, not just to spread awareness of the new role of zoos, but also to educate visitors regarding what is happening outside of zoos in the wild habitat.

Objectives:

- The Rajiv Gandhi Zoo provides multiple opportunities to educate a great variety of people of all ages and levels
- The Zoo reaches hundreds of millions of people both adults and children of Pune and its surroundings. This is an excellent opportunity for education and an unequalled potential to heighten public awareness of the importance of nature conservation.
- Living animals and birds are a unique feature of zoos and form the very basis of zoo education.
- The Rajiv Gandhi Zoo provides an opportunity to see certain animals alive and in a simulated natural habitat
- Many diverse groups of people visiting this zoo includes groups of all ages and educational levels. Different social, ethnic, and cultural backgrounds visit zoos. This diversity is seldom seen in other cultural educational or nature-oriented institutions and provides an extra dimension to the education potential of zoos.
- The Zoo is an interesting topic by the media, both print as well as television, and so zoo happenings are always in the limelight in Pune. A recent example is the appearance of a wild crocodile in the lake.
- Investing the zoo’s educational projects is of value to the government’s and non governmental organization’s efforts to support nature conservation.
- The education value in the zoo setting is compatible with recreation.
- Formal education groups such as schools visit the zoo specifically for nature education purposes

The zoo is open to the public/visitors on week days and weekends. If information is strategically placed and well designed, then the visitors can be educated even when they are relaxing in the zoo.

Zoo visitors can be educated through various interactive and non-interactive ways. Proper signage around the zoo is a permanent non-interactive method of educating literate visitors. However a section of the visitors are not literate and for them using symbols instead of letters is very important. Guided visits are an important tool for such visitors because via verbal communication they can be informed about various aspects of wild animal behaviour and the role they can play to conserve their environment. Interactive exhibits excite children and form an excellent tool and activity based learning found to be effective than by just reading. Secondly children learn more through personal interaction, so they retain more information when someone explains things to them and clarifies their doubts.

Important days in a year like Earth day, Environment day, Forestry day and cultural festivals like Nagpanchmi etc can be effectively utilized for special thematic education campaigns.

BACKGROUND

Though it has been nearly ten years now since the zoo's inception ,the post of a zoo education officer has only been filled recently.

The zoo attracts almost 14 lakh visitors per annum and the visitors come and go but do not learn anything from their visit. Most zoo visitors know nothing about wildlife and for many the zoo visit is often the first time that they are seeing wild animals. The attitude of most visitors is to think of a zoo as a place of recreation. They come with families for picnics or on a day outing to be with each other and are not concerned with bothering little with what they can learn or acquire as information.

Many visitors think of the zoo purely as a cheap entertainment venue and expect that the animals will perform for them. Such visitors need to be provided a module of conservation education that is easily appreciated.

The theme and mission of Rajiv Gandhi Zoological Park (RGZP) Education Master Plan is focused on:

- Promoting awareness of Maharashtra's rich bio-diversity to the zoo visitors and inculcate in them a sense of responsibility to conserve species and ecosystems through interpretation, education programmes and relevant signages.
- To promote and carry out research in wild animals and make data available on wild animal physiology, behaviour, diseases and treatment, which can be translated into public awareness.

However the zoo has not yet initiated long term efforts to achieve our objective of promoting awareness. By and large the zoo has a few instructional sign-boards but people fail to read them and follow what is written on them. Sign boards are exhibited at each and every enclosure, however are not aware of the basic facts of the animal on display like the name of the animal.

Hence, there is a very urgent need to have an educational programme in place at RGZP, which will aid in imparting various facts on wildlife behaviour, environment issues, conservation practices and a bit of civic sense to the visiting public.

IDENTIFICATION OF TARGET GROUPS

Children are tomorrow's future and their minds are also impressionable unlike those of adults. Hence they would be our major target audience and most educational activities would be directed at school children as they come to the zoo in large numbers through school trips, picnics, etc. Children are known to exert a great influence over their parents and this fact is frequently exploited by the advertising industry. Hence targeting children to change adult behaviour can be incorporated in the education programme.

Adults are the second group to be targeted. It is observed that most educated adults do not bother to follow the instructions displayed on the sign boards and are of the opinion that feeding animals in the zoo is their right. Often a lot of zoo visitors want to see the animal in action and therefore they try to rouse the animal in case it is resting. The reasons behind the instructions (do's and don'ts in a zoo) need to be communicated more effectively so that the visitors understand as to why zoo rules need to be obeyed.

CONSERVATION THEMES AND TOPICS

Various themes and topics exist on which our education programme can be based. Zoo visitors will be made aware of and appreciate the importance of wildlife of Maharashtra. Different ecological systems and the need for wildlife conservation is a gap in knowledge that the zoo should be able to bridge. What each visitor can do as responsible human being to conserve nature should be highlighted. The visitors need to know the importance of the wildlife with regard to human life, the current wildlife issues and trends, consequences of hunting and trade, alternatives to these problems and consequences and impact on human life in case of extinction of important species. Visitors need to be educated on the Wildlife Protection Act and Zoo Rules and awareness on environmental and conservation issues, as well as a respect for the environment needs to be generated.

Based on the above themes one can use the following tools to convey the message across to visitors at the zoo:

Population explosion, deforestation, soil erosion, habitat loss, wildlife depletion, human and wildlife conflicts, wild and domesticated animals, habitat and animal adaptation, balanced ecosystems, prey and predator relationships, pollution and its effects on biodiversity, dangers of plastic, wildlife threats, sustainable uses of forest products, do's and don'ts in the zoo.

"*Interpretation*" refers to all the programs offered within the zoo for the visitors. The interpretive programs are intended to explain, demonstrate and facilitate a living zoo experience by interpreting what the visitors are seeing both within and outside the enclosures. The zoo will develop a variety of educational materials. The interpretation program requires long-term planning with different phases of implementation. The implementation of the zoo education programme will be carried out using various tools and techniques.

Strategies

The zoo will outsource its Interpretation education and awareness drive to a competent institution well versed in conservation education. This will be done in close co operation with the zoo education officer. The proposed strategies for implementing the program include:

1. Development of a modern ***Interpretation Centre*** with visual presentation of the species and their specific habitats. These sub centers will provide details of the various bio geographic zones and ecosystems of Maharashtra which forms the range within which the displayed animals are found within the wild.

2. An ***ecorestitution*** program to create natural ambience both within and outside the enclosures. This will be specific to the habitat of the species in different sectors of the zoo such as the Western Ghats, the Deccan and the aquatic ecosystems. This will be depicted in visuals of the sub centers with information on where these animals can be seen in the wilds of Maharashtra.

3. Public programs: Public programmes will be conceptualized for implementation taking into account the literacy and socio-economic levels of the audience.

4. School programs: The zoo's education program is carried out by signs, graphics and other methods which may not be directly perceived as education tools by the public. So a school programme may not necessarily be designed to be a formal educative experience.

Despite the fact that school programs are a priority, they should not be implemented before the zoo is prepared to offer quality programs. Individual topics for different age groups should be identified and games and activities collected and designed for each group. After detailing the programme as per age groups the students should then be contacted and the school programme implemented.

3. Special events such as Workshops, Lectures can be organized on specific topics and conducted for the specific audience or participants.

Techniques

1. Signages: Signs, labels and graphics need to be visually pleasing and interesting. They need to have consistent complimentary color schemes and be located in strategic positions. Signs and graphics should be limited to priority topics so that visitors can comfortably absorb, rather than be over-whelmed by information. The target audiences need to be identified and then priority topics should be selected and prioritized. It is essential to know how people receive information because signs, labels and graphics are open to individual interpretation. Careful planning is required to communicate the intended messages.

a. Signs: Signs should be inform visitors about the zoo rules, give directions and locate facilities. Signs can be of various types viz. directional, instructional, zoo map, basic animal information, interactive, temporary, etc.

Signs should be bilingual (Marathi -English) to enable a large percentage of the visitors to understand, and as many signs as possible should have non-verbal graphics

for those visitors who are unable to read. Signs at the enclosures should be creative as well as informative about the animal on display.

b. Labels: Labels are short descriptive boards that can be placed on trees or other edifices and can impart concise information like where they are found, medicinal use, etc.

c. Graphics: Graphics are the visual representation of a concept. They are essential for illiterate visitors and can provide all visitors with better understanding of certain concepts.

2. Interactive stations

Interactive displays need to be designed to be safe, durable, and to communicate specific messages. They must be designed for specific target audiences. Space and traffic flow need to be considered and again, topics should be prioritized, because there should only be a limited number so that the visitors don't feel bored and can grasp the matter quickly.

Verbal information transfer and visitor interaction with staff is essential for effective zoo education. Direct communication is one of the most effective ways to educate people because it can be personalized and visitors can ask questions. Positive interactions with staff will often be what visitors remember most.

a. Tour guides: Staff can be trained to give guided tours to the interested public who can narrate some tidbits from the personal lives of the animals to make the public's experience more intimate with the animal life in the zoo. Such tours can start at a fixed time from a fixed location and the guides should be able to relate to the different backgrounds of the visitors and express the message of conservation in a way that the visitors will understand and take back with them the message to act in a manner to preserve the environment. The zoo guides should also be able to convey their message in a variety of languages like Marathi, Hindi, English, etc.

b. Zoo keeper talks: Zoo keepers are to be provided with an observation point from which they can keep a watch over the animals and at the same time inform the visitors about the diet of the animal, dispel myths about the animals and provide insight into the animals' behaviour. Zookeeper talks are opportunities for visitors to see first-hand and understand animal management at the zoo. There can be regularly scheduled talks for activities that keepers do every day, such as grooming the elephant, feeding, cleaning cages, etc...Keepers could also talk at feeding times. They can provide information that nobody else can, such as "This monkey is in a bad mood today!" This type of personal information is essential for instilling a respect for animals and teaching people to view them as other living beings. Keeper talks require staff training for proper animal handling and developing interpersonal skills. Scheduling and visitors' interests should also be considered before starting such programmes.

c. Touch Tables: Zoo volunteers can be made in charge of a touch table on Sundays and holidays which could either have a piece of skin, or an animal product like a porcupine quill or a peacock feather which the audience could appreciate and learn more about the anatomy of animals. Live exhibits like reptiles and amphibians could also be displayed and information about the same could be disseminated regarding the same.

3. Visitor center

The visitor center should provide visitors with a variety of information. It should include information on the different programs offered and current zoo events and news. It should be a resource center that has a variety of resources such as books, posters and pamphlets to be used in the center. Most of all, it should be a place to

welcome visitors and prepare them for their visit by explaining the zoo rules, what is offered and what to look for. The visitor center should be located near the entrance to encourage visitors to make use of it. The layout of the room must be planned and materials must be created and attractively displayed.

4. Printed materials

A zoo map, guides and brochures on special topics need to be produced. Brochures are more specific and provide more in-depth information. Priority topics and visitor's interests need to be determined. Again, these materials should be bi-lingual in Marathi and in English. Printed materials should provide information in clear and simple language and should be attractive and interesting. It needs to be determined which printed material will be free and which will be offered at a nominal cost. Printed materials need to be updated and new items should be offered on a regular basis.

Secondly publications like a work book for students with a lot of activity sheets should be developed which can be handed to them when they come to the zoo. The teachers can be given a resource book and would need to be trained to show the children as to how they are to be used and to correct their mistakes wherever necessary.

5. Press, TV and Radio

Education should not be limited to the zoo itself. Mass media could also be an effective way to educate the public. It will also give good publicity to the zoo. TV and Radio channels both could offer programming that is educational and entertaining. Weekly newspaper columns giving out animal information with a picture of the animal to colour can educate school children of different ages. It just requires staff creativity and initiative to make the arrangements and get them interested.

6. Volunteer activities.

Volunteers can be of great assistance to the zoo. It is also a great way to get the community involved and to help the zoo to achieve some of its goals. Volunteer activities can include one day events or long-term volunteer activities. A group of volunteers can be formed with the name "Friends of Zoos" and they could be used for various activities detailed below:

a. Zoo Clean-up Drive

The zoo volunteers can be used to create awareness amongst the public so that they do not litter the zoo premises. They could make an example of themselves and lick up the litter in front of the zoo visitors and explain to them the need for proper waste disposal.

b. Zoo street theatre

This could be one of the programs for the general public that the zoo can run in collaboration with other organizations, to raise people's awareness of and interest in environmental subjects. These programs could also include exhibits, demonstrations, dramas, puppet shows, etc. The information presented could range from practical guidance in conservation techniques to general ecological concepts.

c. Zoo Patrol

Certain zoo visitors are notorious for feeding and teasing the animals. Zoo volunteers would make an excellent zoo patrol team and keep a watch on the errant public and educate/sensitize them as to why they are wrong in doing so, how deleterious over feeding the animals can be and how would it feel in case they were put in the animal's place.

IMPLEMENTATION

To implement the above-defined programs, the Rajiv Gandhi Zoological Park must first recognize the paucity of its existing resources and capabilities. Basic infrastructure in terms of staff, equipment and material need to be considered before actual implementation of the Education Master plan can be executed.

Job description of the educational officer

The Education Officer must be a Public Relations Officer, Marketing Officer, a Volunteer's Scheme Coordinator and an Adoption's Scheme Coordinator all rolled into one.

- 1) He/She should ensure that the zoo visitors have as educational an experience as possible.
- 2) He/She should create and direct classroom based education programmes for all students (primary, secondary, college and university).
- 3) He/She should help train teachers in wildlife and conservation issues and in how to use the zoo most effectively with their class.
- 4) He/She should create information for all signs and trails/pathways and direct the artist when illustrating the text.
- 5) He/She should create educational packs for students and teachers and direct the artist when illustrating the text.
- 6) He/She should give talks to the public especially at the animals' feeding times.
- 7) He/She should create promotional literature and a zoo guidebook.
- 8) He/She should write press releases and articles for newspapers and magazines, respond to negative coverage given by the media and coordinate with any member of the media who wishes to cover aspects of the zoo.
- 9) He/She should create a special activities programme for festival days and holidays.
- 10) He/She should coordinate a zoo volunteer's scheme as well as an animal adoptions scheme.
- 11) He/She should be responsible for training the zoo education team comprising of zoo educators, zoo guides, assistants and demonstrators and lead the team effectively to implement all educational activities of the zoo.

The zoo educational officer should be assisted by a team of staff members comprising of 2 zoo educators, 3 guides, 1 assistant to look after the auditorium/amphitheatre and 3-4 demonstrators to handle touch-tables, demonstrate snakes, etc.

The zoo educators will solely handle zoo outreach activities like coordinating with schools and other academic institutions, arranging their trips to the zoo, taking the students around the zoo and implement the classroom based activities programme designed by the zoo education officer. They should also assist the zoo education officer to create educational packs for students and teachers and as well in training the teachers on issues of environmental and wildlife conservation.

Zoo guides will be trained by the zoo educational officer to take the public (of different age groups, educational levels and economical conditions) around the zoo and talk to them on various aspects of zoo management, animal behaviour and wildlife conservation.

Auditorium attendant will be a person who will look after the auditorium and amphitheatre and will be responsible for the cataloguing and preserving all the education material from brochures to books, films to computers, etc.

Demonstrators may be regular volunteers to the zoo who would be trained by the zoo education officer to look after small interpretation devices like touch tables or take around live animals like amphibians/reptiles that the people could touch or hold. Using these interpretive techniques, the demonstrators could educate the zoo visitors on festival days, wildlife week, etc.

Interpretation Centre

A facility like a visitor's centre with an auditorium and interpretation material and aids is required to be constructed where school children could be given on target specific orientation programmes before being taken around the zoo. The same facility could be designed in such a way so as to use it for screening of wildlife/environment films, holding presentations or workshops, etc.

The Interpretation Centre would basically highlight the zoo's role in today's modern times along with the attractions of the zoo and what people can learn from various exhibits.

Equipment

The zoo education department would require an office for the zoo education officer and other members of his/her team. A computer, colour printer, lamination machine (for temporary signs), LCD projector, slide projector, camera, etc would be the basic equipment required for the department. Loudspeaker along with a microphone would be an asset for outdoor functions. Tables and chairs for the auditorium and chart hangers and white boards for presentations are a must. Cupboards to store all the equipment, books, DVDs, etc will be required.

Materials

Materials like labels, directional sign boards, educational sign boards, interpretive signs at enclosures, signs informing visitors about the Do's and Don'ts in a zoo will be required at the least to start off the education process. Printed material like pamphlets, zoo brochures, students' activity sheets, teacher resource book, stickers, bookmarks, postcards and other creative material would be mandatory to make the zoo classroom programme a success. Other resource material like certificates, compendiums, mementoes, prizes etc would be required when workshops, quizzes, debates etc are organized as part of awareness creating activities. Costumes for street plays and animal material like skin, teeth, bones quills, feathers, etc are needed for making touch tables and other interactive exhibits.

Other high end interpretive material like interactive signage using multimedia would be required to be manufactured professionally from outside and installed at appropriate locations within the zoo premises.

A library could be organized for interested visitors where they can refer books on the premises itself. Therefore, books, movies and documentaries on environment and wildlife should be purchased for educational purposes.

TIME TABLE FOR ONE CALENDAR YEAR

The list of activities to be carried out in a period of one calendar year is given as below:

For General Zoo visitors:

- A) On a daily basis: a) Tour guides
b) Zoo keeper talks
- B) On Weekends: Workshops for interested participants (age group can be determined)
- C) On special Days (as listed in appendix I):
Puppet theatre/show; street plays, signature campaigns, float parade; tree plantation, quiz, drawing competition.

For Organized School Trips

For schools which would have taken a prior appointment from the zoo education officer, the school students would first be taken to the Interpretation centre where they could leave their bags and things for safekeeping. They would be given a talk or shown a film as to why zoos exist and how they should behave in the zoo.

After they are given a brief introduction regarding the Rajiv Gandhi Zoological Park, activity sheets would be distributed to the children and resource books would be given to their teachers and then a zoo educator would take them around the zoo and show them different animals explaining to them their current status in the wild, the way these are managed in the zoo.

The children would be asked to fill in their activity sheets and their teacher would collect them then and correct them later. The teacher would be asked to report back to us on the performance of the students so as to gauge our educational programme level. After taking a round, the students can be involved in some kind of activity like some conservation games, or made to help the zoo by picking up the litter thrown around by the public or by educating visitors on why not to tease and feed the animals.

For Other School Trips:

School trips that would come unannounced would be given a guide to escort them around the zoo premises after they have been taken to the Interpretation centre. Depending on the kind of material available the children could be given stickers, pamphlets or brochures as a souvenir to take home with them.

Friends Of Zoos Club:

Members of eco-clubs belonging to schools and colleges could be given a membership to the Friends of the Zoo Club. The Member would be entitled to free entrance to the zoo and would be given an Identity card, a cap and a badge. These volunteers would be asked to come regularly and help with educational activities like managing touch tables, participating in street plays and help to make the zoo a plastic free zone.

BUDGET

Particulars	Rate x no. of items	Total Cost (Rupees)
Personnel	Salary per month x no. of persons	Per annum cost
Officer in charge	Rs 15,000 x 1	1,80,000
Zoo educator	Rs 10,00 x 2	2,40,000
Zoo Guides	Rs 8,000 x 6	5,76,000
Total cost for Salaries		9,96,000
Infrastructure	Cost of item x no. of pieces	Total cost
Zoo Classroom		Cost of Building
Chair with writing board	Rs 3,000 x 50	1,50,000
Tables (steel)	Rs 6,000 x 6	36,000
LCD projector	Rs 85,000 x 1	85,000
Computer	Rs 40,000 x 1	40,000
Colour Laser Printer	Rs 35,000 x 1	35,000
White Board	Rs 3,000 x 2	6,000
Lamination Machine	Rs 20,000 x 1	20,000
Video Camera	Rs 25,000 x 1	25,000
Cupboards	Rs 6,000 x 6	36,000
Total cost for Classroom		4,33,000 + cost of building
Printed Material	Rate per piece x qty	Total cost
Brochure	Rs 4 x 10,000	40,000
Stickers	Rs 2 x 1,00,000	2,00,000
Pamphlets	Rs 2 x 20,000	40,000
Student Activity Booklet	Rs 25 x 12,000	3,00,000
Resource Material for Teacher's	Rs 50 x 1000	50,000
Postcards	Rs 3 x 8000	24,000
Total Cost for printed Material		6,54,000
Signage	All signs in the zoo	10,00,000
Interactive Interpretation kiosks		To be budgeted separately
Total Cost for Signage		75,00,000 + cost of interactive signs
Activities	Cost per day x no. of days	

Workshops for 50 students (max)	Rs 5,000 x 40	2,00,000
Material and publicity for various activities like signature campaign, quiz, drawing competitions, etc to be executed on special days as listed in Appendix 1	Rs 6,000 x 30	1,80,000
Total Cost for planning of activities		3,80,000
Miscellaneous Contingency Expenses		35,000
Total Estimated Budget for Educational Department		99,63,000 (nearly 1 crore)

Conclusion

As of now the zoo does not contribute to fulfilling the educational objectives as to why Rajiv Gandhi Zoological Park Zoo visitors are often observed and penalized for littering or teasing the animals. The zoo is extremely understaffed when activities like zoo patrolling and education are required.

Zoo keepers are not adequately trained to pass on conservation messages to the visitors. There is a dire need to use the potential of these personnel to promote awareness regarding wildlife and zoo management.

Therefore, keeping in mind the non existing infrastructure that prevails right now in the zoo the following is recommended:

- 1) Building up infrastructure for the Zoo Education Department with a modern interactive Interpretation Center with ecosystem interpretation centers.
- 2) Out-source educational activities for at least one year to a reputed and experienced agency who will co-ordinate with the zoo educational officer and carry out the educational activities enlisted and budgeted above while at the same time set up the infrastructure for an in-house education department. (Total Estimated Cost Rs. 24,98,000)
- 3) Tender the signage (all sign boards as well as interactive kiosks) to a reputed professional agency which has been in the business of interpretation who will look after all aspects of designing, fabricating and installing the signs and develop a full fledged signage programme for the zoo for future years.

List of Important Days in the Zoo Calendar

Date	Event
26 th January	Republic Day
15 th February	Pune Municipal Corporation Day
14 th March	Zoo Day
21 st April	Earth Day
5 th June	World Environment Day
July/August	Nagpanchami
15 th August	Independence Day
August	Raksha Bandhan
October 1 st week	Wildlife Week
November	Animal Welfare Fortnight
November	Diwali
25 th December	Christmas
	Birthdays of famous zoo animals

Appendix 4.-VISITOR DATA FROM APRIL 1999 TO MARCH 2011

The visitation data demonstrates the increasing popularity of the zoo during the last decade.

Table 1 – Number of visitors’ 99-2000

Month	Number Of Children	Number Of Adult	Total Number
Apr-99	22566	43647	66213
May-99	46759	97819	144578
Jun-99	18386	54421	72807
Jul-99	6803	34508	41311
Aug-99	10950	43141	54091
Sep-99	11135	41160	52295
Oct-99	8550	32259	40809
Nov-99	26657	64720	91377
Dec-99	25017	60038	85055
Jan-00	28934	69638	98572
Feb-00	20728	50564	71292
Mar-00	11290	38465	49755
Total	237775	630380	868155

Table 2 – Number of visitors 2000-2001

Month	Number Of Children	Number Of Adult	Total Number
Apr-00	20890	57648	78538
May-00	39579	98807	138386
Jun-00	14575	57522	72097
Jul-00	7032	41380	48412
Aug-00	8085	40444	48529
Sep-00	10238	41560	51798
Oct-00	11692	43720	55412
Nov-00	20761	57405	78166
Dec-00	25807	65824	91631
Jan-01	21255	59489	80744
Feb-01	15150	42993	58143
Mar-01	7707	36270	43977
Total	202771	643062	845833

Table 3 – Number of visitors 2001-2002

Month	Number Of Children	Number Of Adult	Total Number
Apr-01	17004	52500	69504
May-01	30202	83240	113442
Jun-01	13389	55446	68835
Jul-01	7212	40362	47574
Aug-01	8204	46155	54359
Sep-01	9504	41209	50713
Oct-01	6255	33204	39459
Nov-01	18783	61282	80065
Dec-01	29349	73192	102541
Jan-02	22647	65441	88088
Feb-02	18358	50747	69105
Mar-02	9087	40491	49578
Total	189994	643269	833263

Table 4 – Number of visitors 2002-2003

Month	Number Of Children	Number Of Adult	Total Number
Apr-02	18114	58183	76297
May-02	32735	94294	127029
Jun-02	13921	59309	73230
Jul-02	7003	45605	52608
Aug-02	7483	42303	49786
Sep-02	8975	46937	55912
Oct-02	6883	37518	44401
Nov-02	18860	64294	83154
Dec-02	29460	96821	126281
Jan-03	19259	68090	87349
Feb-03	14458	47869	62327
Mar-03	7523	36469	43992
Total	184674	697692	882366

Table 5 – Number of Visitors 2003-2004

Month	Number Of Children	Number Of Adult	Total Number
Apr-03	18606	57811	76417
May-03	31647	88417	120064
Jun-03	13327	56224	69551
Jul-03	6139	38769	44908
Aug-03	9247	49261	58508
Sep-03	8964	47507	56471
Oct-03	12623	52984	65607
Nov-03	23839	81184	105023
Dec-03	29460	90655	120115
Jan-04	26094	87898	113992
Feb-04	18111	65802	83913
Mar-04	7190	38641	45831
Total	205247	755153	960400

Table 6 – Number of Visitors 2004-2005

Month	Number Of Children	Number Of Adult	Total Number
Apr-04	22713	73515	96228
May-04	43028	119056	162084
Jun-04	15085	65395	80480
Jul-04	8260	50191	58451
Aug-04	7769	46396	54165
Sep-04	11132	57179	68311
Oct-04	7845	47546	55391
Nov-04	24133	82063	106196
Dec-04	22444	87466	109910
Jan-05	24822	98810	123632
Feb-05	16928	62611	79539
Mar-05	11539	53440	64979
Total	215698	843668	1059366

Table 7 – Number of visitors 2005-2006

Month	Number Of Children	Number Of Adult	Total Number
Apr-05	21281	72929	94210
May-05	35945	109928	145873
Jun-05	15250	75293	90543
Jul-05	6731	51096	57827
Aug-05	7199	48049	55248
Sep-05	6071	48315	54386
Oct-05	6606	42316	48922
Nov-05	26685	96949	123634
Dec-05	25021	96811	121832
Jan-06	27717	106301	134018
Feb-06	14684	65481	80165
Mar-06	8586	55821	64407
Total	201776	869289	1071065

Table 8 – Number of visitors 2006-2007

Month	Number Of Children	Number Of Adult	Total Number
Apr-06	22489	89389	111878
May-06	36091	122954	159045
Jun-06	14699	80750	95449
Jul-06	4527	45006	49533
Aug-06	4475	43054	47529
Sep-06	7407	55219	62626
Oct-06	54460	66319	120779
Nov-06	64999	67256	132255
Dec-06	30841	117496	148337
Jan-07	25171	108186	133357
Feb-07	17317	71420	88737
Mar-07	8941	60090	69031
Total	291417	927139	1218556

Table 9 – Number of visitors 2007-2008

Month	Number Of Children	Number Of Adult	Total Number
Apr-07	19687	90439	110126
May-07	38611	146657	185268
Jun-07	17045	89781	106826
Jul-07	7160	69713	76873
Aug-07	9750	75889	85639
Sep-07	11089	77975	89064
Oct-07	9241	63594	72835
Nov-07	23553	100819	124372
Dec-07	29875	125466	155341
Jan-08	24860	114444	139304
Feb-08	18122	76609	94731
Mar-08	12560	71670	84230
Total	221553	1103056	1324609

Table 10 – Number of visitors 2008-2009

Month	Number of Children	Num.of Sch. Children	Num of Adult	Num of Foreigner	Num of Handicap	PMC School Children	PMC School Teacher	Total Number
Apr-08	18889	0	87166	0	0	0	0	106055
May-08	44091	0	166217	0	0	0	0	210308
Jun-08	18128	0	110537	0	0	0	0	128665
Jul-08	8032	0	68376	402	31	0	0	76841
Aug-08	9769	0	73364	262	0	0	0	83395
Sep-08	8123	0	61918	198	0	0	0	70239
Oct-08	16754	864	82551	310	22	0	0	100501
Nov-08	25485	0	98579	350	135	0	0	124549
Dec-08	33552	0	115269	318	269	0	0	149408
Jan-09	30909	0	115283	370	187	1990	191	148930
Feb-09	20792	0	72519	323	100	0	0	93734
Mar-09	10068	0	63981	258	163	0	0	74470
Total	244592	864	1115760	2791	907	1990	191	1367095

Table 11 – Number of visitors 2009-2010

Month	Number of Children	ww week	Num of Adults	Num of Foreigners	Num of Handicapped	Total Number
Apr-09	24768	0	99460	282	60	124570
May-09	49557	0	163283	230	80	213150
Jun-09	24391	0	119570	234	115	144310
Jul-09	6943	0	62742	371	59	70115
Aug-09	3583	0	36624	189	135	40531
Sep-09	6516	0	57569	252	81	64418
Oct-09	16336	347	85521	313	37	102554
Nov-09	17453	0	87653	345	126	105577
Dec-09	30574	0	122201	278	82	153135
Jan-10	30045	0	134367	378	187	164977
Feb-10	18566	0	82676	356	189	101787
Mar-10	10900	0	70841	276	61	82078
Total	239632	347	1122507	3504	1212	1367202

Table 12 – Number of visitors 2010-2011

Month	Adult	Child	Foreigner	Handicap	wildlife week	Total Visitor
Apr-10	114408	28742	292	136	0	143578
May-10	159193	46687	260	63	0	206203
Jun-10	111165	22826	252	106	0	134349
Jul-10	82616	8410	331	36	0	91393
Aug-10	82546	9301	438	30	0	92315
Sep-10	92738	12826	387	22	0	105973
Oct-10	74782	11129	366	55	1451	87783
Nov-10	127912	30694	403	78	0	159087
Dec-10	135543	33938	462	56	0	169999
Jan-11	158671	37076	555	132	0	196434
Feb-11	100365	26091	432	80	0	126968
Mar-11	74965	11023	340	30	0	86358
Total	1314904	278743	4518	824	1451	1600440

Appendix 5

Study of Katraj Lake of physico-chemical parameters over the last 13 years

The Katraj lake has been studied by several student of the BVIEER over the last decade. The Studies indicate that water quality improved in the decade between 1995 -2005, but has begun to deteriorate again.

Physico Chemical analysis 1995 (monsoon Season)

SrNo	Month	pH	Conductivity (ms)	Hardness (mg/lit)	Turbidity (NTU)	TS (mg/lit)	TDS (mg/lit)	TSS (mg/lit)	DO (mg/lit)	BOD (mg/lit)	COD (mg/lit)	MPN
1	Aug	9.1	0.521	290	21	600	1019	419	2.9	200	466	NA
2	Sept	8.9	0.555	262	28	466	692	236	2.8	131	220	NA
3	Oct	9.1	0.523	290	22	1572	1220	352	2.8	250	412	NA

Physico Chemical analysis 2005 (monsoon Season)

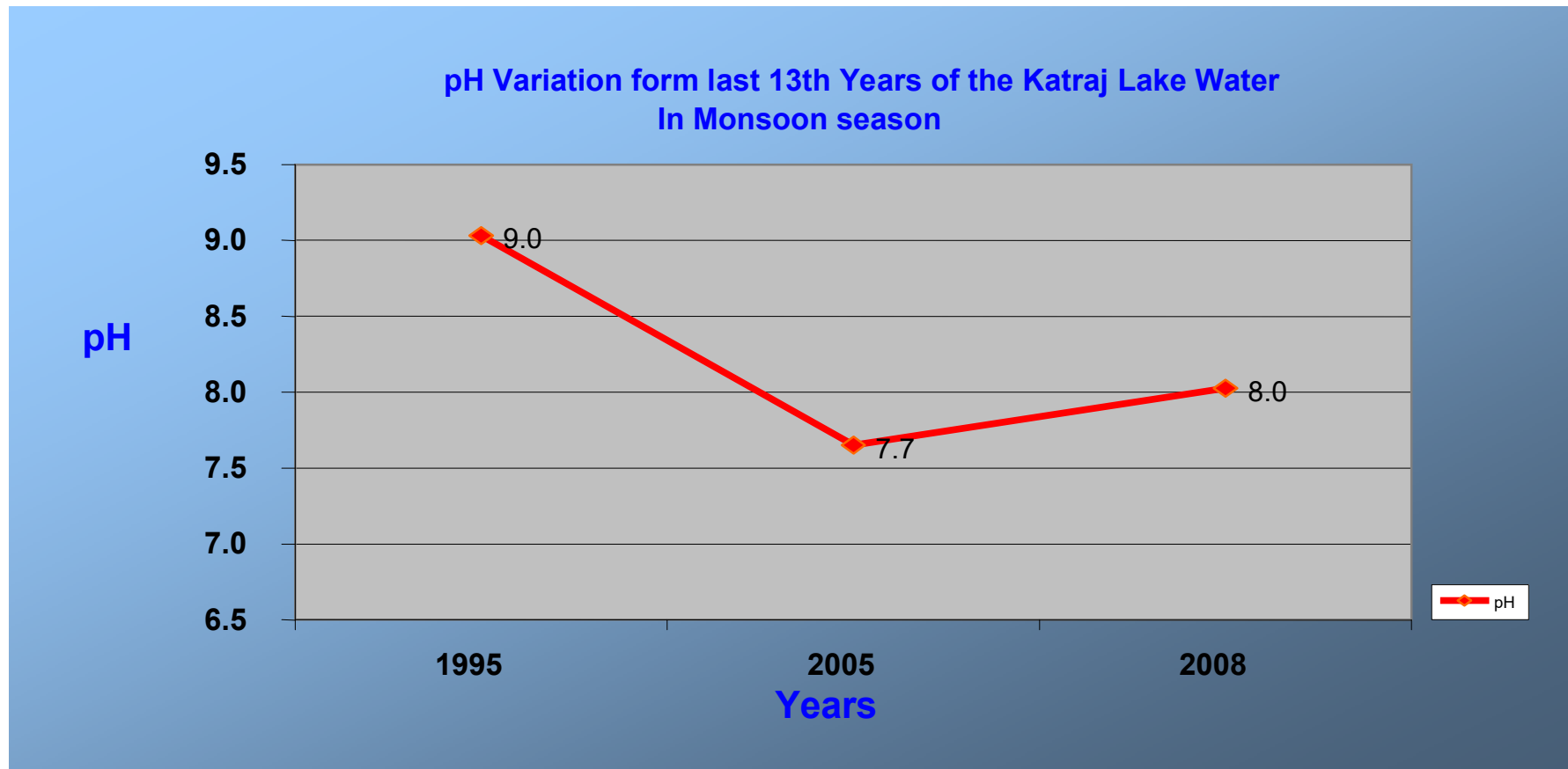
SrNo	Month	pH	Conductivity (ms)	Hardness (mg/lit)	Turbidity (NTU)	TS (mg/lit)	TDS (mg/lit)	TSS (mg/lit)	DO (mg/lit)	BOD (mg/lit)	COD (mg/lit)	MPN
1	July	7.6	0.668	275	18	507	668	161	5.9	1.64	NA	NA
2	Aug	7.7	0.607	268	19	458	550	92	6.4	2.98	NA	NA
3	Sept	7.5	0.678	264	21	552	607	55	6.3	2.86	NA	NA
4	Oct	7.8	0.688	253	20	602	548	54	7.4	1.72	NA	NA

Physico Chemical analysis 2008 (monsoon Season)

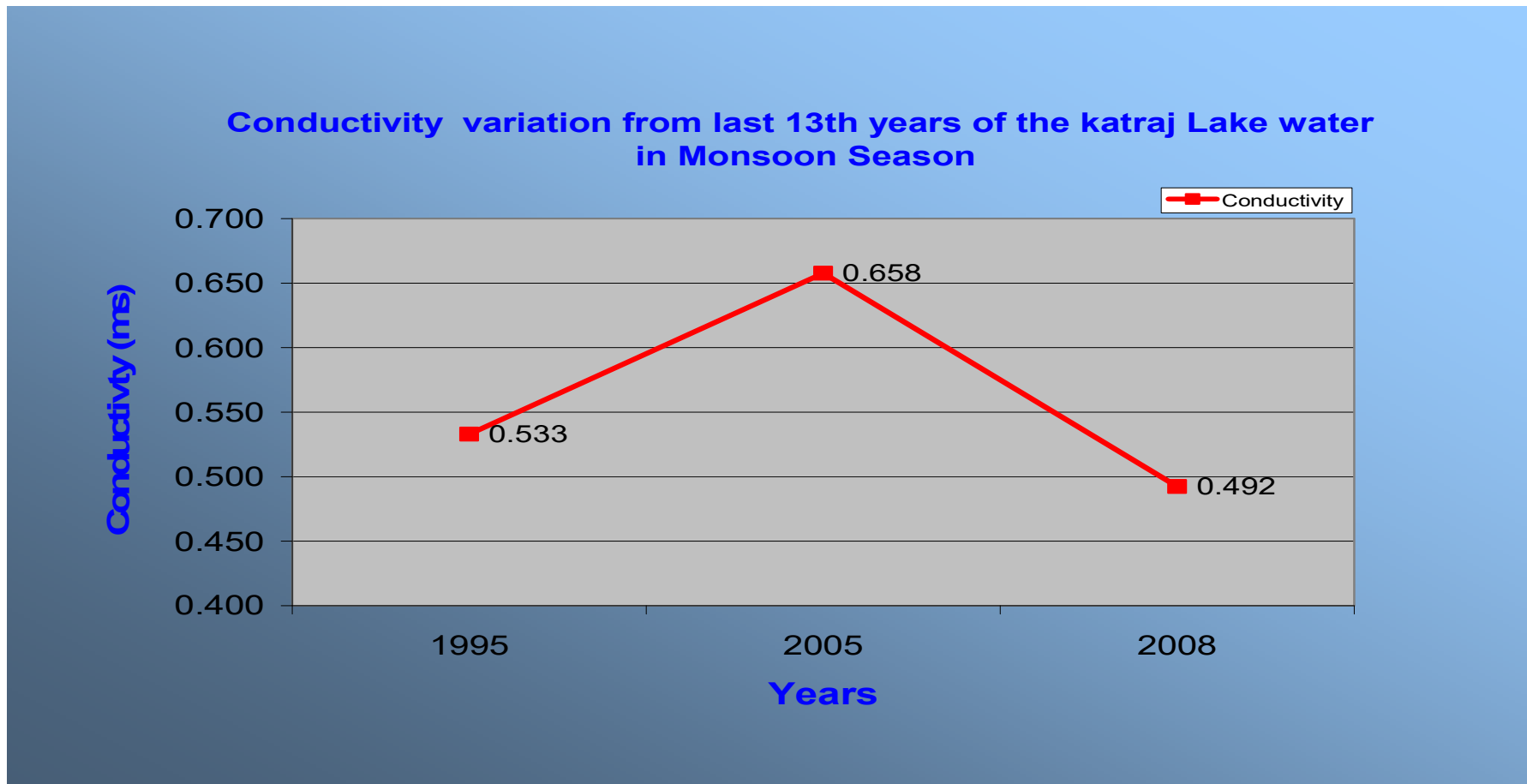
SrNo	Month	pH	Conductivity (ms)	Hardness (mg/lit)	Turbidity (NTU)	TS (mg/lit)	TDS (mg/lit)	TSS (mg/lit)	DO (mg/lit)	BOD (mg/lit)	COD (mg/lit)	MPN
1	July	8.6	0.671	215.56	5.6	784	633.78	150.22	5.73	1.68	16.33	1600
2	Aug	7.8	0.627	214.89	5.8	791.89	655.56	136.33	6.18	1.73	16.44	1600
3	Sept	7.4	0.402	218.33	6.4	845.89	684.67	161.22	6.39	2.74	18.44	1600
4	Oct	8.3	0.448	218.11	6.1	817.44	639.33	178.11	6.4	2.63	16.55	1600

The graphs depict this alteration in water quality and indicates the need for a more proactive, management especially as Zoo plans to develop a major aquatic avifauna section with a walk in aviary. It also hopes to set up an ex-situ breeding colony of water birds. This places an immediate demand for improving water quality.

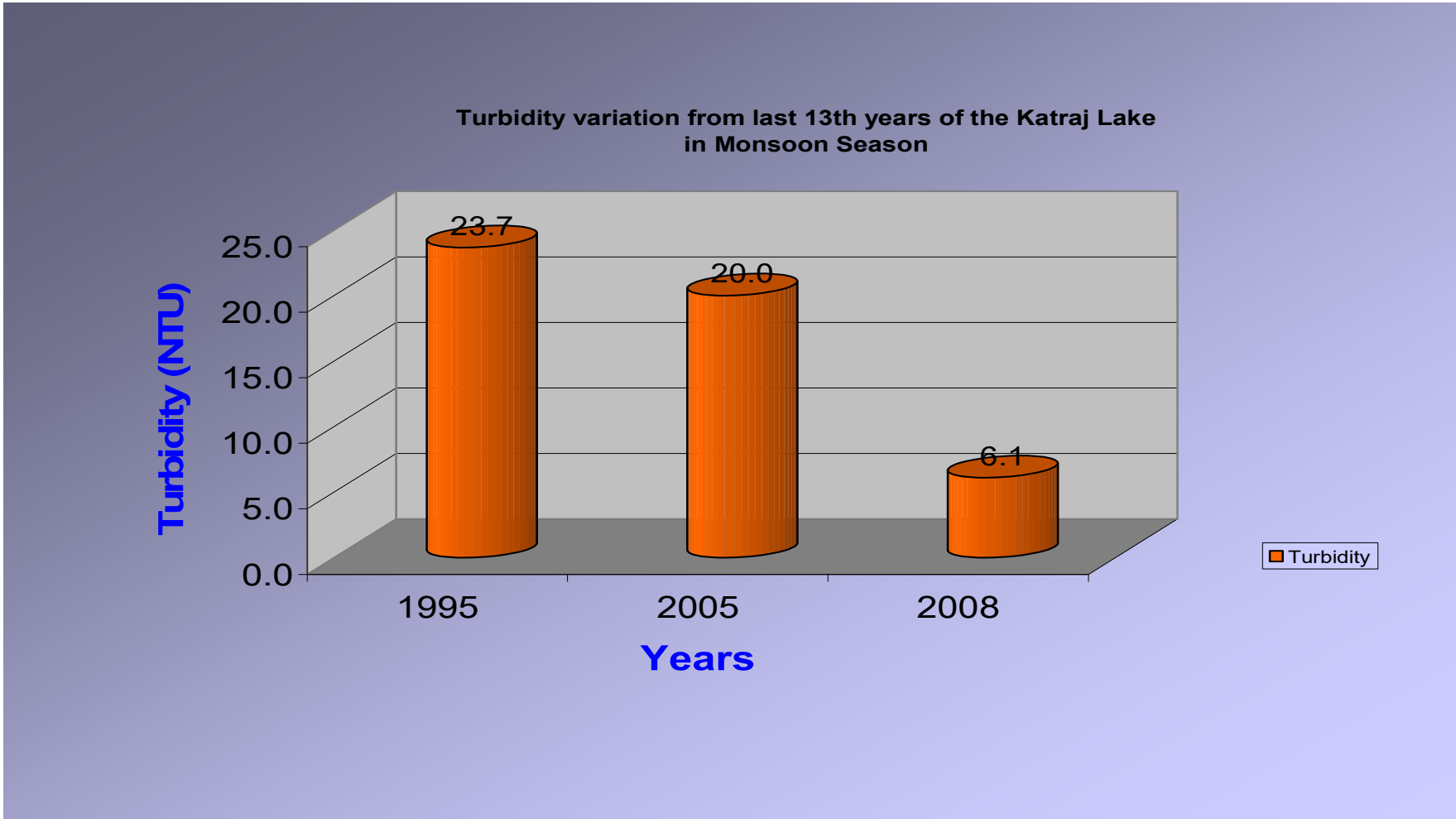
pH



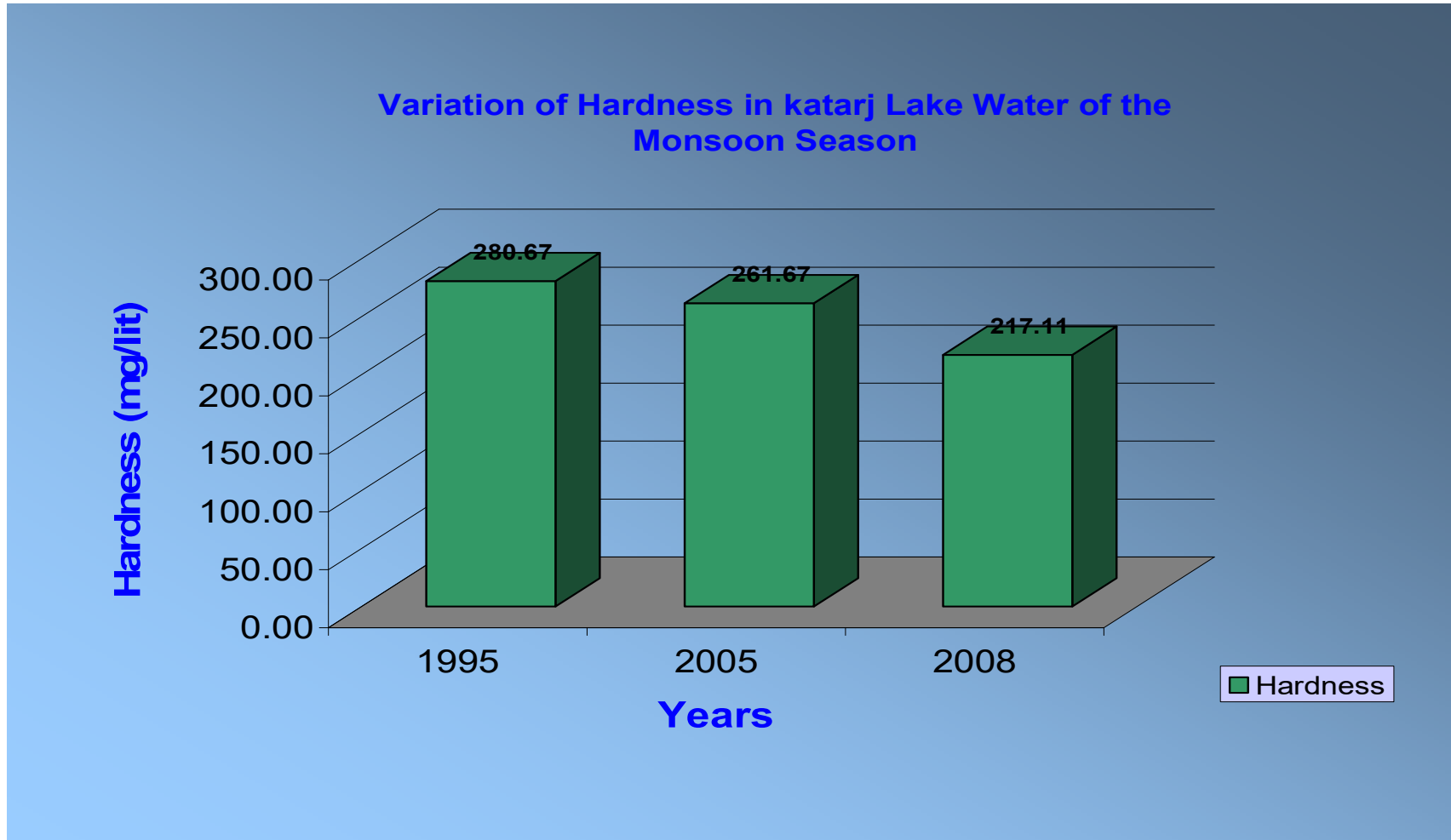
Conductivity



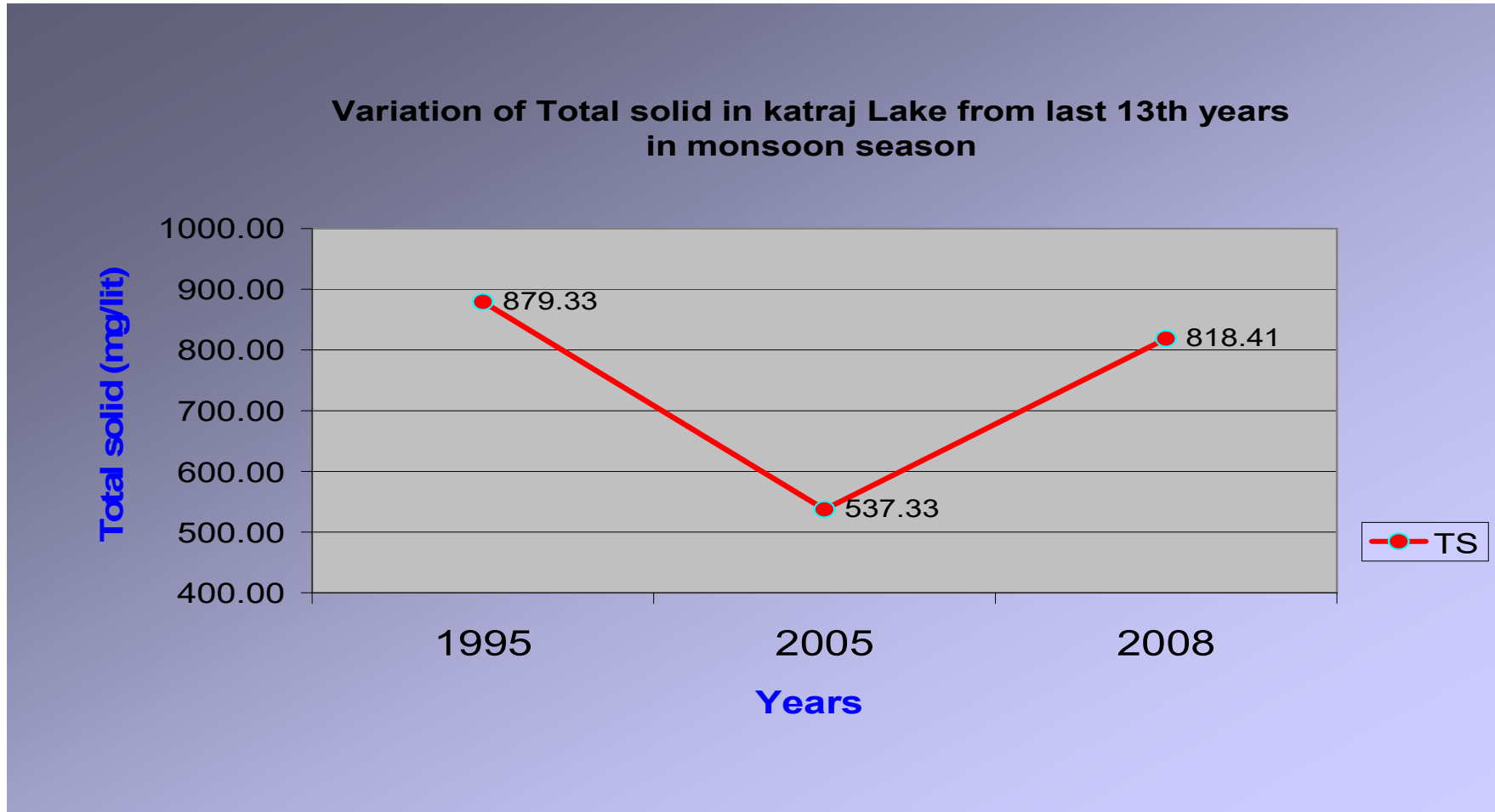
Turbidity



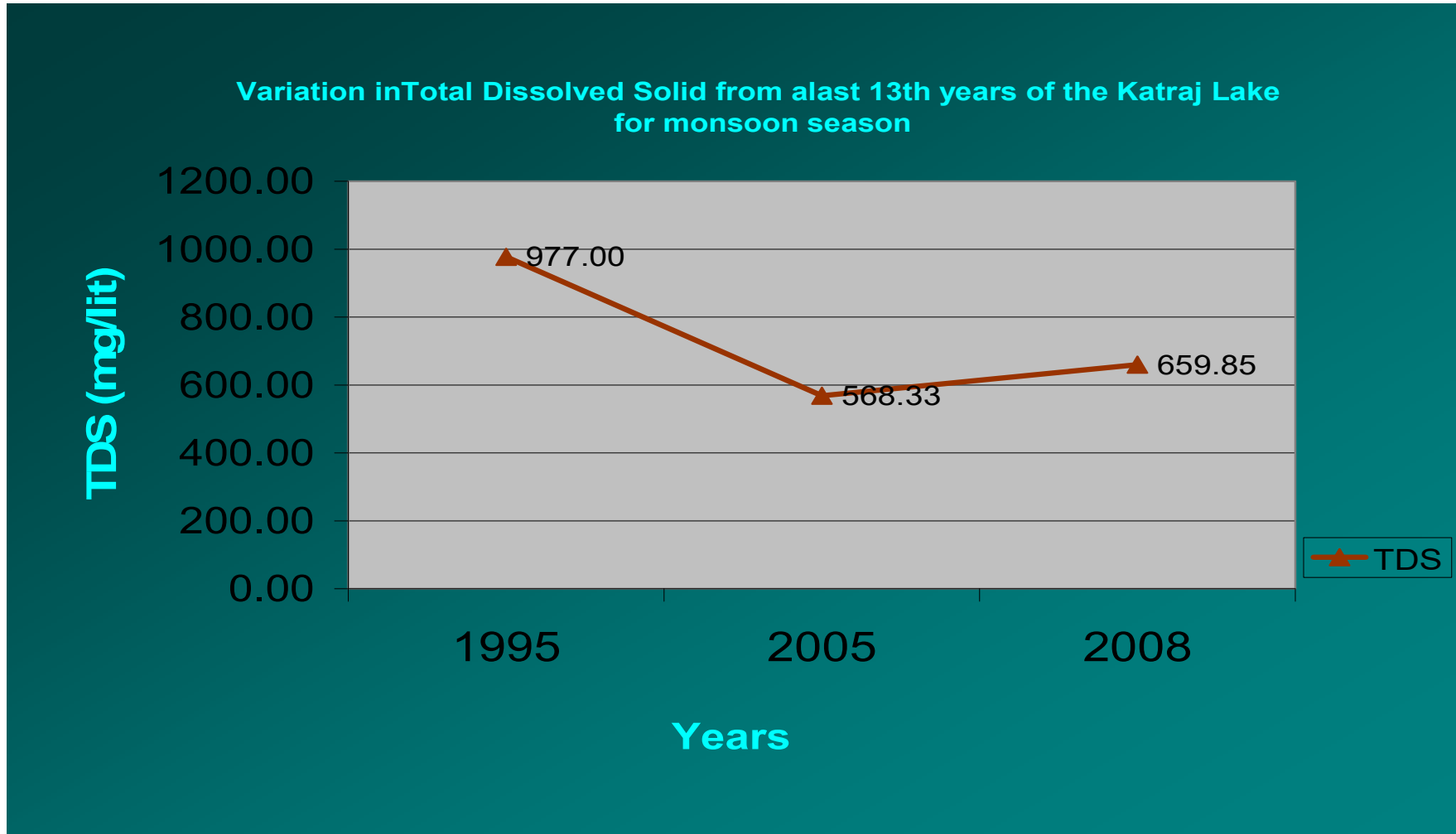
Hardness



Total Solid



Total Dissolved solid

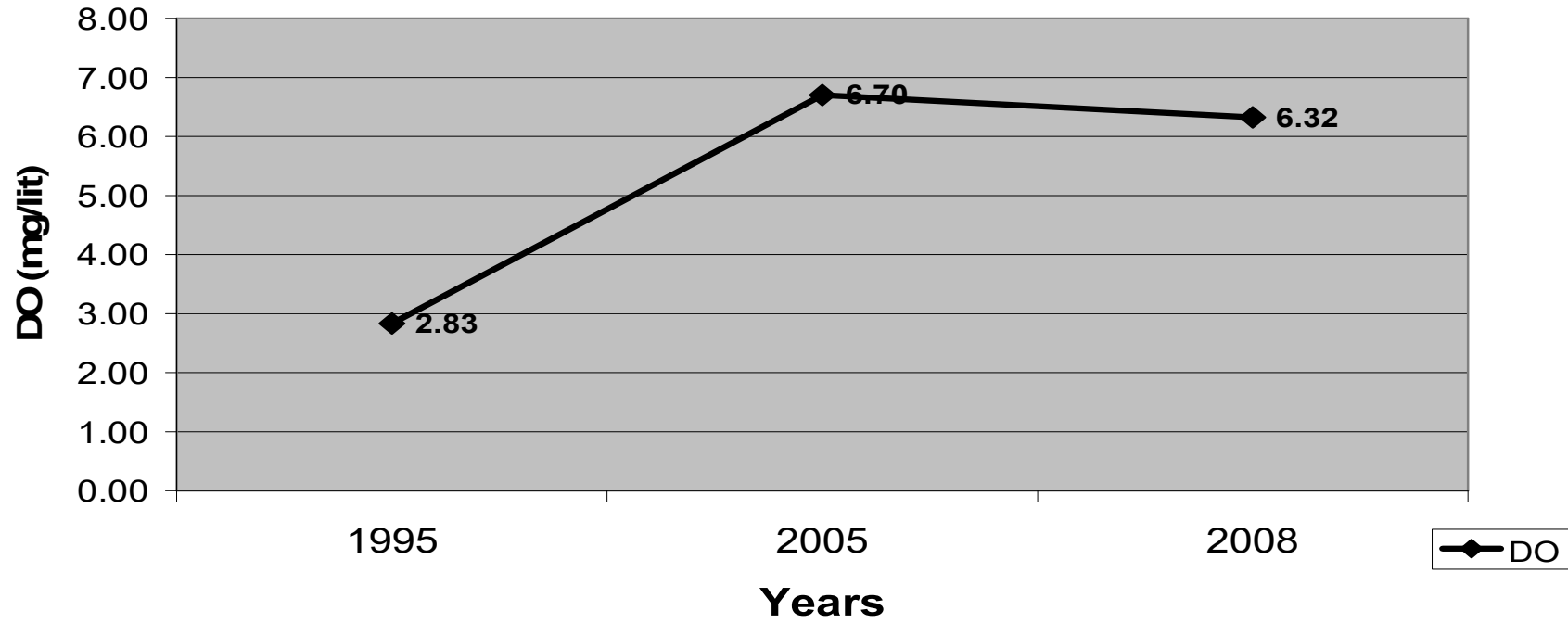


Total Suspended Solid



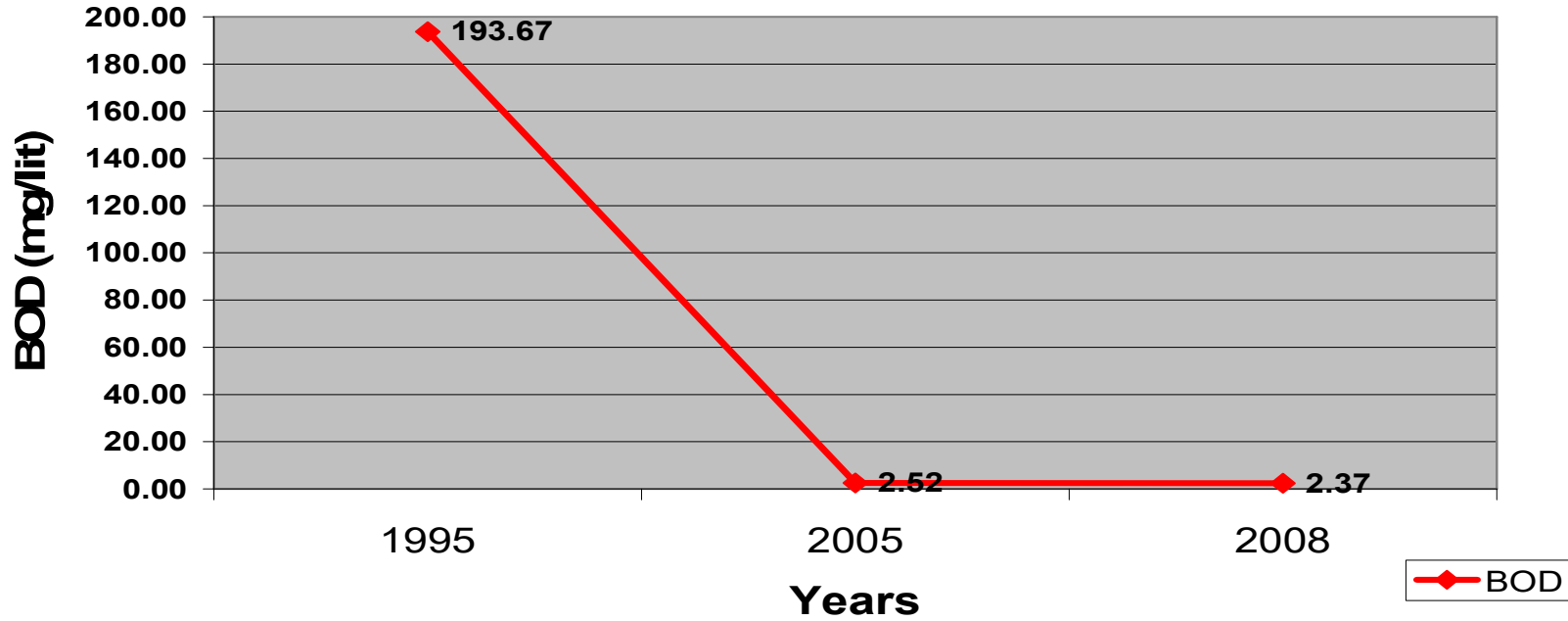
Dissolved Oxygen

Variation in Dissolved Oxygen from last 13th years of the Katraj Lake for monsoon season



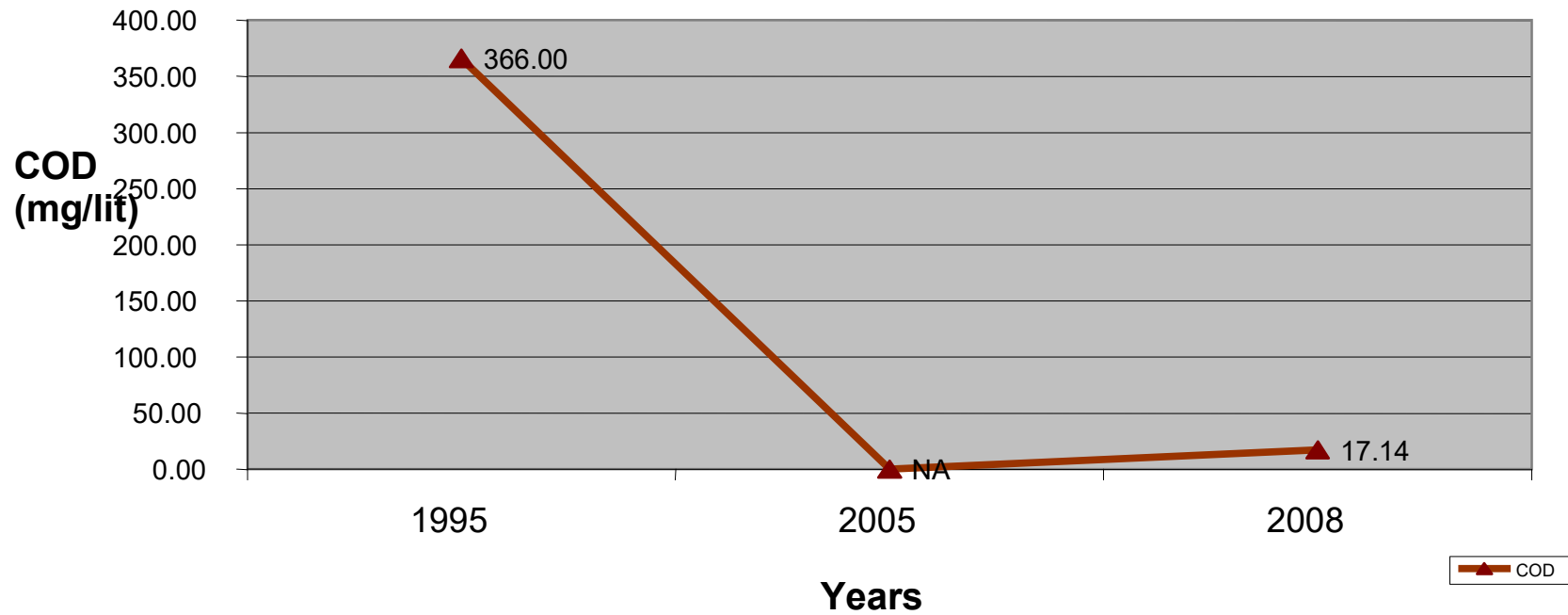
Biological Oxygen Demand (BOD)

Variation in Biological Oxygen Demand from last 13th years of the Katraj Lake for monsoon season



Chemical Oxygen Demand

Variation in Chemical Oxygen Demand from last 13th years of the Katraj Lake for monsoon season



Sr.No	Parameters	Year 1995	Year 2005	Year 2008
1	pH	In these years pH level is high at 9 , indicating lake water was more alkaline.	Up to 7.5 pH was noted which less than the year of 1995 was.	8.5 pH indicates alkaline lake water
2	Conductivity	0.533 (ms) due to dissolve salt present in water.	0.658 (ms) due to high % of dissolved salt in water.	0.492 (ms) due to dissolved low concentration salt present in water.
3	Turbidity	23.7NTU which is very high turbid the lake water.	Decreasing the turbid from 1995 was 20 NTU noted in this year.	Decreasing the turbid from 1995 to 2008 6.1 NTU noted in this year.
4	Hardness	200.67mg/lit Due to high concentration of Carbonate and Bicarbonate.	261.61mg/lit Due to high concentration of Carbonate and Bicarbonate. Decreasing from 1995 onwards.	217.11mg/lit Due to high concentration of Carbonate and Bicarbonate. Decreasing from 1995.
5	TS	879.33mg/lit total solid present in the lake water	537.33mg/lit total solid present in the lake water. Decreasing from 1995	818.41mg/lit total solid present in the lake water. Increasing from 2005
6	TDS	977.00mg/lit TDS present in the lake water	538.33mg/lit TDS present in the lake water ,Decreasing from 1995	659.85mg/lit TDS present in the lake water, slightly increasing from 2005
7	TSS	335.67mg/lit TSS were found.	67.00mg/lit which has very low concentration form the last 10 years.	158.55mg/lit which is slightly increasing form 2005
8	DO	2.83mg/lit very low DO found, Which is not good for fish.	6.7mg/lit permissible DO found, Which is good for fish.	6.3mg/lit which is in a permissible limit DO found and good for fishes.
9	BOD	193.67mg/lit BOD were found.	2.52mg/lit BOD was found, Decreasing from last 10 years	2.37mg/lit BOD was found, Decreasing from last 13 years
10	COD	366.00mg/lit COD was found which is very high COD which makes water non potable	COD is Not Available	17.14mg/lit COD were found.
11	MPN	NA	NA	1600/100ml E.coli form found.

Results

Conclusion

The lake water quality has been found to be improved within last twelve years. The dissolved oxygen levels in water have increased and are within permissible limits. This is possible because inflow of sewage water in the lake was stopped . Water quality is good for aquatic fauna in the lake.

Suggestions

For the lake management.

- ✚ The Katraj tank is an important feature of the landscape of South-Pune. It forms a significant source of precious water, and provides valuable habitats for plants and animals. It moderates the potential threat of hydrological extreme events (drought and floods), influences microclimate, enhances the aesthetic beauty of the landscape and extends many recreational opportunities.
- ✚ The lake provides a wide diversity of values and uses ranging from providing ecological goods and services and direct production values while it was used for fishery. These can be categorised as direct use values with consumptive and non-consumptive uses such as drinking water, irrigation, fishing, eco-tourism etc. indirect use values includes beneficiaries is located away from the lake, potential future use & non-use social benefit of availability of a healthy water resource for the future and emergency needs. It should thus be conserved and protected.

✚ The different environmental problems encountered in the lake include excessive influx of sediments from the lake catchments. If proper management of storm water, combined with a root zone treatment plant is developed this can be significantly reduced. The over-exploitation of lake for activities like recreation, fishing, and siltation resulting in lake shrinkage, deterioration in water quality and impact on bio diversity, climate change etc. are potentially environmentally unsound practices.

Prevention of pollution from point sources by intercepting, diverting and treating the pollution loads entering the lake is a major management concern as the earlier improvement in water quality has deteriorated again during the last 3 or 4 years.

✚ Measures of lake cleaning such as de-silting, de-weeding, bioremediation, aeration, bio-manipulation, nutrient reduction and other successfully tested eco-technologies should be implemented.

✚ Catchments area treatment should include afforestation, storm water drainage management, silt traps etc. should be developed.

✚ Lake front eco-development including public interface programs are an integral part of the zoo's outreach activity.

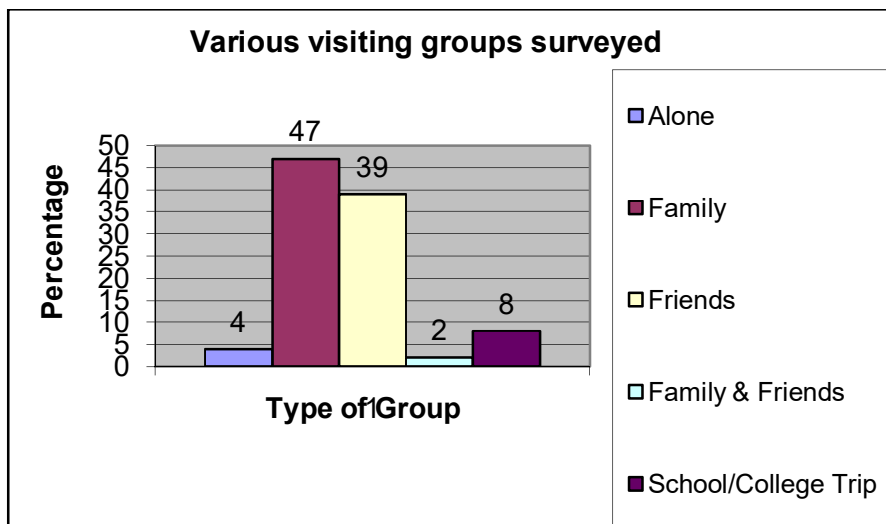
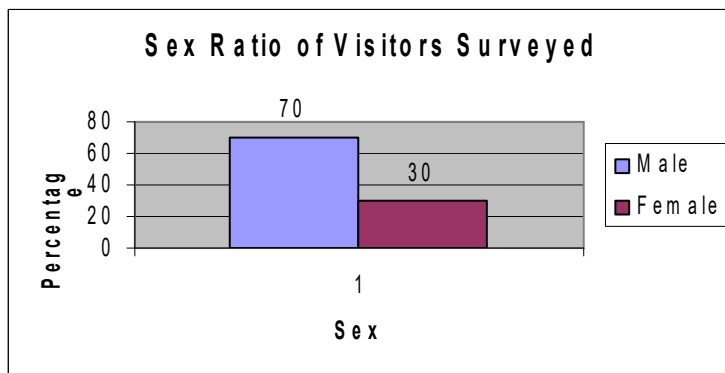
✚ Public awareness and public participation, to keep the water clean is a key concern.

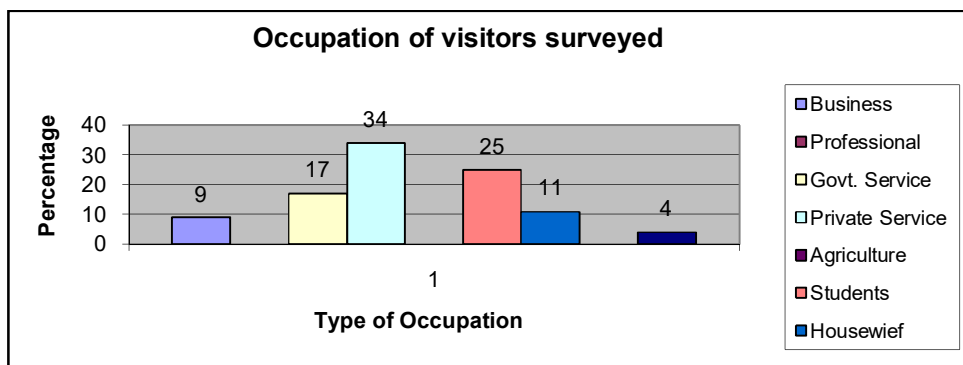
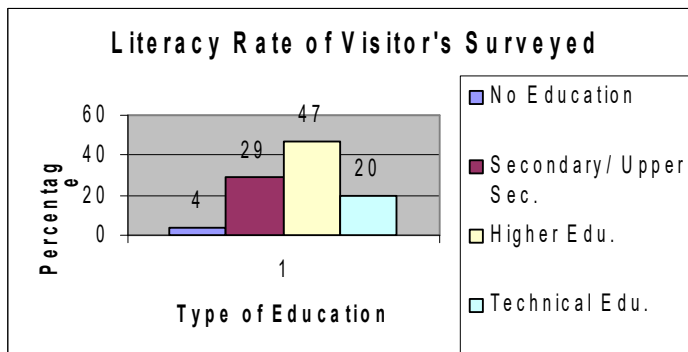
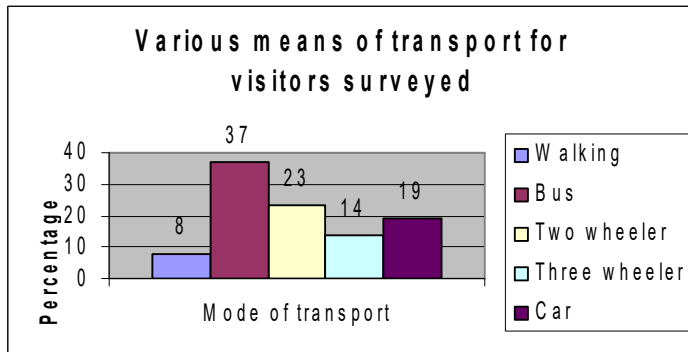
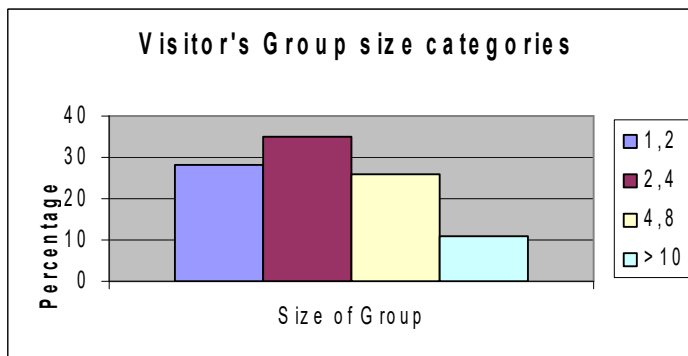
✚ Capacity building, training and research in the area of Lake Conservation must become an integral part of the zoo's day-to-day management.

Appendix – 6

Survey of visitor profile of Rajiv Gandhi Zoo in 2009

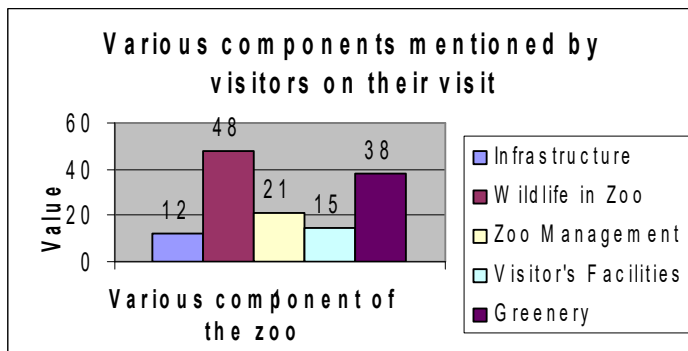
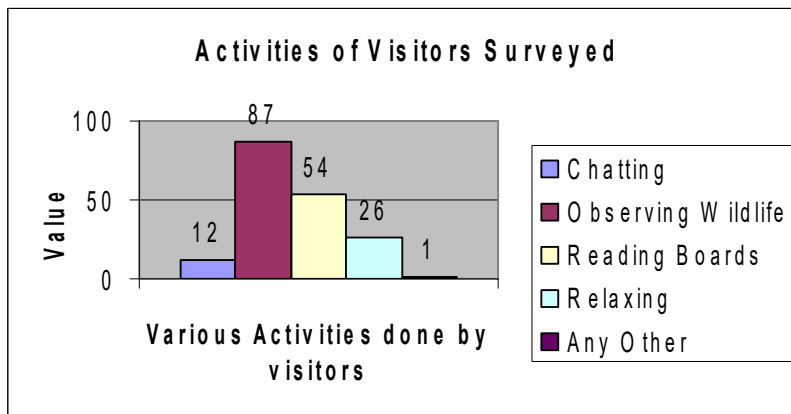
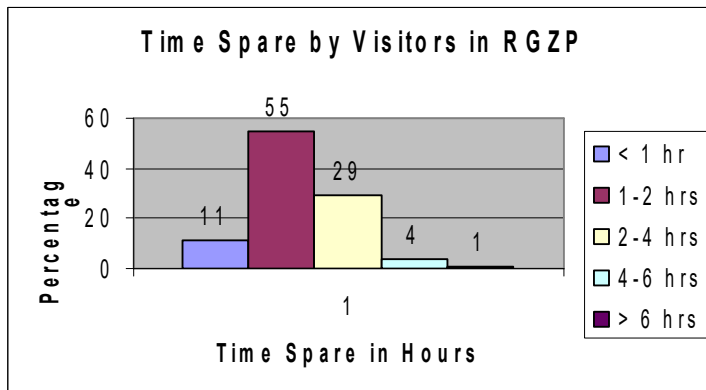
The survey has been done by the Zoo Education Officer and has been carried out under the guidance of the Zoo Director. It demonstrates the popularity of the zoo in Pune and also shows that there are few alternate sites for people who can spare 1 to 4 hours in the day to visit an interesting recreational area. A survey of visitors in 2009 has shown that males come in much larger numbers. Family groups are most frequent and the most frequent group size is between 2 and 4 individuals.



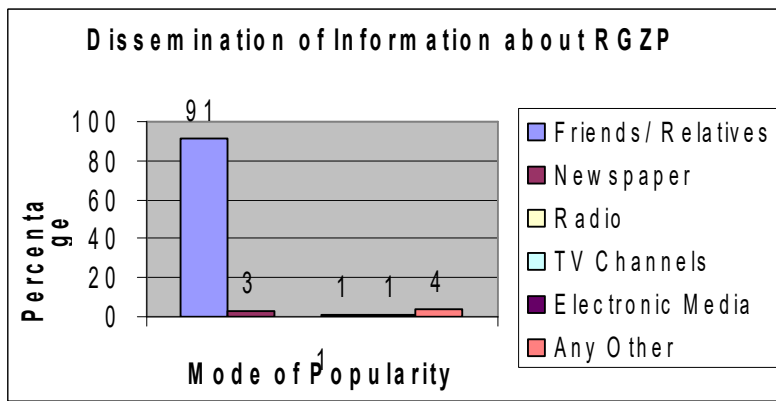


A majority came by public transport or on two wheelers indicating the economic status of the visitors. Nearly half the individuals had some level of higher education and were employees of a variety of service sectors. The important aspect is that 25% were

students. This is an education sensitive audience which accounts for one fourth of the visitors. A readily available target group for conservation education is already attracted to the zoo.



Half on the visitors spend 1 to 2 hours in the zoo, and one fourth spend 2 to 4 hours. Thus there are 75% of individuals that could spend about half an hour in on attractive Information Center. Each individual spends time on several different activities most frequently viewing animals and reading signages. The visitors have an interest in wildlife and the green surrounds.



A large majority of 91% learned about the zoo as a visitor destination from friends and relatives. This demonstrates the need for using media to reach a larger number of interested people. However, this is a catch question as the zoo is already overcrowded. Alternate attractive destinations are thus urgently required to keep a limit on the number of visitors to the zoo.

Appendix – 7

ENCLOSURE ENRICHMENT PLAN

The need for enclosure enrichment has become a major concern for zoo management to create physiologically appropriate enclosures for its animals and birds. In the absence of this animals display stereotypic and distinctive abnormal behavioural characteristics. This is disturbing for the animals as well as for the visitors of the zoo who are frequently disgusted and dismayed at what they perceive as cruelty to the animals. Zoo visitors want to see animals that are healthy physically and displaying their normal behavior.

The preventive steps are invariably easier than attempting to return a psychologically disturbed animal back to normal behavioral patterns. Zoo enrichment has two basic techniques. The most desirable strategy is to create the animal's natural habitat needs, provide it with adequate space, by enriching their lives through simulating their feeding strategies and by creating secluded resting sites and breeding areas all of which simulates the species specific habitat conditions for it's comfortable life. This is referred to as habitat enrichment and normally consists of using natural articles, as far as possible, within the animal's enclosure.

The second and equally important strategy for the animal's well being is to provide the species with the articles (natural or artificial) which the animal or bird likes to play with, explore, use as artificial prey or as nesting material. The artificial articles can be provided when the zoo is closed for visitors so the animal displays this form of activity when the area is quiet and peaceful. As artificial objects gives an unnatural look ,it is not advisable to use them in the presence of the visitors .However in our experience an animal's psychological behavior can be influenced positively even when they are provided with artificial objects in the absence of appropriate natural artifacts.

The Rajiv Gandhi Zoo along with this research experiment (Strategy for zoo enrichment By Neha Singh)) has tried out a number of environmental enrichments for many of the animal species in the zoo. The enrichment plan foresees using these techniques on a regular basis and experiment with innovative tools to bring a high level of comfort in the life of the zoo animals.

The tested enrichment tools used, included –

- 1) Habitat enrichment (enhanced naturalness)
- 2) Behavioural enrichment (dietary manipulation).
- 3) Sensory enrichment(spices, perfumes, catnip for the cats)

- 4) Physical enrichment (toys, furniture to manipulate)
- 5) Social enrichment (contact with conspecific or conspecific.)

Designed enrichment techniques

Animal species	Dietary enrichment	Habitat enrichment	Physical enrichment
Sloth bear	A. Honey filled logs.	A. Deep water pool.	
	B. Food hidden in a gunny sack or in a cardboard box.	B. Big tree can be transplanted for bear to climb, rest and feed.	
	C. Green coconut to play with and feed on.	C. Cave structure to be constructed to provide denning opportunities to the bears.	
	D. Fruits filled in small bamboo.		
	E. Branches of fruit trees for feeding.		
Tiger	A. Feathered chicken	A. Deep water pool to swim or fish. .	A. Gunny sack filled with fig leaves as an alternative prey to manipulate .
	B. Live fishes provided in deep water pool.		
Leopard		A. Dead tree for elevated resting site	A. Gunny sack filled with fig leaves, as an alternative prey to manipulate.
		B. A thick branched tree can be transplanted for shade and climbing opportunities.	

		C. Cave like structure with a resting place above it.	
Elephant	A. Fruits filled in a bamboo.	A. Bamboo clumps can be grown in the enclosure	A. Sack filled with fruits and leaves for elephant to manipulate.
	B. Ficus or bamboo branch as browse.	B. Deep water pool	B. Sand piles.
			C. Novel logs or empty drum to play with.
			D. Big tyre to play with.
Macaques (Bonnet and Rhesus)	A. Green coconut to play with and feed on it.	A. Water pool	A. Sack filled with fruits and leaves to manipulate.
	B. Food in whole form to increase feeding time.		B. Tyre / Wooden ring to play with.
	C. Fruit tree branches D. Scattering and hiding of food in the entire enclosure.		

Long billed vulture and bonellis Eagle	A. Live fishes provided in water pool .	A. Sand/ Peat for dust bath.	A. Twigs to play with.
	B. Scattering food items in entire enclosure.	B. Nest boxes on surfaces and platforms at the top of the enclosure for stimulating nesting behaviour .	B. Feathers of other birds to play with.
	C. Gunny sack filled with leaves , twigs and fish .	C. More area for free flight.	C. Snake sheds to manipulate.
	D. In the summer season fish frozen in ice block can be provided.	D. Providing perches at varying heights ,in the enclosure.	
	E. Feathered chicken.		

Several of the above suggestions have been tried and tested. The majority of them have been highly successful in providing the animal with activities which reduce boredom, enhance their activity period providing them with a sense of well being. Also all the enrichments have been evaluated and carefully observed when introduced in the enclosure to ensure that they do not pose any risk to the animals.

Behavioural enrichment provided for testing alteration in the animal behaviour.

Species	Enrichment provided
1.Sloth bear	1.Green coconut provided as food enrichment
	2.Bamboo branches as food enrichment
2.Tiger	1.Feathered chicken as food enrichment
3.Rhesus macaque	1.Bamboo rings as physical enrichment
	2.Ropes tied on tree branches as a physical enrichment
	3.Scattering of food in the enclosure.
4.Bonnet macaque	1.Ropes tied to tree branches as physical enrichment
5.Elephant	1.Bamboo branches as food enrichment

4.6 Social enrichment provided in the zoo

Species	Enrichment provided
1.Wolf	A pair was introduced in the enclosure as a social enrichment
2.Jackal	Conspecifics were introduced in the enclosure as a social enrichment.

Habitat Enrichments

3) Habitat enrichment has been done for tiger enclosure, jackal enclosure, wolf enclosure, bear enclosure, bonnet macaque enclosure ,Rhesus macaque enclosure, vulture enclosure, eagle enclosure, peafowl enclosure, porcupine enclosure, leopard enclosure, spotted deer enclosure, sambar enclosure, black buck enclosure, chausingha and nilgai enclosure.

Sloth Bear

There are four bears in Katraj zoo. Two are adult males , one adult female and one male is recently born (two months old).

Male-Robert

Female-Julie

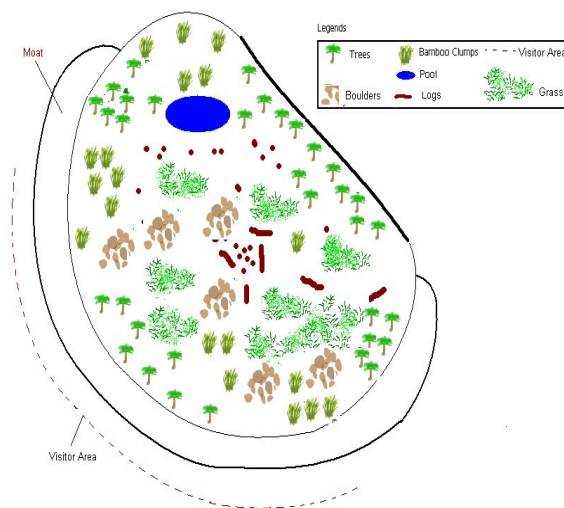
Younger Male- Narsha

Newborn male.

Habitat Enrichment

The enclosure area is full of trees some of which are. *Acacia nilotica* , *Ficus religiosa*, *Tecoma grandis*, *Azadirachta indica*, *Acacia leucophloea* and new trees such as *Legerstomia*, and *Terminilia arjuna* has also been planted. The enclosure contains many rocks, boulders, logs adding complexity and naturalness to the enclosure.

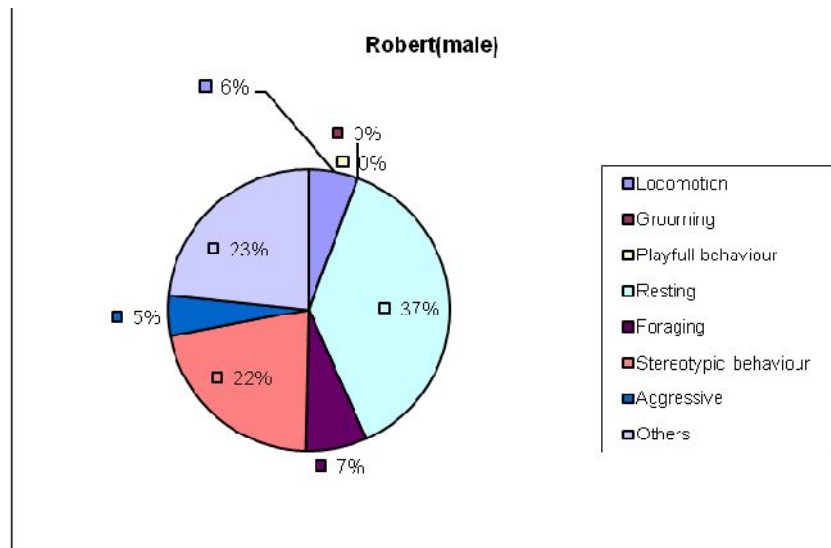
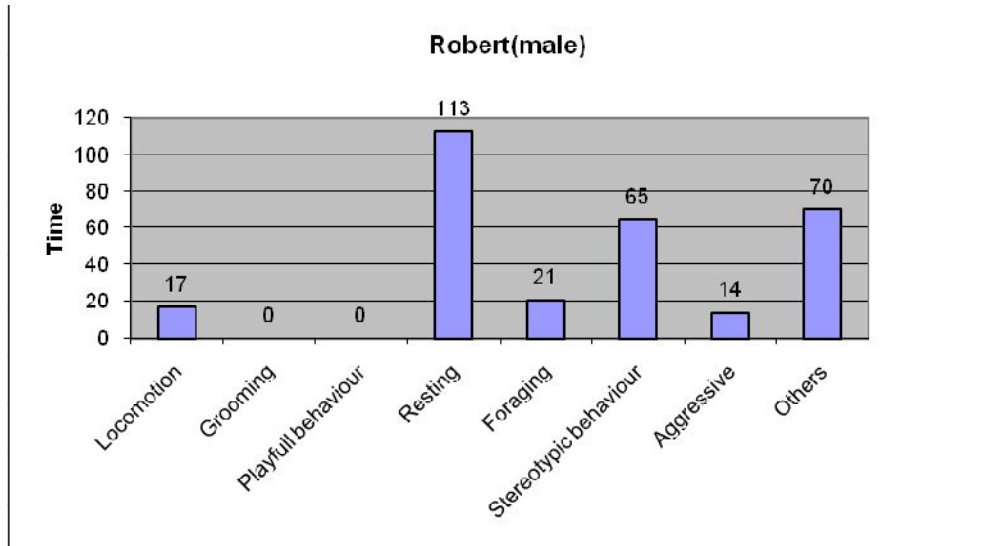
Enclosure has grass , small bushes and a water pool for the bears.



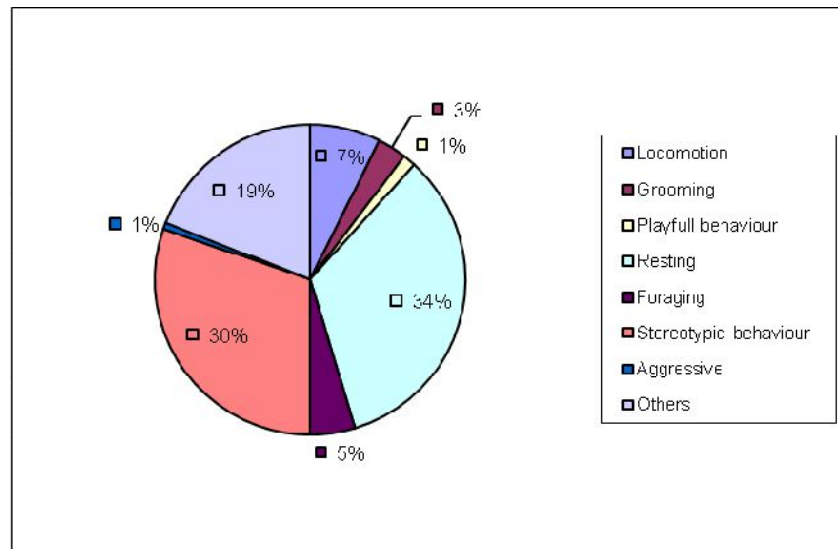
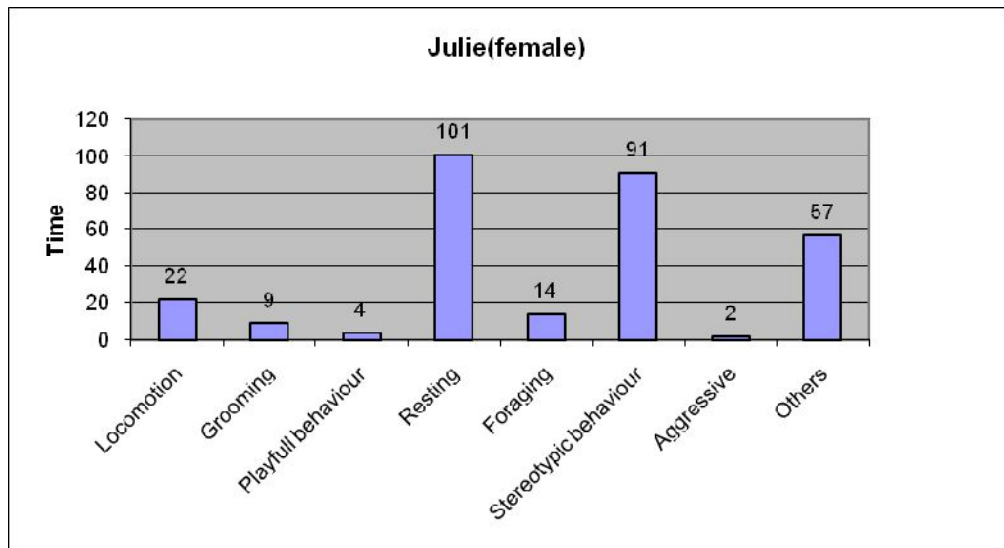
Habitat provided in the zoo for the Bears.

Behavioural charts of individual bears-

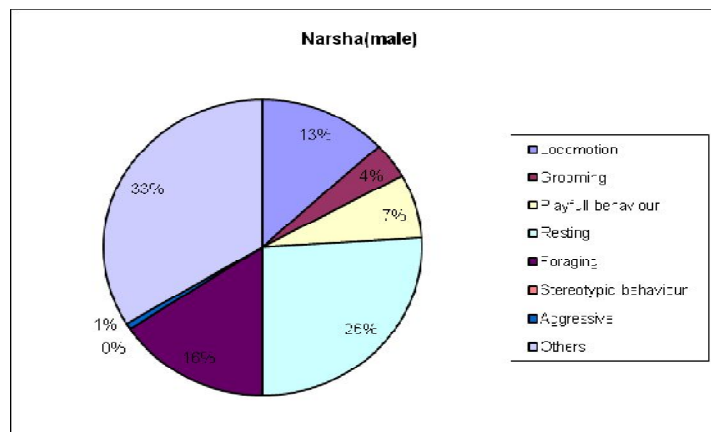
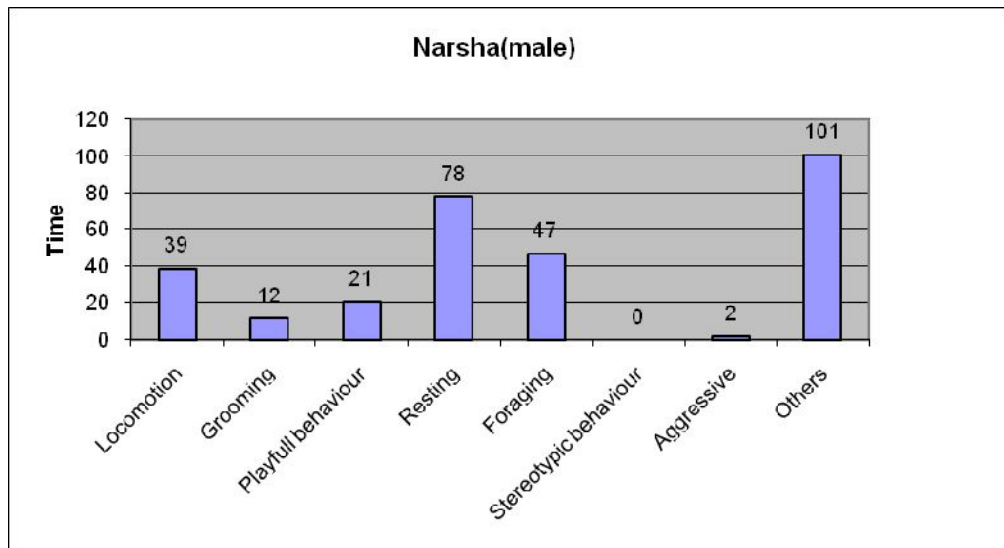
1) Robert- the older male bear



2) Julie- the female bear



3) **Narsha-** the younger male bear



Behavioural observations for the pre enrichment period-

Robert the elder male bear

- The older male exhibits twenty two percent stereotypic pacing
- The resting observed in Robert is thirty seven percent.
- He exhibits six percent locomotion.
- He exhibits seven percent foraging.

Julie-the female bear

- The female exhibits thirty percent stereotypic pacing.
- She exhibits thirty four percent resting behaviour.

- She exhibits seven percent locomotion.
- She exhibits five percent foraging.

Narsha the younger male bear

- The younger male does not show any stereotypic pacing.
- Narsha exhibits thirteen percent locomotion.
- He exhibits twenty six percent resting.
- Narsha exhibits sixteen percent foraging.
- Narsha exhibits seven percent playful behaviour.

The juvenile bear is three months old and the female mother bear carry him around on her back.

1) Enrichment applied -Green coconuts were provided to bears as food enrichment.

a) Initially a whole (unopened) green coconut was given to the bears. The younger bear came to investigate but as he could not open the coconut, he became disinterested after eight minutes. The older male bear came to investigate after forty two minutes . After much sniffing and rolling of the coconut he also abandoned it as he was unable to open it. The Female bear was disinterested and did not come to investigate the coconut.

b) As second food enrichment , partially opened coconut was provided to bears , in the afternoon after the regular feeding .

The younger male (Narsha) showed a keen interest in the new object and investigated it first. He extracted some coconut from the shell and started eating it ,on observing this the older male (Robert) become interested in the new object and came to investigate. When Narsha saw that Robert was approaching him he left with a smaller portion of the coconut. After much sniffing, Robert ate the rest of the coconut. .

The female bear showed no interest in the open coconut.

In fifty eight minutes the bears had finished up the coconut These .Behavioural observations was done for five hours - one hour during enrichment and four hours post enrichment..

Observations during food enrichment-

The stereotypic pacing enclosed by Robert which was earlier twenty two percent, reduced to nine percent during the enrichment period . Locomotion of Robert also increased from six percent during pre enrichment period to ten percent during enrichment period and foraging increased from seven percent to twelve percent.

Enrichment did not affected the female bear's behavior(Julie) very much. In the first one hour she did not show pacing but in the next four hours she enclosed stereotypic pacing. However stereotypic behavior was found to be reduced from thirty percent to thirteen percent . Her locomotion increased from seven percent to nine percent but as she did not take much interest in the coconut, her foraging time did not increase.

2) Enrichment applied -Green coconut provided for second time

When a partially opened coconut was given for the second time to the bears ,the older male bear (Robert) came to investigate first . He opened the coconut in nine minutes and ate a bigger portion. Then he left some coconut and went to rest. Meanwhile the female bear came to investigate the new object. She sniffed and rolled the coconut ,but did not eat it and went back to rest. After some time Robert came back to the coconut to investigate it but left without eating. Meanwhile the younger male (Narsha) came to investigate , but as he came near the coconut, Robert came running and seeing Robert approaching, Narsha left the scene. .Robert sniffed the area and went back to rest. Robert came again twice to investigate the left over coconut shell.

Observations during enrichment period-

The foraging time of Robert, the older male increased from seven percent pre enrichment period to fifteen percent during enrichment period. Locomotion of Robert was also increased from six percent pre enrichment period to twelve percent during enrichment period . After the enrichment period, Robert enclosed resting behavior for most of the time. Foraging time of the female bear increased from three percent to .nine percent She showed no stereotypic pacing during enrichment period and enclosed resting behavior for most of the time.

As the younger male-Narsha, was not allowed by the older bear to come near the coconut, Narsha's foraging time decreased from sixteen percent during pre enrichment period to thirteen percent during the second enrichment. For most of the enrichment period, sixty percent of total time, Narsha was not visible.

3)Enrichment applied--Fresh bamboo branch was given to the Sloth bears as food enrichment.

Bamboo branches were given to the bears in the afternoon during their usual resting time. Branches were put in the moat. The Female bear sensing that a new object was introduced in the enclosure, displayed a threatening gesture, probably to show that she did not want to be disturbed in the afternoon, during her resting time.

No bear approached the branch for thirty five minutes. After that, the older male came inside the moat to investigate the new object. He (Robert) sniffed it and then started dragging it around. Robert carried the branch from the moat to the upper enclosure, near their resting place. Now the female bear showed an interest in the bamboo and came to investigate.. She investigated the bamboo for about eleven minutes and then went back to rest.

When Narsha came near the bamboo branches, the older bear threatened him and ran after him. Narsha climbed up a babool tree and Robert sat under the tree. After this playful behavior for forty four minutes, Robert came back to the bamboo branches. Robert tore the branches and scattered the leaves all around. He did not eat the leaves. After this Robert went to rest but came back many times to investigate.

Behavioural observations during enrichment period –

During the enrichment period, the older male bear's resting was significantly reduced from forty percent during pre enrichment period and fifty percent during coconut enrichment to eighteen percent, when fresh bamboo was provided. Foraging increased from seven percent during pre enrichment period and twelve percent during coconut enrichment to twenty percent with bamboo enrichment. Locomotion also increased from six percent in pre enrichment period, to about ten percent during coconut enrichment, to fifteen percent in bamboo enrichment. Playful behavior of twenty six percent was observed in Robert, which is usually not seen, indicating that this had reduced his boredom and provided the animal with satisfactory activities.

Time spent in resting during enrichment, by the female bear is the same as that during pre enrichment period. Foraging time was also unchanged and is about eight percent. The important behavioral change observed was that, during enrichment, she showed no stereotypic pacing. This could have been purely incidental.

When the younger male-Narsha tried to come near the bamboo branch, he was chased by Robert. Narsha was then not visible for forty nine percent of the time of the total enrichment period. Narsha enclosed playful behavior for twenty nine percent of the total enrichment period.

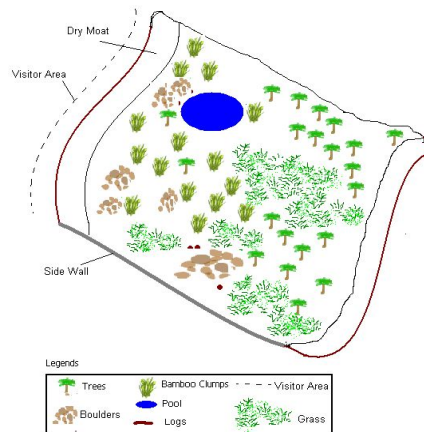
The Purpose of this enrichment was to increase foraging time of bears and encourage natural behavior. It enhanced their activity and increased their normal social interaction for a major part of the day. This indicates the need to use these techniques more frequently.

Bamboo is cheap, edible, and an abundant browse which also acts as a substrate material for animals to hide behind, drag around, or to bed down with. Even tearing up the browse material is a successful enrichment activity for bears.

Tiger

There are ten tigers in the zoo. Five of which are yellow and the other five are white tigers.

Habitat provided for the yellow tigers in the zoo



Habitat Enrichment

For yellow tigers an entire new enclosure has been prepared. The enclosure has many trees, logs, boulders, bushes, grasses which acts as visual barriers and provides natural rubbing areas and scratching opportunities for tigers. A water pool and a cave like structure has been constructed in the enclosure.

The zoo displays one tiger(white) and one or two(yellow tigers) at a time in the open area. The other tigers remain in their resting cages. Tigers are fed daily in the evening hours at four thirty-five pm. The tiger in the open gets food after six pm ,when the zoo closes while his caged counterparts are given food at around five pm. Probably when the feeding time nears, the tiger(on display) starts pacing near the resting cages.

Upon entering a yard recently occupied by another animal, a tiger immediately patrol the grounds, sniff everything, and then re-mark the entire area. They mark by wiping their back feet on the ground, urinating, or scratching tree trunks and big logs. The cats also use tree trunks as scratching posts to sharpen their claws

4) ENRICHMENT APPLIED - feathered chicken as food enrichment to tigers.

. Wild felids devote much of their lives to stalking, killing, and consuming their prey. Big cats can range up to 20 miles in a single night in search of food and spend hours crushing bone and tearing flesh(Smithsonian National zoological park).

Providing an outlet for the tiger's natural hunting behaviors in zoos can be a challenge. Providing feathered chicken is an enrichment activity that allow the tigers to display natural crushing and tearing behaviors .

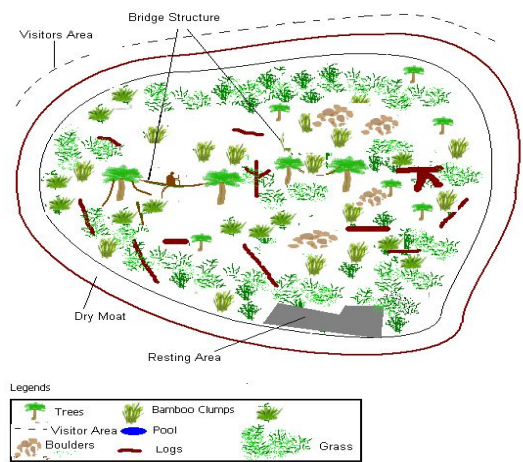
Tigers get chicken on Wednesdays and for other week days beef is being provided. Three to four chickens are given to each individual .Usually tigers take nine to ten minutes for finishing their un-feathered chicken. With feathered chicken tigers took about fifteen to twenty two minutes. This enrichment enhances the handling and processing behavior of the animal.

The feeding time of tigers was increased .The time taken in eating feathered chicken differs for each individual..One female tiger (Gypsy) does not prefer un-feathered chicken and does not eat it.

Rhesus Macaque

There are total five Rhesus macaques in the zoo. The alpha male's name is Coco.

Habitat provided



Habitat enrichment

The enclosure has a number of big trees which provides shade and climbing opportunities for the macaques. Many dead trees have also been put as climbing structures. Two bamboo bridges have been made between the tree branches. A rope is tied to a tree branch to stimulate play behaviour among macaques.

Behavioural study

In the behavioural study of macaques, it was observed that they used to play in the morning. When their feeding time nears, which is usually eleven or twelve noon, macaques stop playing. Usually feeding is done inside their resting place. In the afternoon older macaques are usually lethargic and they rest. Social grooming can also be seen in the afternoon. In the afternoon younger animals play on tree branches. In the evenings, play and grooming behavior have been observed frequently.

5) Enrichment applied-

Wooden rings as physical enrichment to macaques.

Observations during enrichment period

Wooden rings (made up of bamboo) were tied to the tree in the morning . At first the alpha male came to investigate the rings. The Alpha male tested and tried the rings for thirteen minutes. After feeling it ,and sniffing it, alpha male played with it for fifteen minutes. As soon as the alpha male left the rings, other macaques came to investigate the new object . The investigation was over in fourteen minutes and then younger macaques started playing with the rings. Macaques played with rings for three hours and twenty two minutes and as their feeding time neared, they become disinterested. When the ring was available ,there was less social grooming and more play.

Bonnet and Rhesus macaques

6) Enrichment applied

Hanging rope as physical enrichment for Rhesus and Bonnet macaques.

Observations during enrichment

A rope was tied to the tree branches in both the enclosures (of Rhesus macaques and of Bonnet macaques) as physical enrichment. Macaques play with the rope by swinging on it. Higher levels of play activity was induced in juveniles rather than in adults. Thus the play behavioral change also depends upon the age of the animal. As every toy has a limited period of time that they are attractive to human children similarly younger animals enjoy this but get bored after a time. The use of rope is lessened in a few days as it became a part of the enclosure for the macaques . This indicates the need to periodically introduce new furniture or change the position of existing one into the primate enclosure.

One of the main reasons for animal play is that it provides the animal with the opportunity to practice social and behavioural skills that it needs for survival and group activities especially in primates. Primates are complicated beings and they need to be challenged, not just physically , but also mentally , when they are in captivity.

7) Enrichment applied

Scattering of food items in the enclosure as food enrichment for Rhesus macaques.

Observations during enrichment

Usually food is given to Rhesus macaques inside the resting place. It takes a whole day to finish the food given inside the resting place. Juveniles usually come inside soon and feed but older macaques come hesitantly because when they come to feed inside their resting place, the individual which is needed to be captured is caged by the keeper.

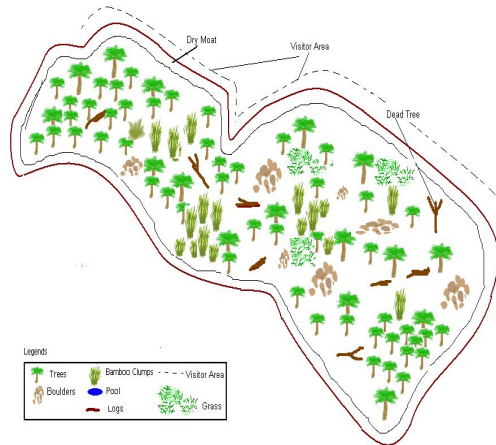
When food was scattered in the enclosure, macaques finished the food in one hour thirty two minutes. The scattering of food make feeding more challenging as well as it makes difficult for an individual to dominate over the other macaques for the food. It also decreases the need to separate the animals for feeding.

In the wild, primates spend considerable time looking for food and moving between food patches (that is foraging) and relatively little time in feeding. Primates posses a hand with five figures that gives them advantage to manipulate infinite range of food items.(environmental enrichment for captive animals, Robert J. Young.)

Elephant

There are two female elephants in the zoo. At the time of the behavioural study, enclosure was being prepared and they were not under display in the zoo. The enclosure has been opened for the public now and the two female elephants roam in the large naturalistic enclosure, for the whole day, with their mahouts

Habitat provided



Habitat Enrichment

The enclosure is full of trees which provide shade in the enclosure . Hard tree trunks provide rubbing surfaces for the elephants. The elephants can be seen uprooting the trees in the enclosure . Elephants uproot trees to mark their territories

8) Enrichment applied-

Fresh bamboo branches were provided for the elephants as food enrichment.

Observations during enrichment

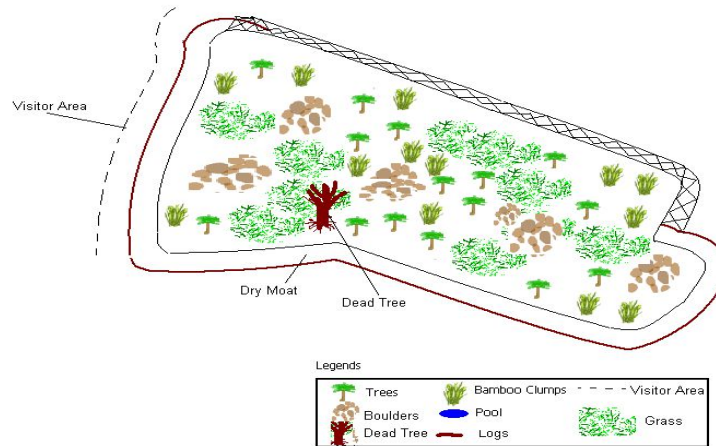
As elephants are chained for most part of the day and are released In open (with mahaout) for 2 hrs in the morning, bamboo was given in their resting place . Separate branches were provided to both the elephants.

Both the elephants showed a keen interest in bamboo branches as a part of food enrichment .Both played with the branches while munching the leaves. They scattered the leaves all around and were engaged in eating and playing with the bamboo for one hour and forty two minutes.

Jackal

The Indian jackals usually live in pairs or small family groups and all members of a family unit play a part in defending their territory and hunting.

Habitat Provided in the zoo



Habitat Enrichment

The Jackal enclosure is a newly prepared one in which the enrichment has been taken care of in the designing phase itself. The enclosure has many trees such as *Acacia nilotica*, *Tecoma grandis*, *Eucalyptus globulus*, *Bambusa bambos* clumps. It has logs, boulders, dead trees and a water pool.

Social Enrichment

Initially two female jackals were introduced in the new enclosure, in the zoo. As the zoo environment was new to them, they were afraid for the first three days. They did not eat anything for the first three days. This shows that they were stressed in the new environment. After three days, both started to eat but still were afraid of zookeepers and ran to hide when anyone entered the enclosure. In the first two days they also dug a small den inside the enclosure for hiding.

1)Enrichment applied

Conspecifics were introduced in the jackal's enclosure as social enrichment.

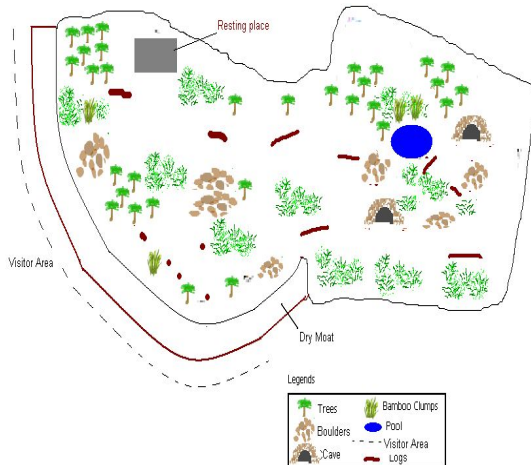
Observations during enrichment

. After fifteen days two more females were introduced in the enclosure as a social enrichment. After the introduction of new individuals, the behavior of the two females became more normal.

The provision of the correct social environment can be a source of endless stimulation for social animal species. It is important therefore to recreate natural group structures, natural composition and sizes whenever possible.

Wolf

Wolf(*Canis Lupus*) is the largest wild member of the canidae family. Occasionally, single wolves are found in the wild, though family of four to six individuals are more common. Normally, the pack consists of a male, a female, and their year old offspring.



Habitat Enrichment

The wolf enclosure is a newly prepared. The enclosure has many trees ,has several rocks , boulders, dead trees , tree stumps and logs enhancing the naturalness of the enclosure. Two cave structures have been made (with the logs) to provide denning opportunities for the wolves.

Behavioural study

A female wolf (Lucy) was introduced recently in the zoo in the newly made enclosure. As the zoo environment was new for the female wolf, she was stressed. She did not eat anything for first three days. On fourth day she started eating but ate only one chicken .

Enrichment applied—

Conspecific was introduced in the wolf's enclosure as social enrichment

Observations during enrichment

After fifteen days a new male wolf was introduced in the enclosure as a social enrichment. After introduction of the male female's behaviour became normal. The pair was not seen to fight or show any aggressive behavior. The pair also mated. The companionship in captivity can be beneficial as it encourages healthy competition as well as cooperative behaviours.

RESULTS

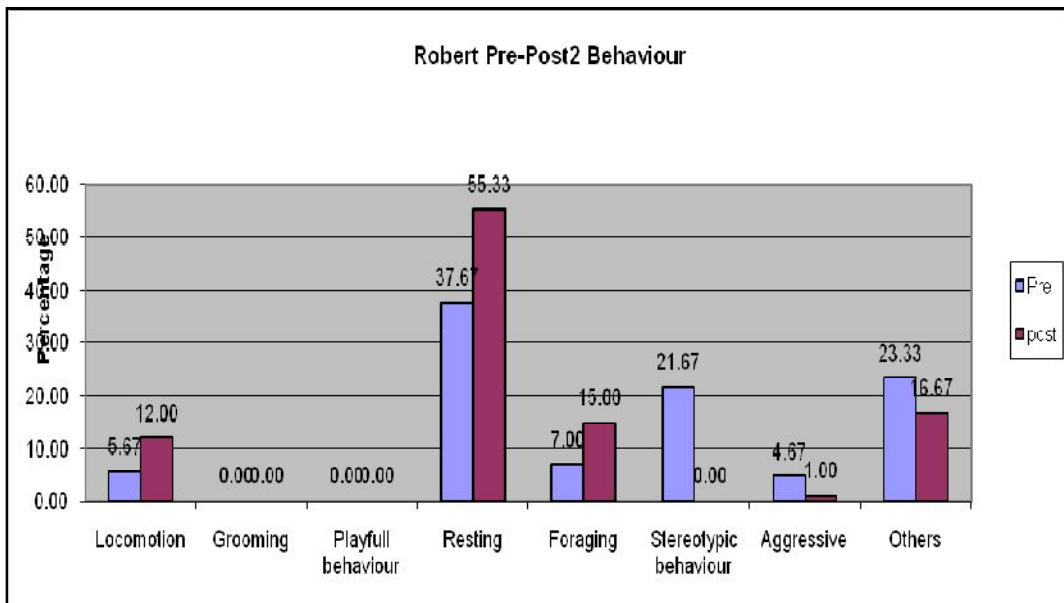
Habitat Enrichment

The habitats of all the animal species in the zoo were studied during the research. It was observed that the zoo enclosures have a naturalistic design providing choices for the zoo animals to have control over their lives. All the enclosures have trees, bushes ,grass providing shade, visual barriers ,climbing and foraging opportunities to the animals along with bridges, caves, shades and water pools. Due to the naturalistic environments ,animal species in zoo generally do not exhibit any stereotypic behaviours.

Behavioural Enrichment

1) Bear

All the three enrichments applied to the bears decreased their stereotypic behaviour and increased locomotion and foraging in them ,during the enrichment period.



Graph showing pre behaviour and behaviour during enrichment for male bear.

2) Tiger

The tigers are given food in the resting cages. The chicken usually provided to the tigers are unfeathered and thus needs no processing by the tiger. Usually tigers take nine to fifteen minutes in eating un feathered chickens. When feathered chicken was provided as a enrichment, it took fifteen to twenty three minutes in finishing up the chicken. Thus the feeding time of the tigers were considerably increased. The enrichment stimulated the natural handling and precessing behaviours in the tigers.

3) Bonnet and rhesus macaques

a) Wooden ring as physical enrichment

It induced a high level of play behaviour among the macaques. During enrichment period less grooming and more playful behaviour was observed. The macaques in the zoo do not exhibit any stereotypic behaviour probably because of the naturalistic enclosure design provided to them in the zoo.

b) Hanging rope as a physical enrichment

Hanging ropes were tied to the branches of trees in the bonnet and rhesus macaques enclosure. Hanging rope as physical enrichment stimulated play behaviour and wine swinging in the macaques. The high level of play was observed for four days but the use of rope was lessened in a seven days as it became a part of the enclosure for the macaques.

c) Scattering of food in the enclosure as a dietary enrichment

Usually the food is provided in the resting cages. The food- composed of-fruits and green leafy vegetables was scattered in the enclosure, as a dietary enrichment. Scattering of food in the enclosure lead to an equitable feeding among macaques as individual macaque could not dominate over the other macaques for the food.

4)Elephant

Bamboo branches as dietary enrichment

The bamboo branches were provided to the elephants ,in their resting place.,as a dietary enrichment .The bamboo was preferred by the elephants as they were engaged in playing with the stump, eating and scattering the leaves for one hour forty two minutes.

Conclusions

The study shows that the behavioural enrichment provided to the animal species in the zoo, have significant effect on their behavioral repertoire. The effects of behavioural enrichment however differ for each individual animal. The dietary enrichment provided, reduced the stereotypic behaviour in the sloth bears. During the enrichment period, the stereotypic behaviour was replaced by foraging and locomotion behaviour .The bamboo enrichment was found to be more successful than the coconut enrichment for the sloth bears. The bamboo enrichment not only reduced the stereotypic behaviour but induced a play behaviour in the male bear, which is usually not observed. However the effects .of the feeding enrichment only seem to last as long as it takes a bear to consume the food. The stereotypic pacing was observed three to four hours after the feeding enrichment.

The study of the tiger behaviour shows that the only one male tiger shows significant stereotypic behaviour,14%, and the stereotypic pacing in the other tigers in only 5%-6%. The feeding regime was found to affect stereotypic pacing levels in tigers. The zoo tigers use to pace when the feeding time approaches, near the wall of the resting cages in the evening hours. The study also highlights that the size and the substrate type of the enclosure influences the animal's behaviour. The minimal abnormal behaviours observed in the tigers was influenced by the naturalistic environment provided in the zoo.

The scattered food enrichment provided to the macaques shows that it changes the time budget of the macaques in the captivity as the time they spent engaged in environmentally directed behaviors was increased. Scattering the food in the enclosure significantly increased the time spent exploring the environment.

The results of the bamboo enrichment provided to the elephants shows that the natural browse keeps them busy for hours as they strip off the bark, manipulate the object and chew on the leaves. It induced a play behaviour in the elephants.

Recommendations

- It is recommended that the caretakers of the enclosures learn to observe abnormal behaviour and provide appropriate enrichment for their animals, on a regular basis. Enrichment should be an integral part of animal husbandry – not something that gets added in from time to time .If this is done, any abnormal behaviour should cease or at least decrease .This would improve the animal's welfare .
- The night areas and winter quarters should also be taken into account when planning enrichment features. Time spent by the animals off exhibit can be, in many situations, greater then time spent in the exhibit. Non-natural elements that may not be appropriate for public viewing can often be incorporated into these off exhibit areas.
- Enrichment devices may lose their novelty if offered too frequently or left in an exhibit for an extended period of time.Enrichment devices left for a long time in enclosure becomes a part of the "furniture .It is recomended that enrichment device should be Rotated several items either on a schedule or randomly. It will likely provide more stimulation to the animals. . Modifying a device can also make something old, "new again".
- For enrichment to be safely provided, it is highly recommended that zoo establish enrichment procedures and protocols, as well as a chain of command that animal keepers can follow.
- The provision of artificial enrichment object is recommended, in the absence of any natural enrichment available, as long as it fulfills the aim of improving the animal welfare in captive environment.

**[STRATEGY OF ZOO ENRICHMENT-with special reference to Rajiv Gandhi
Zoological Park Pune. By Neha Singh Under the Guidance of Dr Erach Bharucha.]**

APPENDIX 8

LANDSCAPE RESTORATION PLAN

The Rajiv Gandhi Zoo already has a green space of trees and shrubs as well as a waterscape of the lake. However in the early stage of development the need for rapid greening consisted of planting *subabul* and other exotics by the Forest Department.

The zoo ecorestoration plan is based on the biodiversity needs of the area outside the enclosures. A major effort will be to develop a forest and a grassland terrestrial systems as well as a natural aquatic ecosystem as the zoo is essentially intended to provide visitors with an experience of specific microhabitats of the three important and threatened ecosystems of Western Maharashtra.

The current biodiversity profile of the zoo environment has a mix of mainly exotic trees with a scattered growth of local species. The species richness includes 12 indigenous and 9 exotic species of trees.

Suggested biodiversity eco-restoration strategy for Rajiv Gandhi Zoo :

- To enhance biodiversity within the Rajiv Gandhi zoo the subabul and eucalyptus plantation will have to be gradually thinned out and substituted with local species. The identified places for this purpose are near entrance, evergreen species around Tiger, Gaur, Sambhar and Leopard enclosures, deciduous species planted around Chital, Blue bull enclosure and in the proposed reptile section and xerophytes around the Wolf, Jackal, Chinkara and Black buck enclosures. These patches will be substituted by other indigenous trees such as *Bombax ceiba*, *Bauhinia racemosa*, *Saraca indica*.
- The mean canopy percentage of the terrestrial park is 85%. There should be a mixing of evergreen and deciduous plant species as evergreen provides shade and deciduous for flowering and fruiting which ultimately helps to enhance the biodiversity. The grassland areas will be planted with xerophytes species in next 5 years.
- 30% of alien invasive species which generally support lower abundance and diversity of native wildlife will be removed. During the following 5 years another 30% will be substituted. The last 30% will be replaced from next 10 to 20 years.
- To increase butterfly diversity the zoo will plant some of the food plants for caterpillar and nectar plants for butterflies.

- A **Butterfly habitat** will be developed in the zoo. As butterflies are associated with specific plants those will be used over the whole area.
- Shrubs and herbs like *Curcuma pseudomontana* (gauri), *Karvi*, *Ferrea indica*, *Impatiens acaulis*, *Ceropegio hirsula*(climber), *Senecio grahamii* will be introduced and a nursery will be maintained for these species.
- **Nala** will be restored in the zoo in a way to depict the ecosystems a stream.

Appendix 9

Demographic analysis of Rajiv Gandhi Zoological Park and it's effect on surrounding residents' lifestyle

The Rajiv Gandhi Zoological Park is surrounded on the west by NH4 and a residential and commercial area beyond it. To the south is the smaller, upper Katraj lake around which there is a settlement of small houses that have been built between from 1994 to date. Upstream of this lake there are also a few small scale industries beyond which extends the catchment of these lakes. This includes motor car garages, small scale metal works, cargo transporters and a market area. To the east, there are old as well as new housing complexes. The northern boundary of zoo is the Old Peshwa Bund, below which lies a strip of vacant land which once belonged to the zoo.

To study the impact of the surrounding area on the zoo, a survey of the land use on its perimeter and other social issues in the local area have been studied through a set of questions designed for appreciating the local environmental issues.

A review of people living around the zoo has shown that they have various different perceptions of the value of the zoo in the neighborhood. They were not aware that their activities such as improper disposal of waste could in fact create an impact on the zoo by polluting the water through drainage systems, storm water runoff and garbage. All these appear to be having a potential impact on the zoo which the local people do not appear to be concerned about.

It is evident that several of the societies have benefitted from the presence of the zoo. There are some residents who invariably use the zoo for morning walks as there are no other gardens or jogging parks in the surrounding area. The high rise apartments overlooking the verdant green space of the zoo are obviously benefitted by an excellent view, good breeze and a natural environment.

One of the negative aspects of this site is that there is no space for expansion of the zoo as it is now completely surrounded by housing. This could have been foreseen a decade ago when the surrounding land was an agricultural area and a waste land.

The areas around the zoo have been divided into six major sectors depending upon their location. They are as follows.

- 1) Bibvewadi area close to the Old Peshwa Bundh.
- 2) Students of Bharati Vidyapeeth University.
- 3) New housing and shops to the west.
- 4) Housing and shops to the south of Pune- Bombay bypass road
- 5) Upper Katraj lake area.
- 6) Eastern housing complex.

Sector 1: Bibvewadi area close to the Old Peshwa Bundh

This sector covers the area of upper Bibvewadi which consists of upper middle class residents. There are residents who have lived there from last five to six months to about

six years. The zoo is at a distance of about 200 m from the surveyed area towards North. This direction is downstream of the Katraj lake.

Seven out of ten persons visit the zoo about once in two months. Two people visit the zoo about once in six months. One person had not visited the zoo even once in last six seven months of his residence in the area. None of them seem to visit the zoo regularly for morning walk or any specific purpose. The Katraj lake water is not used by this area nor is the sewage of this area disposed in this lake. In the opinion of residents, they would have selected this place to live even in the absence of zoo.

An important effect of the zoo on this area is that the sound of animals from the zoo is heard in the homes, especially during night times. Five persons out of ten had this experience.

Sector 2: Students of Bharati Vidyapeeth University

This sector consists of students of Bharati Vidyapeeth University situated to the northwest of Rajiv Gandhi Zoological Park. The University is at a distance of about 300 mts from the zoo.

The frequency of Students visiting the zoo varies from twice a week to once in six months. Three students out of ten the zoo once a week. They say that zoo is the only green place in the vicinity. Pune has a number of public gardens, but the Rajiv Gandhi Zoo is the only garden in this area and this is the reason to prefer to visit it. The entry passes are very cheap and there is enough space for parking the vehicles. Another reason for visiting the zoo is that the area of zoo is big unlike most of other public gardens in Pune. There is no unwanted effect of the zoo on this sector.

Sector 3: New housing and shops to the west

This sector covers the housing apartments and the shops to the west of zoo, aligning the Satara Road. These houses and shops surveyed have been built during last six years. New constructions are still going on.

The frequency of people visiting the zoo is about once in two months or when there are guests. Eight out of ten persons interviewed gave this answer. One person visited the zoo once in six months. There was one shopkeeper who had never visited the zoo. Although the zoo does not play a major role in the lives of the people, the green space of zoo was one of the reasons of selecting the place. The advertisement of all the apartments consisted of view of green space of the zoo as an additional feature of the place. Four persons thought that zoo gave the assurance that there would be no construction in the future in the place of zoo. There are no adverse effects like increased traffic, sound of animals, etc due to the zoo. The place already has good infrastructural facilities like bus stand, rickshaw stand and Satara Road. These facilities are indirectly due to the presence of zoo. Hence they feel that zoo has given them indirect benefits and has proven to be one of the major factors responsible for the development of this area. Another fact experienced by all the ten residents is that this area inspite of being close to a highway, is cooler if compared to other areas towards Pune city and farther from the zoo. The reason could be the green space of the zoo.

Unlike the residents, the shopkeepers are not at all affected by the presence of zoo in their vicinity. They seldom visit the zoo.

Sector 4: Housing and shops to the south of Pune- Bombay bypass road

This area is to the southwest of Katraj zoo. It consists of a residential area with apartments of three to four floors, vegetable and fish market, shops, a college and a building complex. The residents are generally of middle class. The area is densely constructed.

The frequency of six people visiting the zoo is about once in six months. Four persons seldom visit the zoo. According to the residents the frequency is low since the zoo is not very close to the area. People are not aware that this area is a part of catchment area of upper Katraj lake. Hence they are also not aware that they are likely to have an effect on water of the lake on the zoo. Three residents get the view of the green space of the zoo from their homes. However zoo is not one of the reasons to select the location of their house. This feature was also not used to advertise about the apartments. There is no effect of the zoo on the lives of people staying in this area.

Sector 5: Upper Katraj lake area

This area is the area towards south of Katraj zoo where people belonging to relatively low income group live. The area consists of residential area. A review of the duration that people have been living in this area showed that maximum number of people have lived there from less than twelve years as before twelve years the site was an agricultural land and waste land.

The area still southwards consists of some small scale industries like metal works, garages, petrol stations, transport business etc. This is a large area as compared to all other sectors of study. There is a lake in this area which is connected to the lake in the zoo by a nala. This lake is the place where all the sewage pipelines of this area are emptied. Sector four is the catchment area of this lake and the water is finally conveyed to the lake in the zoo.

The residents who have stayed here from a considerably longer time generally state that the area was less crowded and the lifestyle was different from what it is at present. None of the residents said that they selected the place due to the zoo in the vicinity. Zoo plays a relatively small role in the lives of the residents. All ten persons said that they take their guests and relatives to the zoo. There is no additional traffic congestion due to the zoo. There is no effect of the solid waste, odour of animals on the residents. People mentioned that there was a public toilet in the place where the zoo stands now. This is not replaced after the area was fenced for the zoo. The lake was used by residents to bath their cattle till the fence of zoo was built.

Six residents are aware that the sewage from their area finally emptied in the zoo. But this was considered to be an advantage of the residents. People are not aware that this may have a negative impact on the surrounding of the zoo. The garbage collection in this area is also improper. PMC vehicle is provided for garbage collection. But the awareness level about proper garbage disposal is low. Hence some amount of garbage is added to the sewage. This results in even higher pollution of the lake.



The sewage from sector 5- Upper Katraj lake area entering the premises of the zoo

Sector 6: Eastern housing complex

This area is towards the east of Katraj zoo. It consists residents staying there from about two years to about twelve years. The housing types are bungalows and new apartments. The major population is literate. The area is very close to the zoo.

Six residents visit the zoo about once in three months. The green space of the zoo was an added feature of the place used to advertise the sale of apartment. People are happy to have the green space in the vicinity. People also seem to be aware about the higher biodiversity of the place because of the greenery of the zoo. Four residents had an opinion that they do not visit the zoo very often because it has only one entrance and exit. The area of the eastern housing complex is behind the zoo. The entrance is on the opposite side of this area. Hence in order to visit the zoo the residents of this area have to take a long route around the zoo. The infrastructural facilities of the area are well developed.

This area is such that people have to take a longer route from Satara Road around the zoo. But people do not seem to complain about this. The reason is that this area is developed after the zoo. The area of the zoo always had a water body. Hence there was no road passing through it and they don't feel that they have to travel an extra distance to their house due to the zoo in their way. Residents also do not appear to have a problem caused by large number of people visiting the zoo as it is an enclosed area and there is only one entry and exit.

Conclusion

The local residents are from different socioeconomic groups. The area of Bibvewadi close to the Old Peshwa Bundh, students of Bharati Vidyapeeth University, new housing and shops to the west and eastern housing complex have more residents from upper economic strata, whereas areas of housing and shops to the south of Pune-Bombay bypass road and upper Katraj lake area have people from relatively lower economic strata. Eastern housing complex has high rise housing with high density population while upper Katraj lake area has ground floor housing with a relatively lower density of population. These houses are crowded and the residents are from a generally lower economic group. People have both positive and negative perceptions about development going on around the Rajiv Gandhi Zoo.

The Bharati Vidyapeeth University for its garden, gets water from Katraj lake. Some people have noticed that the bird diversity of this area is higher as compared to the surrounding areas due to the green space of Rajiv Gandhi Zoological Park. The view of green space of the zoo is an added feature to their housing location. The zoo also gives a surety that there will be no construction at that particular place in the future.

The upper Katraj lake acts as a sump for the drainage sewage lines of surrounding area. This lake is connected to the lower Katraj lake situated inside the zoo. In spite of being aware of this fact there is a misconception that the waste water going into the lake is beneficial. They perceive that it is a good option to get rid of the waste water. But there appears to be no realization that this can cause pollution of the lake.

The people interviewed in the sector upstream to the lake said that the zoo was a good green space. The land prices have consistently gone up irrespectively of the zoo as this is one of the most rapidly growing areas of Pune city today.

No infrastructural advantages have occurred in presence of zoo for the surrounding. However it may be noticed that this is the only green space. There were public toilets in the past where the zoo now exists. This facility does not exist now. This is an important feedback which corporation should address.

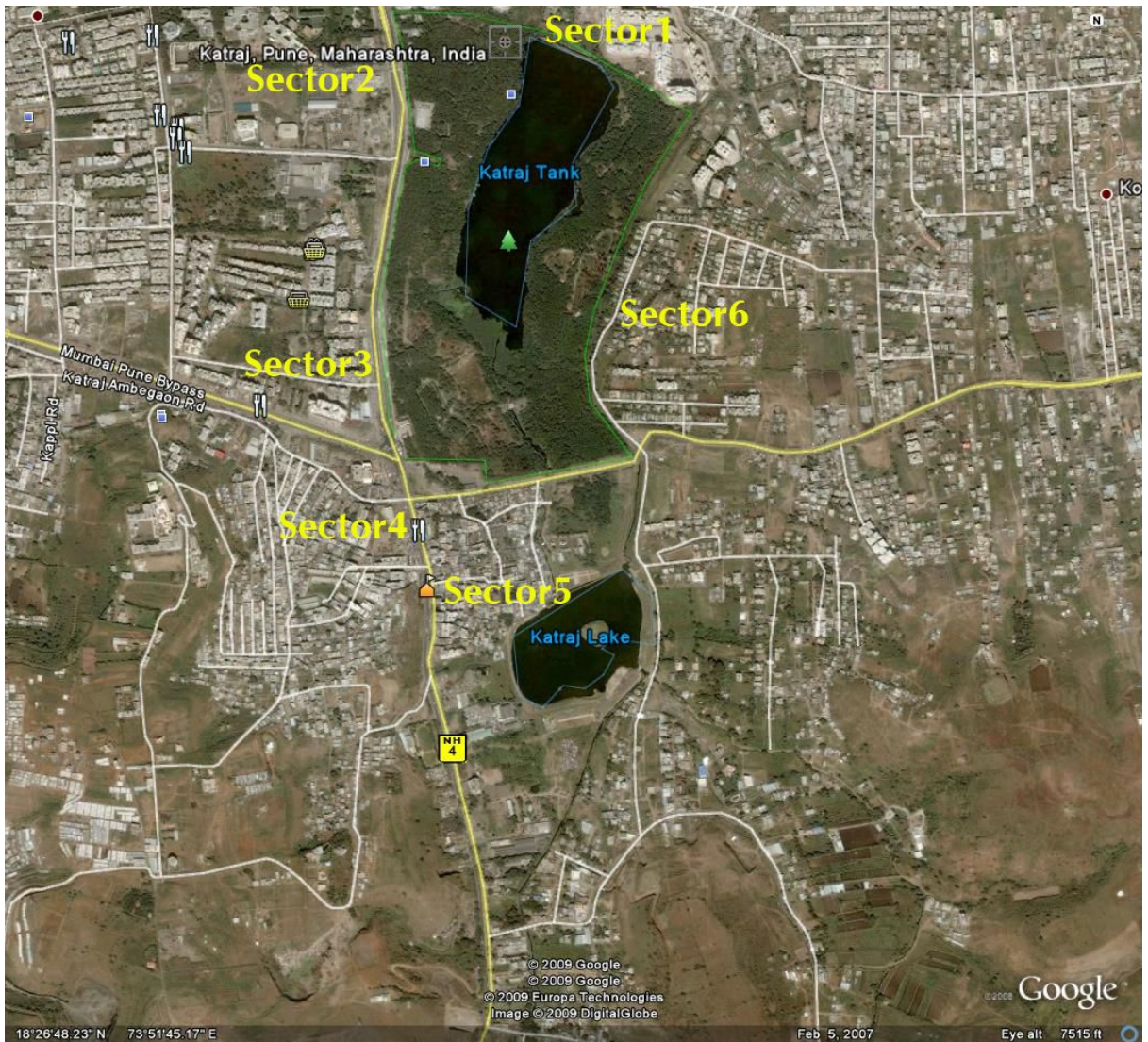
The review of people who were out for morning walks in the surrounding area showed that four out of six people would like to visit the zoo for morning walk provided the zoo is open during the mornings and there are no entry charges.

QUESTIONNAIRE:

1. Housing type, its distance from the zoo, household interviewed is literate or illiterate.
2. For how long have you lived here?
3. What was the place like before the zoo was built?
4. Were there any houses in the place? If yes then do you have any idea where they moved and how were they repaid?
5. Is the green space of zoo one of the reasons of selecting this location of your house?

6. Would you choose this place to build a house if there was no zoo?
7. How is the zoo important in your life?
8. How often do you visit it?
9. Do you face a problem of increased traffic due to the zoo?
10. Does the sound of animals in zoo bother you?
11. Do you face a problem of some offensive odours due to the zoo?
12. Do you have to take a longer route to nearby places because of the location of zoo?
If yes then does it bother you?
13. Do you have any problem due to solid waste of the zoo?
14. Do you get water supply from Katraj lake? If yes then are you satisfied by the
quality and quantity of water?
15. Does the lake cause any other problems?
16. Do the visitors of zoo have an effect on your social and cultural life?
17. How does the zoo benefit you?
18. What effect has the zoo on land prices?
19. Have you got better infrastructural facilities due to the zoo?
20. Other advantages or disadvantages if any.

Rajiv Gandhi Zoological Park and surrounding area



Appendix-10 .List of trees found area wise-
Elephant Enclosure

Sr. No.	Botanical Name	Common Name	No. of trees
1	<i>Flacourtia latifolia</i>	Tambat	3
2	<i>Santalum album</i>	Chandan	49
3	<i>Acacia leucophloea</i>	Hivar	107
4	<i>Acacia chundra</i>	Lal Khair	26
5	<i>Acacia nilotica</i>	Babhul	27
6	<i>Ricinus communis</i>	Castor	1
7	<i>Ficus religiosa</i>	Pipal	1
8	<i>Pongamia pinnata</i>	Karanj	6
9	<i>Thevesia nerifolia</i>	Bitti	41
10	<i>Azadirachta indica</i>	Neem	17
11	<i>Ziziphus jujuba / mauritiana</i>	Ber	9
12	<i>Psidium guajava</i>	Guava	82
13	<i>Pithecellobium dulce</i>	Vilayati Chinch	23
14	<i>Bauhinia variegata</i>	Kanchan	3
15	<i>Leucaena latisiliqua</i>	Subabhul	1878
16	<i>Gliricidia sepium</i>	Gliricidia	168
17	<i>Butea monosperma</i>	Flame of Forest	5
18	<i>Ziziphus xylopyra</i>	Ghati	4
19	<i>Eucalyptus globulus</i>	Nilgiri	43
20	<i>Acacia feruginea</i>	Pandhara Khair	1
21	<i>Cassia siamea</i>	Kashid	99
22	<i>Erythrina suerosa / variegata</i>	Indian Coral Tree	3
23	<i>Ficus racemosa</i>	Wildfig	5
24	<i>Bombax ceiba</i>	Red Silk Cotton	6
25	<i>Emblica officinalis</i>	Awala	1
26	<i>Bambusa vulgaris</i>	Yellow Bamboo	1
27	<i>Phoenix sylvestris</i>	Sindhi	4
28	<i>Acacia auriculaformis</i>		1
29	<i>Peltoforum pterocarpum</i>	Son Mohar	1
30	<i>Tabubia sp.</i>		3
31	<i>Madhuca indica</i>	Indian Butter Tree	3
32	<i>Bauhinia racemosa</i>	Apta	4
33	<i>Ceiba pentandra</i>	White Silk Cotton	1
34	<i>Dalbergia lanceolaria</i>	Dandus	1
35	<i>Ailanthus excelsa</i>	Maharukh	1
36	<i>Lannea coromondelica</i>	Moya	1
37	<i>Annona squamosa</i>	Custard Apple	2
38	<i>Eugenia jambolina</i>		2
39	<i>Dendrocalamus srtictus</i>		1
			2634

Elephant Enclosure

Sr. No.	Botanical Name	Common Name	No. of trees
1	<i>Santalum album</i>	Chandan	16
2	<i>Cassia siamea</i>	Kashid	12
3	<i>Bauhinia variegata</i>	Kanchan	15
4	<i>Tecoma stans</i>		1
5	<i>Moringa oleifera</i>	Drumstick	2
6	<i>Peltophorum pterocarpum</i>	Son Mohar	1
7	<i>Pongamia pinnata</i>	Karanj	18
8	<i>Azadirachta indica</i>	Neem	6
9	<i>Milliongtonia hortensis</i>	Indian Cork Tree	4
10	<i>Acacia leucopholea</i>	Hivar	5
11	<i>Prosopis julifora</i>	Wedi Babhul	14

Available Area – I

14	<i>Leucaena latisiliaqua</i>	Subabhul	286
5	<i>Cocus nucifera</i>	Coconut	1
16	<i>Capparis grandis</i>	Pachunda	2
17	<i>Flacourtia latifolia</i>	Tambat	2
18	<i>Acacia chundra</i>	Lal Khair	8
9	<i>Cassia grandis</i>		5
20	<i>Bambusa indica</i>	Green Bamboo	8
21	<i>Tecoma grandis</i>	Sag	2
22	<i>Gliricidia sepium</i>	Gliricidia	54
23	<i>Thevesia nerifolia</i>	Bitti	4
24	<i>Acacia nilotica</i>	Babhul	4
			473

Available Area - II

	Botanical Name	Common Name	No. of trees
1	<i>Butea monosperma</i>	Flame of Forest	2
2	<i>Acacia leucophloea</i>	Hivar	1
3	<i>Gliricidia sepium</i>	Gliricidia	2
4	<i>Santalum album</i>	Chandan	5
5	<i>Azadirachta indica</i>	Neem	4
6	<i>Acacia suma</i>		1
7	<i>Acacia nilotica</i>	Babhul	3
8	<i>Tectona grandis</i>	Teak	59
9	<i>Lantana camera</i>		32
10	<i>Eucalyptus globulus</i>	Nilgiri	69
11	<i>Leucaena latisilqua</i>	Subabhul	473
12	<i>Bombax ceiba</i>	Red Silk Cotton	1
13	<i>Tecoma stans</i>		14
			666

Leopard Enclosure

Sr. No.	Botanical Name	Common Name	No. of trees
1	<i>Acacia leucophloea</i>	Hivar	25
2	<i>Bridellia retusa</i>		5
3	<i>Gliricidia sepium</i>	Gliricidia	18
4	<i>Dalbergia sissoo</i>	Shisham	2
5	<i>Spathodea campanulata</i>	Tulip Tree	2
6	<i>Gmelina arborea</i>	Shivam	3
7	<i>Cassia siamea</i>	Kashid	32
8	<i>Cassia glauca</i>	Tamruj	3
9	<i>Bambusa indica</i>	Green Bamboo	3
10	<i>Pithecellobium dulce</i>	Vilayati Chinch	3
11	<i>Leucaena latisilqua</i>	Subabhul	4
			100

Wild Dog Area

Sr. No.	Botanical Name	Common Name	No. of trees
1	<i>Bombax ceiba</i>	Red Silk Cotton	5
2	<i>Phoenix sylvestris</i>	Sindhi	1
3	<i>Dalbergia lanceolaria</i>	Dandus	1
4	<i>Santalum album</i>	Chandan	4
5	<i>Eucalyptus globulus</i>	Nilgiri	105
6	<i>Acacia chundra</i>	Lal Khair	7
7	<i>Ziziphus jujuba</i>	Ber	2
8	<i>Acacia nilotica</i>	Babhul	7
9	<i>Millingtonia hortensis</i>	Indian Cork Tree	10
10	<i>Acacia leucophloea</i>	Hivar	284
11	<i>Bauhinia racemosa</i>	Apta	3
12	<i>Bridelia retusa</i>		1
13	<i>Syzygium cuminii</i>	Jamun	1
14	<i>Leucaena latisiliqua</i>	Subabhul	1148
15	<i>Ziziphus xylopyra</i>	Ghati	2
16	<i>Bambusa vulgaris</i>	Yellow Bamboo	10
17	<i>Peltoforum pterocarpum</i>	Peltoforum / Son Mohar	8
18	<i>Delonix regia</i>	Gulmohar	19
19	<i>Azadirachta indica</i>	Neem	1
20	<i>Gliricidia sepium</i>	Gliricidia	71
21	<i>Tectona grandis</i>	Teak	35
22	<i>Cassia siamea</i>	Kashid	3
23	<i>Acacia farnesiana</i>	Dev Babhul	1
24	<i>Capparis grandis</i>	Tambat	1
			1730

Wolf enclosure

Sr. No.	Botanical Name	Common Name	No. of trees
1	<i>Eucalyptus globulus</i>	Nilgiri	2
2	<i>Acacia nilotica</i>	Babhul	4
3	<i>Ficus benghalensis</i>	Banyan Tree	1
4	<i>Leucaena latisilqua</i>	Subabhul	85
5	<i>Gliricidia sepium</i>	Gliricidia	6
6	<i>Santalum album</i>	Chandan	2
			100

Present Nilgai Enclosure

Sr. No.	Botanical Name	Common Name	No. of trees
1	<i>Bauhinia variegata</i>	Kanchan	4
2	<i>Eucalyptus globulus</i>	Nilgiri	6
3	<i>Leucaena latisilqua</i>	Subabhul	28
4	<i>Millingtonia hortensis</i>	India Cork Tree	47
			85

New Black Buck Enclosure

Sr. No.	Botanical Name	Common Name	No. of trees
1	<i>Leucaena latisilqua</i>	Subabhul	70
2	<i>Acacia leucophloea</i>	Hivar	11
3	<i>Cieba pentandra</i>	White Silk Cotton	22
4	<i>Gliricidia sepium</i>	Gliricidia	12

Area between Spotted Deer & Bear

Sr. No.	Botanical Name	Common Name	No. of trees
1	<i>Ficus racemosa</i>	Wild Fig	1
2	<i>Eucalyptus globulus</i>	Nilgiri	33
3	<i>Tectona grandis</i>	Teak	2
4	<i>Cassia siamea</i>	Kashid	13
5	<i>Acacia farnesiana</i>	Dev Babhul	2
6	<i>Peltoforum pterocarpum</i>	Peltoforum / Son Mohar	7
7	<i>Bauhinia variegata</i>	Kanchan	1
8	<i>Cassia glauca</i>	Tamruj	3
9	<i>Dalbergia lanceolaria</i>	Dandus	5
10	<i>Bauhinia racemosa</i>	Apta	2
11	<i>Acacia leucophloea</i>	Hivar	3
12	<i>Acacia nilotica</i>	Babhul	2
13	<i>Leucaena latisiliqua</i>	Subabhul	10
14	<i>Ficus benjamina</i>		1

Behind Nilgai & Chousinga Enclosure

Sr. No.	Botanical Name	Common Name	No. of trees
1	<i>Leucaena latisiliqua</i>	Subabhul	312
2	<i>Acacia leucophloea</i>	Hivar	5
3	<i>Ficus racemosa</i>	Wild Fig	1
4	<i>Phoenix sylvestris</i>	Sindhi	9
5	<i>Putranjiva roxburgii</i>	Childlife Tree	2
6	<i>Delonix regia</i>	Gulmohar	2
7	<i>Peltoforum pterocarpum</i>	Peltoforum	7
8	<i>Acacia nilotica</i>	Babhul	53
9	<i>Syzygium cuminii</i>	Jamun	10
10	<i>Ziziphus xylopyra</i>	Ghati	5
11	<i>Erythrina suberosa</i>	Indian Coral Tree	3
12	<i>Terminalia cuneata/ arjuna</i>	Arjun	9
13	<i>Pongamia pinnata</i>	Karanj	7
14	<i>Azadirachta indica</i>	Neem	8
15	<i>Bombax ceiba</i>	Red Silk Cotton	3
16	<i>Santalum album</i>	Chandan	7
17	<i>Casuarina equisatefolia</i>	Suru	6
18	<i>Dalbergia larnceolaria</i>	Dandus	1
19	<i>Cassia siamea</i>	Kashid	35
20	<i>Bambusa vulgaris</i>	Yellow Bamboo	7
21	<i>Eucalyptus globulus</i>	Nilgiri	8
22	<i>Rogstenia regia</i>	Bottle Palm	3
23	<i>Thespesia populnea</i>	Bhendi Tree	1
24	<i>Terminalia bellirica</i>	Behda	1
			505

Present Black Buck Enclosure

Backside of Yellow & White Tiger

Sr. No.	Botanical Name	Common Name	No. of Trees
1	<i>Tectona grandis</i>	Teak	59
2	<i>Dalbergia sissoo</i>	Shisham	27
3	<i>Peltoforum pterocarpum</i>	Peltoforum	1
4	<i>Acacia suma</i>	Son Khair	2
5	<i>Dalbergia lanceolaria</i>	Dandus	5
6	<i>Cassia siamea</i>	Kashid	6
7	<i>Acacia chundra</i>	Lal Khair	3
8	<i>Acacia leucophloea</i>	Hivar	2
9	<i>Eucalyptus globulus</i>	Nilgiri	5
10	<i>Bauhinia variegata</i>	Kanchan	5
11	<i>Azadirachta indica</i>	Neem	3
12	<i>Ziziphus xylopyra</i>	Ghati	2
13	<i>Gliricidia sepium</i>	Gliricidia	10
14	<i>Acacia longifolia / auricular formis</i>	Australian Babhul	1
15	<i>Pongamia pinnata</i>	Karanj	25
16	<i>Acacia nilotica</i>	Babhul	1
17	<i>Leucaena latisiliqua</i>	Subabhul	390
			547

Yellow Tiger lawn

Sr. No.	Botanical Name	Common Name	No. of trees
1	<i>Leucaena latisiliqua</i>	Subabhul	60
2	<i>Gliricidia sepium</i>	Gliricidia	33
3	<i>Eucalyptus globulus</i>	Nilgiri	33
4	<i>Acacia chundra</i>	Lal Khair	1
5	<i>Sesbania sesban</i>	Shevari	1
6	<i>Cassia siamea</i>	Kashid	6
7	<i>Cassia glauca</i>		2
8	<i>Acacia nilotica</i>	Babhul	1
9	<i>Syzygium cuminii</i>	Jamun	1
10	<i>Acacia leucophloea</i>	Hivar	3
			141

Plantation in front of Bear Enclosure

Sr. No.	Botanical Name	Common Name	No. of trees
1	<i>Leucaena latisiliqua</i>	Subabhul	4
2	<i>Gliricidia sepium</i>	Gliricidia	62
3	<i>Eucalyptus globulus</i>	Nilgiri	1
4	<i>Acacia leucophloea</i>	Hivar	3
5	<i>Bambusa vulgaris</i>	Yellow Bamboo	2
6	<i>Cassia siamea</i>	Kashid	8
7	<i>Thivesia nerifolia</i>	Bitti	1
8	<i>Pongamia pinnata</i>	Karanj	2
9	<i>Peltoforum pterocarpum</i>	Peltoforum / Son Mohar	1
			84

Area on backside of Black Buck

Sr. No.	Botanical Name	Common Name	No. of trees
1	<i>Muntingia calabura</i>	Singapur Cherry	1
2	<i>Albizia procera</i>	Safed Shirsh	4
3	<i>Bombax ceiba</i>	Red Silk Cotton	1
4	<i>Thespesia populnea</i>	Bhendi Tree	1
5	<i>Dalbergia sissoo</i>	Shisham	2
6	<i>Syzygium cumini</i>	Jamun	2
7	<i>Psidium guajava</i>	Guava	1
8	<i>Terminalia sp.</i>		1
9	<i>Acacia nilotica</i>	Babhul	4
10	<i>Ricinus cumminis</i>	Castor	31
11	<i>Cassia siamea</i>	Kashid	39
12	<i>Casurina equisitifolia</i>	Suru	11
13	<i>Eucalyptus globulus</i>	Nilgiri	72
14	<i>Leucaena latisiliqua</i>	Subabhul	168
15	<i>Pithecellobium dulce</i>	Vilayati Chinch	91
			429

Between Leopard & Yellow Tiger

Sr. No.	Botanical Name	Common Name	No. of trees
1	<i>Cassia surattensis (glauca)</i>	Tamruj	21
2	<i>Eucalyptus globulus</i>	Nilgiri	9
3	<i>Cassia siamea</i>	Kashid	7
4	<i>Acacia leucophloea</i>	Hivar	6
5	<i>Bambusa vulgaris</i>	Yellow Bamboo	1
6	<i>Acacia feruginea</i>	Pandhara Khair	2
7	<i>Leucaena latisiliqua</i>	Subabhul	48
8	<i>Tectona grandis</i>	Teak	2
9	<i>Bridellia retusa</i>		1
10	<i>Butea monosperma</i>	Flame of Forest	1
11	<i>Gliricidia sepium</i>	Gliricidia	139
12	<i>Tecoma stans</i>		1
13	<i>Acacia chundra</i>	Lal Khair	2
14	<i>Azadirachta indica</i>	Neem	2
15	<i>Ziziphus jujuba</i>	Ber	1
16	<i>Ziziphus xylopyra</i>	Ghati	4
17	<i>Bauhinia variegata</i>	Kanchan	1
			248

Available Area - III

Sr. No.	Botanical Name	Common Name	No. of trees
1	<i>Leucaena latifolia</i>	Subabhul	2479
2	<i>Michelia champaka</i>	Sonchaph	5
3	<i>Azadirachta indica</i>	Neem	18
4	<i>Morinda citrifolia</i>	Bartondi	4
5	<i>Bambusa indica</i>	Green Bamboo	11
6	<i>Cassia siamea</i>	Kashid	10
7	<i>Eucalyptus globulus</i>	Nilgiri	6
8	<i>Acacia nilotica</i>	Babhul	60
9	<i>Tamarindus indica</i>	Imli	9
10	<i>Alianthus excelsa</i>	Maharukh	5
11	<i>Santalum album</i>	Chandan	41
12	<i>Peltoforum pterocarpum</i>	Pelto forum	2
13	<i>Ziziphus jujube / mauritiana</i>	Ber	10
14	<i>Bauhinia variegata</i>	Kanchan	1
15	<i>Pongamia pinnata</i>	Karanj	11
16	<i>Ficus racemosa</i>	Wild Fig	2
17	<i>Bombax ceiba</i>	Red Silk Cotton	3
18	<i>Acacia suma</i>	Son khair	3
19	<i>Prosopis julifera</i>		5
20	<i>Plumeria rubra</i>	Lal Chapha	9
21	<i>Bambusa vulgaris</i>	Yellow Bamboo	5
22	<i>Lantena camera</i>	Ghaneri	94
23	<i>Baubinia racemosa</i>	Apta	4
24	<i>Ficus benghalensis</i>	Banyan Tree	1
25	<i>Artabotrys odorantisimus</i>		2
26	<i>Bridelia resusa</i>		2
27	<i>Acacia leucophloea</i>	Hivar	13
28	<i>Acacia auriculiformis</i>	Australian Babhul	7
29	<i>Thespesia sp.</i>	Bendi Tree	10
30	<i>Shrubera swetenoida</i>	Mokh	1
31	<i>Sterculia foetide</i>		2
32	<i>Ziziphus xylopyra</i>	Ghati	2
33	<i>Dalbergia lanceolaria</i>	Dandus	2
34	<i>Cassia glauca / surathensis</i>		5
35	<i>Dalbergia sissoo</i>	Shisham	1
36	<i>Plumeria alba</i>	Pandhara Chapha	2
37	<i>Annona squamosa</i>	Custard Apple	1
38	<i>Acacia chundra</i>	Lal Khair	10
39	<i>Syzygium cumini</i>	Jamun	12
40	<i>Phoenix sylvestris</i>	Sindhi / Palm	6
41	<i>Roystonea regia</i>	Bottle palm	1
42	<i>Unknown</i>		5

Back & front of Peacock Cage

Sr. No.	Botanical Name	Common Name	No. of trees
1	<i>Gliricidia sepium</i>	Gliricidia	14
2	<i>Leucaena latisiliqua</i>	Subabhul	104
3	<i>Eucalyptus globulus</i>	Nilgiri	6
4	<i>Ficus benghalensis</i>	Banyan Tree	1
5	<i>Cassia glauca</i>	Tamruj	1
6	<i>Acacia nilotica</i>	Babhul	6
7	<i>Cassia siamea</i>	Kashid	5
8	<i>Santalum album</i>	Chandan	13
9	<i>Peltoforum pterocarpum</i>	Peltoforum	4
10	<i>Acacia leucophloea</i>	Hivar	2
11	<i>Albizia lebbeck</i>	Shirish	8
12	<i>Acacia feruginea</i>	Pandhara Khair	8
13	<i>Delonix regia</i>	Gulmohar	4
14	<i>Ziziphus jujuba / mauritiana</i>	Ber	1
15	<i>Bauhinia racemosa</i>	Apta	5
16	<i>Azadirachta indica</i>	Neem	4
17	<i>Bauhinia variegata</i>	Kanchan	2
18	<i>Phoenix sylvestris</i>	Sindhi	2
19	<i>Erythrina variegata / suberosa</i>	Indian Coral Tree	2
20	<i>Acacia chundra</i>	Lal khair	6
			198

Monkey Enclosure

Sr. No.	Botanical Name	Common Name	No. of trees
1	<i>Polyalthia longifolia</i>	Pscudo Ashok	4
2	<i>Pithecellobium dulce</i>	Vilayati Chinch	87
3	<i>Spathodia campunulata</i>	Pichkari	1
4	<i>Santalum album</i>	Chandan	4
5	<i>Cassia siamea</i>	Kashid	5
6	<i>Peltoforum pterocarpum</i>	Peltoforum	2
7	<i>Erythrina variegata / suberosa</i>	Indian Coral Tree	2
8	<i>Leucaena latisiliqua</i>	Subabhul	3
9	<i>Ficus racemosa</i>	Wild Fig	1
10	<i>Samanea saman</i>	Rain Tree	1
11	<i>Khaya senegalensis</i>	Khaya	1
12	<i>Gliricidia sepium</i>	Gliricidia	65
13	<i>Unknown</i>		1
			177

Main Building Area

Sr. No.	Botanical Name	Common Name	No. of trees
1	<i>Cassia siamea</i>	Kashid	33
2	<i>Gliricidia sepium</i>	Gliricidia	96
3	<i>Peltoforum pterocarpum</i>	Peltoforum	13
4	<i>Terminalia catapa</i>	Wild Badam	1
5	<i>Leucaena latisiliqua</i>	Subabhul	3
6	<i>Eucalyptus globulus</i>	Nilgiri	1
7	<i>Bauhinia variegata</i>	Kanchan	2
8	<i>Acacia auriculiformis</i>	Australian Babhul	1
			150

Between Present Nilgai & Black Buck (Canal)

Sr. No.	Botanical Name	Common Name	No. of trees
1	<i>Mutangia calabura</i>	Singapur Cherry	1
2	<i>Ricinus cummunis</i>	Castor	2
3	<i>Phoenix sylvestris</i>	Sindhi	2
4	<i>Delonix regia</i>	Gulmohar	1
5	<i>Bambusa indica</i>	Green Bamboo	1
6	<i>Acacia nilotica</i>	Babhul	16
7	<i>Acacia chundra</i>	Lal Khair	9
8	<i>Leucaena latisiliqua</i>	Subabhul	100
			132

Lawn in front of Monkey Enclosure

Sr. No.	Botanical Name	Common Name	No. of trees
1	<i>Gliricidia sepium</i>	Gliricidia	32
2	<i>Cassia siamea</i>	Kashid	8
3	<i>Pongamia pinnata</i>	Karanj	3
4	<i>Acacia nilotica</i>	Babhul	13
5	<i>Peltoforum pterocarpum</i>	Peltoforum	3
6	<i>Sheferella actinophyla</i>	Umbrella Tree	3
7	<i>Leucaena latisiliqua</i>	Subabhul	11
8	<i>Holoptellia integrifolia</i>	Vavli	1
9	<i>Jacaranda acutifolia</i>	Nil Mohar	2
10	<i>Cassia grandis</i>		4
11	<i>Santalum album</i>	Chandan	10
12	<i>Acacia leucophloea</i>	Hivar	1
13	<i>Spathodia campunulata</i>	Pichkari	1
14	<i>Cassia glauca</i>	Tamruj	1
15	<i>Syzygium cumini</i>	Jamun	1
16	<i>Polyalthia longifolia</i>	Pscudo Ashok	5
17	<i>Bambusa indica</i>	Green Bamboo	1
18	<i>Ficus benjamina</i>		1
19	<i>Azadirachta indica</i>	Neem	1
			102

MTDC Lawn & Backside of it

Sr. No.	Botanical Name	Common Name	No. of trees
1	<i>Bauhinia variegata</i>	Kanchan	5
2	<i>Ficus benamina</i>		6
3	<i>Bambusa vulgaris</i>	Yellow Bamboo	2
4	<i>Gliricidia sepium</i>	Gliricidia	23
5	<i>Eucalyptus globulus</i>	Nilgiri	14
6	<i>Peltophorum pterocarpum</i>	Son-Mohar	7
7	<i>Azadirachta indica</i>	Neem	9
8	<i>Albizia lebbeck</i>	Shirish	5
9	<i>Bombax ceiba</i>	Red Silk Cotton	1
10	<i>Acacia leucophloea</i>	Hivar	8
11	<i>Lannea coromandelica</i>	Moya	1
12	<i>Acacia chundra</i>	Lal Khair	4
13	<i>Delonix regia</i>	Gulmohar	5
14	<i>Dalbergia sissoo</i>	Shisham	1
15	<i>Acacia feruginea</i>	Pandhara Khair	2
16	<i>Bougainvillea spectabilis</i>	Began vel.	1
17	<i>Schrubera swietenoides</i>	Mokha	1
18	<i>Ficus benghalensis</i>	Banyan Tree	1
19	<i>Pithecellobium dulce</i>	Vilayati Chinch	1
20	<i>Pongamia pinnata</i>	Karanj	3
21	<i>Ficus racemosa</i>	Wild Fig	2
22	<i>Leucaena latisiliqua</i>	Subabhul	353
23	<i>Ficus religiosa</i>	Pipal	2
			457

Snake Park Area

Sr. No.	Botanical Name	Common Name	No. of trees
1	<i>Polyalthia Longifolia</i>	Pseudo Ashok	04
2	<i>Pongamia pinnata</i>	Karanj	44
3	<i>Tamauridus indica</i>	Imli	01
4	<i>Erythrina variegata/suberosa</i>	Indian Coral Tree	06
5	<i>Ziziphus jujuba / mauritiana</i>	Ber	01
6	<i>Pridium guajava</i>	Guava	03
7	<i>Bauhinia racemosa</i>	Apta	01
8	<i>Santalum album</i>	Chandan	02
9	<i>Carissa congesta</i>	Karvand	06
10	<i>Caesalpinia bondus</i>	Sagargota	01
11	<i>Peltoforum pterocarpum</i>	Son Mohar	01
12	<i>Ficus religiosa</i>	Pipal	03
13	<i>Gliricidia sepium</i>	Gliricidia	69
14	<i>Spathodea companulata</i>	Pichkari	01
15	<i>Bambusa vulgaris</i>	Yellow Bamboo	10
16	<i>Cassia Siamea</i>	Kashid	04
17	<i>Leucaena latisiliqua</i>	Subabhul	103
18	<i>Azaduiahta indica</i>	Neem	03
19	<i>Mangifera indica</i>	Mango	01
20	<i>Khaya senegalensis</i>	Khaya	01
			265

Crains Area

Sr. No.	Botanical Name	Common Name	No. of trees
1	<i>Bauhinia racemosa</i>	Apta	03
2	<i>Holoptellia integrifolia</i>	Vavli	01
3	<i>Dalbergia lanceolaria</i>	Dandus	02
4	<i>Ficus benghalensis</i>	Banyan Tree	01
5	<i>Ficus religiosa</i>	Pipal	02
6	<i>Ficus racemosa</i>	Wildfig	02
7	<i>Tamarindus indica</i>	Imli	02
8	<i>Albizia lebbek</i>	Shirish	01
9	<i>Peltophorum pterocarpum</i>	<i>Peltophorum</i>	01
10	<i>Pongamia pinnata</i>	Karanj	01
11	<i>Ziziphus xylopyra</i>	Ghati	04
12	<i>Bambus indica</i>	Green Bamboo	02
13	<i>Bougainvillea spectabilis</i>	Paper Plant	05
14	<i>Santalum album</i>	Chandan	14
15	<i>Acacia leucophloea</i>	Hivar	11
16	<i>Acacia suma</i>	Son Khair	03
17	<i>Acacia nilotica</i>	Babhul	32
18	<i>Leucaena latisiliqua</i>	Subabhul	241
19	<i>Gliricidia sepium</i>	Gliricidia	48
			376

Bear II Area

Sr. No.	Botanical Name	Common Name	No. of trees
1	<i>Pongamia pinnata</i>	Karanj	07
2	<i>Phoenix sylvestris</i>	Sindhi	01
3	<i>Holoptelia infegrifolia</i>	Vavli	01
4	<i>Ficus religiosa</i>	Pipal	02
5	<i>Acacia suma</i>	Son Khair	06
6	<i>Azadirachta indica</i>	Neem	09
7	<i>Ziziphus mauritiana</i>	Ber	02
8	<i>Thespesia populnea</i>	Bhendi Tree	01
9	<i>Ficus bengamina</i> (replant)		01
10	<i>Syzygium cumini</i>	Jamun	02
11	<i>Ficus racemosa</i>	Wildfig	01
12	<i>Peltoforum pterocarpum</i>	<i>Peltoforum</i>	03
13	<i>Cassia siamea</i>	Kashid	22
14	<i>Lannea coromondelica</i>	Moya	01
15	<i>Ficus benghalensis</i>	Banayan Tree	01
16	<i>Dalbergia sissoo</i>	Shisham	01
17	<i>Acacia leucophloea</i>	Hivar	05
18	<i>Dalbergia lanceolaria</i>	Dandus	04
19	<i>Eucalyptus globulus</i>	Nilgiri	05
20	<i>Gliricidia sepium</i>	Gliricidia	228
21	<i>Leucaena latisiliqua</i>	Subabhul	26
22	<i>Bambusa vulgaris</i>	Yellow Bamboo	01
23	<i>Santalum album</i>	Chandan	01
24	<i>Ailanthus excelsa</i>	Maharukh	01
			332

Sambar Enclosure

Sr. No.	Botanical Name	Common Name	No. of trees
1	<i>Cassia siamea</i>	Kashid	32
			32

Backside of Sambar & Spotted Dear Enclosure

Sr. No.	Botanical Name	Common Name	No. of trees
1	<i>Leucaena latisiliqua</i>	Subabhul	150
2	<i>Acacia nilotica</i>	Babhul	14
3	<i>Azadirachta indica</i>	Neem	7
4	<i>Pithecellobium dulce</i>	Vilayati Chinch	3
5	<i>Santalum album</i>	Chandan	9
6	<i>Morinda citrifolia</i>	Bartondi	3
7	<i>Gliricidia sepium</i>	Gliricidia	22
8	<i>Acacia suma</i>	Son Khair	12
9	<i>Cassia siamea</i>	Kashid	32
			252

Lawn in front of Leopard

Sr. No.	Botanical Name	Common Name	No. of trees
1	<i>Gliricidia sepium</i>	Gliricidia	192
2	<i>Ziziphus mauritiana</i>	Ber	2
3	<i>Acacia leucophloea</i>	Hivar	17
4	<i>Santalum album</i>	Chandan	2
5	<i>Bambus indica</i>	Green Bamboo	88
6	<i>Acacia feruginea</i>	Pandhara Khair	1
7	<i>Erythrina variegata/suberosa</i>	Indian Coral Tree	1
8	<i>Bauhinia variegata</i>	Kanchan	2
9	<i>Tectona grandis</i>	Teak	1
10	<i>Eucalyptus globulus</i>	Nilgiri	2
11	<i>Pongamia pinnata</i>	Karanj	18
12	<i>Schebera suetainoides</i>	Mokha	5
13	<i>Grewia titifolia</i>	Dhaman	2
14	<i>Bombax ceiba</i>	Red Silk Cotton	1
15	<i>Peltophorum pterocarpum</i>	Peltophorum	4
16	<i>Gmelina arborea</i>	Shivan	2
17	<i>Acacia nilotica</i>	Babhul	1
18	<i>Dalbergia sissoo</i>	Shisham	1
19	<i>Leucaena latisiliqua</i>	Subabhul	14
20	<i>Cassia siamea</i>	Kashid	68
			424

Proposed Lion Enclosure

Sr. No.	Botanical Name	Common Name	No. of trees
1	<i>Azadirachta indica</i>	Neem	53
2	<i>Bombax ceiba</i>	Red Silk Cotton	7
3	<i>Peltophorum pterocarpum</i>	Peltophorum	10
4	<i>Ziziphus jujuba</i>	Ber	7
5	<i>Lannea coromandelica</i>	Moya	5
6	<i>Pongamia pinnata</i>	Karanj	7
7	<i>Cassia glauca</i>	Tamruj	14
8	<i>Albizia amara</i>	Kansar	3
9	<i>Bambus indica</i>	Green Bamboo	7
10	<i>Dalbergia sissoo</i>	Shisham	40
11	<i>Santalum album</i>	Chandan	69
12	<i>Cassia siamea</i>	Kashid	44
13	<i>Lantana camera</i>		25
14	<i>Gliricidia sepium</i>	Gliricidia	184
15	<i>Bauhinia varigata</i>	Kanchan	20
16	<i>Acacia nilotica</i>	Babhul	25
17	<i>Leucaena latisiliqua</i>	Subabhul	401
18	<i>Acacia leucophloea</i>	Hivar	117
19	<i>Acacia chundra</i>	Lal Khair	305
20	<i>Albizia lebbeck</i>	Shirish	1
21	<i>Pongamia pinnata</i>	Karanj	8
22	<i>Dalbergia melanoxylon</i>	Patangi	6
23	<i>Acacia feruginea</i>	Pandhara khair	7
24	<i>Bambusa vulgaris</i>	Yellow Bamboo	2
25	<i>Erythrina variegata/suberosa</i>	Indian Coral Tree	17
26	<i>Ficus benghalensis</i>	Banyan Tree	6
27	<i>Bauhinia purpurea</i>	Kanchan	36
28	<i>Bauhinia racemosa</i>	Apta	4
29	<i>Ficus elastica</i>	Indian Rubber Tree	1
30	<i>Eucalyptus globulus</i>	Nilgiri	26
31	<i>Dalbergia lanceolaria</i>	Dandus	1
			1458

Rescue Centre

Sr. No.	Botanical Name	Common Name	No. of trees
1	<i>Jacaranda mimosifolia</i>	Nilmohar	5
2	<i>Leucaena latisiliqua</i>	Subabhul	50
3	<i>Pongamia pinnata</i>	Karanj	48
4	<i>Santalum album</i>	Chandan	13
5	<i>Bambusa vulgaris</i>	Yellow Bamboo	7
6	<i>Caesalpinia pulcherima</i>	Sankasur	4
7	<i>Cassia siamea</i>	Kashid	64
8	<i>Azadirachta indica</i>	Neem	8
9	<i>Lannea coromandelica</i>	Moya	1
10	<i>Ziziphus jujuba</i>	Ber	2
11	<i>Syzygium cumini</i>	Jamun	1
12	<i>Terminalia catappa</i>	Deshi Almond	8
13	<i>Delonix regia</i>	Gulmohar	2
14	<i>Eucalyptus globulus</i>	Nilgiri	33
15	<i>Peltophorum pterocarpum</i>	Son Mohar	2
16	<i>Annona squamosa</i>	Custard Apple	1
17	<i>Dracena sp</i>	Dracena	37
18	<i>Swietenia mahogoni</i>	Mahogoni	9
19	<i>Acacia nilotica</i>	Babhul	1
20	<i>Erythrina variegata/suberosa</i>	Indian Coral Tree	1
21	<i>Acacia leucophloea</i>	Hivar	1
22	<i>Gliricidia sepiun</i>	Gliricidia	377
23	<i>Parkia biglanduolsa</i>	Chenduphal	1
24	<i>Roystonea regia</i>	Bottlepalm	6
25	<i>Polyalthia longifolia</i>	Pseudoashok	7
26	<i>Ficus benjamina</i>		6
27	<i>Livinstonia chinensis</i>	Fan Palm	20
28	<i>Gmelina arborea</i>	Shivan	1
29	<i>Acacia leucophloea</i>	Hivar	4
30	<i>Capparis grandis</i>	Pachunda	1
31	<i>Erythrina variegata</i>	Indian Coral Tree	1
32	<i>Terminalia Cattapa</i>	Deshi Almond	2
			724

Proposed Enclosure of Nilgai & Chousinga

Sr. No.	Botanical Name	Common Name	No. of trees
1	<i>Ceiba pentandra</i>	White Silk Cotton	3
2	<i>Eucalyptus globulus</i>	Nilgiri	77
3	<i>Tectona grandis</i>	Teak	21
4	<i>Khaya senegalensis</i>	Khaya	2
5	<i>Peltophorum pterocarpum</i>	Peltophorum/Son mohar	1
6	<i>Santalum album</i>	Chandan	18
7	<i>Acacia nilotica</i>	Babhul	32
8	<i>Azadirachta indica</i>	Neem	9
9	<i>Lannea coromandelica</i>	Moya	1
10	<i>Acacia chundra</i>	Lal Khair	4
11	<i>Acacia leucophloea</i>	Hivar	26
12	<i>Leucaena latisiliqua</i>	Subabhul	1009
13	<i>Bauhinia racemosa</i>	Apta	3
14	<i>Bauhinia purpurea</i>	Kanchan	2
15	<i>Ziziphus jujuba</i>	Ber	2
16	<i>Bombax ceiba</i>	Red Silk Cotton	1
17	<i>Albizia amara</i>	Kansar	1
18	<i>Flacourtia latifolia</i>	Tambat	5
19	<i>Cassia siamea</i>	Kashid	4
20	<i>Ficus racemosa</i>	Wild Fig	1
21	<i>Pongamia pinnata</i>	Karanj	5
22	<i>Artrabotrys odoratum</i>	Micro Chapha	1
23	<i>Aegle marmalos</i>	Bael	1
24	<i>Butea monosperma</i>	Flame of forest	1
25	<i>Dalbergia melanoxylon</i>	Patangi	1
26	<i>Hibiscus rosa-sinensis</i>	Jaswand	2
27	<i>Grewia pilosa</i>	Dhaman	1
			1234

Proposed Reptile Area (New Reptile Area)

Sr. No.	Botanical Name	Common Name	No. of trees
1	<i>Acacia chundra</i>	Lal Khair	1
2	<i>Terminalia arjuna</i>	Arjun	1
3	<i>Acacia farnesiana</i>	Dev-Babhul	5
4	<i>Bauhinia purpurea</i>	Kanchan	7
5	<i>Capparis grandis</i>	Panchunda	8
6	<i>Ziziphus jujuba</i>	Ber	4
7	<i>Acacia leucophloea</i>	Hivar	29
8	<i>Acacia nilotica</i>	Babhul	59
9	<i>Tectona grandis</i>	Teak	43
10	<i>Pongamia pinnata</i>	Karanj	3
11	<i>Azadirachta indica</i>	Neem	1
12	<i>Santalum album</i>	Chandan	25
13	<i>Cassia siamea</i>	Kashid	141
14	<i>Ceiba pentandra</i>	Pandhari Savar	1
15	<i>Leucaena latisiliqua</i>	Subabhul	50
16	<i>Gliricidia sepiun</i>	Gliricidia	1188
17	<i>Syzygium cumini</i>	Jamun	1
18	<i>Bambusa vulgaris</i>	Yellow Bamboo	55
19	<i>Kigelia pinnata</i>		4
20	<i>Sweitenia mohagoni</i>	Mohagoni	33
21	<i>Bombax ceiba</i>	Red Silk Cotton	6
22	<i>Eucalyptus globulus</i>	Nilgiri	1
23	<i>Peltophorum pterocarpum</i>	Peltophorum/Son mohar	38
24	<i>Phoenix sylvestris</i>	Sindhi	1
25	<i>Cassia glauca</i>	Tamruj	5
			1710

Available Area - IV

Sr. No.	Botanical Name	Common Name	No. of trees
1	<i>Millingtonia hortensis</i>	Indian Cork Tree	2
2	<i>Peltophorum pterocarpum</i>	Peltophorum/Son Mohar	9
3	<i>Samanea saman</i>	Rain tree	2
4	<i>Bauhinia racemosa</i>	Apta	3
5	<i>Holoptelia integrifolia</i>	Vavli	3
6	<i>Pongamia pinnata</i>	Karanj	18
7	<i>Santalum album</i>	Chandan	30
8	<i>Flacourtia latifolia / indica</i>	Tambat	1
9	<i>Bambusa vulgaris</i>	Yellow Bamboo	5
10	<i>Acacia nilotica</i>	Babhul	2
11	<i>Bombax ceiba</i>	Red Silk Cotton	1
12	<i>Delonix regia</i>	Gulmohar	18
13	<i>Eucalyptus globulus</i>	Nilgiri	4
14	<i>Jacaranda mimosifolia/acutifolia</i>	Nilmohar	21
15	<i>Cordia sp</i>	Bhokar	4
16	<i>Gliricidia sepiun</i>	Gliricidia	180
17	<i>Azadirachta indica</i>	Neem	20
18	<i>Leucaena latisiliqua</i>	Subabul	567
19	<i>Bougainvillea spectabilis</i>	Bogan vel/Paper Plant	1
20	<i>Acacia leucophloea</i>	Hivar	2
21	<i>Tamarindus indica</i>	Imli	3
22	<i>Mangifera indica</i>	Mango	1
23	<i>Ficus racemosa</i>	Wild Fig	1
24	<i>Bauhinia purpurea</i>	Kanchan	6
25	<i>Erythrina variegata/suberosa</i>	Indian Coral Tree	1
26	<i>Ficus religiosa</i>	Pipal	1
27	<i>Ehretia laevis</i>	Ajan Vriksha	1
28	<i>Hibiscus rosa-sinensis</i>	Jaswand	2
29	<i>Putranjivi roxburgii</i>	Putranjivi	15
30	<i>Annona squamosa</i>	Custard Apple	2
31	<i>Ziziphus jujuba</i>	Ber	1
32	<i>Cassia siamea</i>	Kashid	1
33	<i>Acacia chundra</i>	Lal Khair	1
34	<i>Acacia feruginea</i>	Pandhara Khair	2
35	<i>Lantana camera</i>		49
36	<i>Syzygium cumini</i>	Jamun	1
37	<i>Cassia glauca</i>	Tamruj	13
38	<i>Albizia lebbeck</i>	Shirish	1
39	<i>Caesalpinia pulcherrina</i>		1
40	<i>Phoenix sylvestris</i>	Sindhi	2
41	<i>Flacourtia latifolia</i>	Tambat	1
			999

Available Area - V

Sr. No.	Botanical Name	Common Name	No. of trees
1	<i>Cassia siamea</i>	Kashid	12
2	<i>Ailanthus excelsa</i>	Maharukh	1
3	<i>Bombax ceiba</i>	Red Silk Cotton	3
4	<i>Caesalpinia pulcheritna</i>	Shankasur	4
5	<i>Putranjiva roxburgii</i>	Putranjiva	1
6	<i>Eucalyptus globulus</i>	Nilgiri	12
7	<i>Ziziphus xylopyra</i>	Ghati	2
8	<i>Tamarindus indica</i>	Imli	7
9	<i>Prosopis juliflora</i>	Wedi Babhul	1
10	<i>Acacia leucophloea</i>	Hivar	7
11	<i>Acacia chundra</i>	Lal Khair	4
12	<i>Acacia nilotica</i>	Babhul	27
13	<i>Santalum album</i>	Chandan	26
14	<i>Azadirachta indica</i>	Neem	21
15	<i>Millingtonia hortensis</i>	Indian Cork Tree	47
16	<i>Leucaena latisiliqua</i>	Subabhul	520
17	<i>Gliricidia sepium</i>	Gliricidia	507
18	<i>Pongamia pinnata</i>	Karanj	5
19	<i>Capparis grandis</i>	Pachunda	3
20	<i>Grewia tiliifolia/pilosa</i>	Dhaman	2
21	<i>Peltophorum pterocarpum</i>	Peltophorum/Son mohar	3
22	<i>Acacia feruginea</i>	Pandhara khair	2
23	<i>Jacaranda acutifolia</i>	Nilmohar	1
24	<i>Dolichandrone falcata</i>	Med Shingi	1
25	<i>Tectona grandis</i>	Teak	15
26	<i>Spathodea campanulata</i>	Pichkari	1
27	<i>Terminalia cattapa</i>	Wild Almond	3
28	<i>Khaya senegalensis</i>	Khaya	4
29	<i>Ziziphus jujuba</i>	Ber	6
30	<i>Erythrina variegata/suberosa</i>	Indian Coral Tree	3
31	<i>Bambus indica</i>	Green Bamboo	2
32	<i>Acacia suma</i>	Son Khair	7
33	<i>Dalbergia melanoxylon</i>	Patangi	4
34	<i>Delonix regia</i>	Gulmohar	3
			1267

Kitchen & Hospital Area

Sr. No.	Botanical Name	Common Name	No. of trees
1	<i>Cassia siamea</i>	Kashid	23
2	<i>Capparis grandis</i>	Pachunda	10
3	<i>Azadirachta indica</i>	Neem	14
4	<i>Eucalyptus globulus</i>	Nilgiri	39
5	<i>Delonix regia</i>	Gulmohar	2
6	<i>Santalum album</i>	Chandan	101
7	<i>Tectona grandis</i>	Teak	65
8	<i>Acacia nilotica</i>	Babhul	20
9	<i>Acacia leucophloea</i>	Hivar	20
10	<i>Jacaranda acutifolia</i>	Nilmohar	11
11	<i>Ziziphus jujuba</i>	Ber	3
12	<i>Peltophorum pterocarpum</i>	Son mohar	60
13	<i>Gliricidia sepium</i>	Gliricidia	364
14	<i>Leucaena latisiliqua</i>	Subabhul	200
15	<i>Polyalthia longifolia</i>	Pscudo Ashok	1
16	<i>Tecoma stans</i>		1
17	<i>Ficus racemosa</i>	Wild Fig	2
18	<i>Lantana camera</i>		2
19	<i>Annona squamosa</i>	Custard Apple	4
20	<i>Bauhinia racemosa</i>	Apta	2
21	<i>Phoenix sylvestris</i>	Sindhi	3
22	<i>Bambusa vulgaris</i>	Yellow Bamboo	14
23	<i>Khaya senegalensis</i>	Khaya	1
24	<i>Erythrina varigeta/suberosa</i>	Indian Coral Tree	1
25	<i>Morinda citrifolia</i>	Bartondi	3
26	<i>Albizia lebbek</i>	Shirish	3
27	<i>Flacourtia latifolia</i>	Tambat	3
28	<i>Ziziphus xylopyra</i>	Ghati	8
29	<i>Acacia feruginea</i>	Pandhara Khair	1
30	<i>Bombax ceiba</i>	Red Silk Cotton	1
31	<i>Psidium guajava</i>	Guava	1
32	<i>Putranjiva roxburgii</i>	Putranjiva	9
33	<i>Heterophragma quadriloalare</i>	Varas	1
			993

Spotted Deer Enclosure, area between S. Deer and Samber

Sr. No.	Botanical Name	Common Name	No. of trees
1	<i>Acacia leucophloea</i>	Hivar	20
2	<i>Cassia siamea</i>	Kashid	13
3	<i>Ficus religiosa</i>	Pipal	1
4	<i>Eucalyptus globulus</i>	Nilgiri	1
5	<i>Ziziphus jujuba</i>	Ber	1
6	<i>Acacia nilotica</i>	Babhul	5
7	<i>Leucaena latisiliqua</i>	Subabhul	55
8	<i>Azadirachta indica</i>	Neem	1
9	<i>Bambusa indica</i>	Green bamboo	3
			100

Appendix 11-Veterinary Research Conducted at RGZP

- 1) **‘Rearing of wildlife orphans with special emphasis on leopard cubs’** (2002).
A.V. Belsare.
4th Veterinary workshop on Management of Rare and Endangered wild animals and their neonatal care ‘Thiruanathpuram 25th – 27th April 2002.
- 2) **‘Anesthesia in Wild Fauna’**(2002).
A.V. Belsare.
Indian Society for Veterinary Surgery conference at Mumbai in 2002.
- 3) **Contraception in a Blackbuck (*Antilope cervicapra*) using Melengestrol Acetate** (2003)
K .D. Umrigar and A.V. Belsare
Zoosprint Journal:1129: June,2003.
- 4) **Fracture Management in Four Horned Antelope** (2008).
N.K. Nighot , R. V. Jadhav and Kazveen Umrigar
National seminar on advance in Zoo and Management and Disease of Wild animals.20-21th
June 2008.KVFSU, Hebbal Bengaluru.
- 5) **Chronic recurrent acidity in yellow Indian tiger (*Panthera tigris*)** (2008)
More B. K, R. V. Jadhav, G. Vijay Kant, C. S. Mote, D. K. Bodre, S. N . Kadam & S. V. Rahane
International Symposium of IAVP 10-12 Nov.2008. IVRI. Izzatnagar.
- 6) **Evaluation of Deworming programme in captive Wild Animal** (2008).
S.N Nevase, N.V. Khade, A. J. Pawar, G. Vijay Kanth and N .K. Nighot
XXX National Congress of Veterinary Parasitology. Nov 18-20/2008.
College of Vet. Science,Ludhiana.
- 7) **Suggested Effective strategy for deworming in zoo Animals** (2009).
S.N Nevase, N.V. Khade, A. J. Pawar, M. D. Kulkarni & N. K. Nighot
IX Indian Veterinary Congress, XVI Annual Conference of IAAVR, 20– 21 / Feb 2009.
Bombay Veterinary College, Bombay.
- 8) **Prevalence of normal intestinal microflora in captive wildlife in Katraj Zoo.** (2009)
N.V. Khade, S.N Nevase, A. J. Pawar, M. D. Kulkarni & N. K. Nighot
IX Indian Veterinary Congress, XVI Annual Conference of IAAVR, 20-21/Feb 2009.
Bombay Veterinary College, Bombay.

Paper on -

- 1) **Squamous Cell Carcinoma in Royal Bengal Tiger (*Panthera tigris*)**
- 2) **Successful treatment of Fasciola infection in Indian Elephant (*Elephas maximus*).**

are pending to be published.

Appendix 12.-

Questionnaire for visitors and school teachers to understand the role of Rajiv Gandhi Zoo.

A study of visitors to the Rajiv Gandhi Zoo in 1999 showed that 38% of responders visited the zoo solely as a source of entertainment and thrill of seeing 'glamour' species. They wanted an enjoyable visit without hassles or tensions as a place for a picnic. However 46% wanted a close interaction with the animal world, which they valued as an opportunity.

There were 14% who gave varied responses that included botanical studies, passing time in a scenic environment and experiencing nature.

There were 30% of responders who wanted alterations in the signages. They wanted to know more about the habitat, distribution, feeding behaviour, habitats and peculiarities of each species.

Several visitors wished to see more species, especially exotic glamour species. A greater degree of cleanliness, better seating arrangements and security measures were mentioned as desirable changes.

There were 36% of responders who felt the cages could be cleaner and wanted more frequent garbage disposal, while 24% wanted to have cleaner seating. There were 96% of visitors who felt that security was not an issue. As many as 92% of visitors felt that conserving and protecting species was important but did not directly refer to the zoo as a conservation tool.

The reasons for threats to wildlife were given as being related to pollution, deforestation, poaching and hunting. The perception in 58% of responders was that the zoo is a place where animals are only kept for viewing in captivity. Only 4% felt that the zoo is an educational center.

School teachers were accessed through a questionnaire on the role of zoos. They had teaching experience ranging from 2 to 20 years. The majority taught Geography and English with other subjects as class teachers.

Among those interviewed, 41% said zoos were created to cage animals, 23% said zoos provide an opportunity to see animals as a part of relaxation, 17% felt it is a recreational facility, while 41% felt that it played a role in education.

However, only 17% had taken students to the zoo but a majority felt it is a worthwhile activity but is difficult to implement for a variety of reasons.

Over the last decade there has been no change in the community perception of the role of the zoo. The zoo is now in the process of changing this ingrained perception by organizing a major education and awareness initiative.

A review of visitor profiling has been done in 2009 by the recently appointed Zoo Education Officer which provides the bases for designing the future educations and awareness drive.

Appendix – 13

DUTIES OF DIFFERENT FRONT LINE STAFF OF RAJIV GANDHI ZOOLOGICAL PARK

IV. Accountant (Bill Clerk) at PMC

- 1) To handle finance and account matter of both Plan and Non Plan, budget estimates and to scrutinize flow of recurring and non-recurring expenditure as well as miscellaneous expenditure.
- 2) To check cash book, contingencies, cash ledger, vouchers and review the progress of expenditure against sanctioned grants and to ensure booking of all expenditure and preparation of balance sheet as per the rules.
- 3) To check and prepare bills of salaries, D.A., advances, T.A. claims, LTC, Public and civil works, vehicle fuel, animal diets, material and supplies and to ensure regular Income Tax deduction of the employees.
- 4) To ensure submission of timely statements and revenue earned and expenditure incurred.
- 5) To keep Zoo Cash and other valuables in safe custody in accordance with the Cash Book.
- 6) To make payments on passed bills and receive payments against receipts.
- 7) To process past vouchers and place them before audit for checking.
- 8) To fetch cash from bank and deposit revenue in the bank regularly
- 9) Preparation of all cheques and entries of pay and accounts.
- 10) To issue admission tickets to ticket clerk and maintain all their relevant records.

V. Office Clerk

1. To process matters of advertisements, incidents, honorarium, awards, fees, vigilance, disciplinary action etc.
2. To take action to invite tenders for diet articles, medicines, stationers, hardware items and civil works etc. well in advance for the commencing financial year and their finalization.
3. To ensure timely preparation and submit all annual returns.
4. To supervise and guide the subordinate staffs of Director's personal section.
5. Taking dictation from the Director.
6. To maintain confidential files, service records and other relevant correspondences of the Directors personal section.
7. To maintain records of the movements of all the important files and papers.
8. To record the proceedings of the meetings and draft preparations for the necessary Issue.
9. To attend telephonic calls, receive visitors and employees and guide them to solve

their genuine problems and arrange meeting with the director.

- 10 Arrange maintenance of computer system, telephone net works and photo copy machine in the Zoological Park.
11. To maintain all the correspondences pertaining to various meetings about management works.
- 12 To arrange various meetings and programmes to be conducted in the zoo.
13. Management and maintenance of auditorium/conference hall and visitors room.
14. To receive and check quantity of animal diet articles and other rations from the contractors, its proper storage and timely distribution.

IX. Curator (Animals)

- 1) To supervise the cleanliness and maintenance work of the animal enclosures, cages and surroundings.
- 2) To ensure daily supply of ration and water to the animals and submit regular ration requisitions according to the need.
- 3) To record and report daily on health, breeding and feeding conditions of the animals and birds. Taking all measures for their up keeping and breeding well.
- 4) To assist in capturing, crating and transportation of animals.
- 5) Liaison with Veterinary Section for health related problems and treatment of animals, Commissionary Section for proper and timely supply of animal diet and Estate (Maintenance) Section for repair of damaged enclosures, cages, etc.
- 6) To maintain records of all the live stock and inventories of the animals.
- 7) To plan and design the construction and modification of animal enclosures, houses, cages etc. and other infrastructure required in order to meet the physiological and biological needs of the animal species.
- 8) To take action for planned prospective breeding of the Zoo collection.
- 9) To deal with all the correspondences pertaining to animal exchange and ensure for safe transportation of the animals for the purpose.
- 10) To maintain stud books, history cards of various Zoo animals.
- 11) To ensure proper and safe storage of food items in the store.
- 12) To ensure maintenance of all the types of stock register, daily diet register, upto date.
- 13) To take action for timely distribution of the food and fodder from the store.
- 14) Overall supervision of zoo sanitation and hygiene i.e. cleaning of roads, footpaths, public conveniences etc.
- 15) To take measures for the pest control and to check stray dog entrance.
- 16) To maintain disposal of animal and vegetation waste materials.
- 17) To ensure proper maintenance of waste burning huts, bone houses and incinerator etc.

x. Live Stock Supervisor

- 1) Collection of specimens during Necropsy examination and their preparation for microbiological and pathological laboratory examinations.
- 2) To assist the Veterinary Officer in taking x-ray radiographs of asick animals. Develop x-ray films, chemicals, cassettes and maintenance of their stock properly.
- 3) To requisite x-ray films, chemicals, cassettes and maintenance of their stock properly.
- 4) To maintain radiographic lab and x ray machine, endoscope etc in working condition.
- 5) To arrange requisition for handling and operating medical cases.
- 6) To assist Veterinary doctor in day to day treatment/dressings and management of surgical and gynecological cases.
- 7) To maintain stock of medicine and equipments in Zoo hospital.
- 8) To maintain feeding records of in-door patients.

XI. Head Animal Keeper

- 1) To supervise timely cleanliness of enclosures, cages, removal of animal waste and undesired vegetation from enclosures/cages
- 2) To arrange shelters, perching materials, tree logs and branches required for protection from natural vagaries and species biological needs.
- 3) To ensure prompt repair of the damaged enclosures, cages, structures etc.
- 4) To ensure that no foreign material remains in the animal vicinity.
- 5) To ensure all doors and gates of enclosures and cages are securely fastened and locked to prevent escape of the zoo animals.
- 6) To ensure all doors. Latches and pulley are well lubricated for smooth and easy functions.
- 7) To assist the Curator (Animals) in smooth functioning of the animal section and in his absence.
- 8) Issue keys of the animal houses every morning and collect at the end of the day and place at the secure places for the night.
- 9) Any other assigned by the seniors.

XII. Ticket Clerk:

- 1) To issue gate entry tickets, car entry tickets, guide books, maps etc. and deposit of all the revenue with the account section.
- 2) To complete and maintain all the relevant records and submit to the accounts for verification and signing.
- 3) Any dispute with the visitors at the gate to be brought to the notice of the Director, Deputy or Estate Officer.

XII. Driver:

- 1) Operation of Zoo Vehicle and undertaking its petty maintenance works.
- 2) Maintenance of vehicle trolley.
- 3) Maintaining log book.
- 4) Any other work assigned by the supervisors.

XIII Zoo Keepers

- 1) To clean regularly the animal night shelters/houses/kraals/enclosures of animals wastes, leftout food and undesirable objects etc.regular cleaning of water troughs.
- 2) To ensure timely feeding and watering of animals.
- 3) To report to the superiors about the health condition, heat, mating, breeding and feeding condition and other observations immediately.
- 4) To report to the superior-any damage to the enclosures, cages, structures etc for immediate repair.
- 5) To remove all the foreign materials from the animal enclosures.
- 6) To assist in capture, crating and shifting of live animals as and when required and to take dead animals to hospital /post mortem room for PM examination.
- 7) To protect the animals from teasing and vandalism, damage to enclosures and signboards fittings and to ensure security of the zoo and its inmates.
- 8) To check and ensure proper locking of the enclosures/cages/houses atleast half an hour before the zoo is closed.
- 9) Any other duty assigned by the Supervisor.

XIV. Watchman/ Chowkidar

- 1) To watch over and guide the Zoo properly
- 2) To assist the animal and garden section staffs in curbing vandalism and preventing any undesired activities in the Zoo premises.
- 3) To check public vehicles entering into the Zoological Park and to regulate the movement of visitors at the time of heavy rush
- 4) To maintain and enforce security of the zoo premises in the duty areas and in the event of any untoward happenings report to higher authority about the same.
- 5) To report all the lost and found properties to the Superiors.
- 6) Any other duty assisted by the superiors.

XV. Mali

- 1) To maintain lawns and gardens of the Zoo by regular watering, fertilizing, hoeing, weeding and cutting grasses.
- 2) To plant shrubs, herbs, hedges, trees and other adornments on the lawns and grounds.
- 3) To raise and maintain plant nursery for replenishing plants and tree collection of zoo premises.
- 4) To do timely weeding, looping and pruning of undesired vegetation and suitable use of disposed and decaying vegetation, fallen dead trees and plants.
- 5) To clean the wastes left by the visitors in the lawn.
- 6) To report to supervisors and control spoiling and damaging of lawns and grounds by the visiting public.
- 7) To ensure up-keep of nursery required for plantation, propagation of trees, shrubs, herbs, climbers, hedges etc. in the entire zoo.
- 8) Any other duty assigned by the Horticultural supervisor.

XVI. Office Peon

- 1) Maintain all files in safe custody in the record room.
- 2) Making available files as and when required.
- 3) Weeding and dusting of files.
- 4) To lift the files in the administration section.
- 5) Dusting and weeding, delivery of letters and assisting the officials and staffs in their day to day work.

XVII. Sweepers

- 1) Swipping /cleaning of all the buildings/roads, footpaths, trails on daily basis.
- 2) Removing and dumping and ultimately disposal/ burning of garbage/waste in the burning sheds. Maintenance of burning sheds. Maintenance and emptying of dust bins.
- 3) Maintenance of public toilets.
- 4) Maintenance of bone houses.
- 5) Any other work assigned by the supervisors

Daily Registers to be maintained:

- 1) Daily Report Register
- 2) Stock Register
- 3) Inventory of animals
- 4) births and deaths
- 5) Health status register – Treatment Register
- 6) Endangered species
- 7) Daily diet register
- 8) Annual maintenance register with expenditure/ annual maintenance and maintenance of enclosure, maintenance of contract of equipments.
- 9) Untoward incidents register with reasons and action taken reports.
- 10) Minute book of Zoo Advisory Board.
- 11) Accident and disaster register.
- 12) Security register.
- 13) Visitor's complaint book.

Appendix 14

List of selected indigenous trees and shrubs

Trees:

NO	Scientific name	Common name	Nursery	Remarks/Use
1	<i>Bauhinia racemosa</i>	Apta	S.F	slpoes
2	<i>Bombax malabaricum</i>	kate sawar		Roadside, Forest Food
3	<i>Butea monosperma</i>	Palas	Empress garden	Roadside, Forest Food
4	<i>caryato urens</i>	Bherali maad	Empress garden	Roadside, Forest Food
5	<i>cassia fistula</i>	Bahava	Empress garden	Roadside, Forest Food
6	<i>Crataeva adansonii</i>	Waiwarna		Forest Food
7	<i>Dalbergia sisoo</i>	Sisoo	Empress garden	Roadside, steep slopes
8	<i>Ficus racemosa</i>	Umber	Empress garden	Roadside, Ponds
9	<i>Gardenia lucida</i>	Kokam	Gokhale	Roadside
10	<i>Lagerstromia flos-reginae</i>	Dikemali	Gokhale	Medicinal, Slopes
11	<i>Lagerstromia microcarpa</i>	Taman	Gokhale	Medicinal, Slopes
12	<i>Madhuca latifolia</i>	Nana	Gokhale	Medicinal, Slopes
13	<i>Mammea suriga</i>	Moha	Empress garden	Roadside
14	<i>Mangifera indica</i>	Surangi	Empress garden	Roadside
15	<i>Mappia foetida</i>	Amba	Empress garden	Roadside, slopes
16	<i>Michelia champaca</i>	Narakya/Ranwanga	S.F	Slopes
17	<i>Mimusops elengi</i>	Chapha	Empress garden	Slopes
18	<i>Mitragyna parviflora</i>	Bakul	Empress garden	Slopes
19	<i>Nycatanthes arbortristis</i>	Kalam	Empress garden	Roadside
20	<i>Phyllanthus emblica</i>	Prajakta	Empress garden	Slopes
21	<i>Pongamia pinnata</i>	Awala	S.F	Roadside, Slopes
22	<i>Pterocarpous marsupium</i>	Karanj	Empress garden	Roadside
23	<i>Sapindus laurifolius</i>	Bija	S.F	Roadside
24	<i>Saraca indica</i>	Ritha	S.F	Roadside
25	<i>Semecarpus anacardium</i>	Sitecha ashok	S.F	Slopes
26	<i>Syzygium cuminii</i>	Biiba	S.F	Slopes
27	<i>Terminalia belerica</i>	Jambhul	Empress garden	Slopes
28	<i>Terminalia chebula</i>	Yela/Behada	S.F	Slopes
29	<i>Terminalia paniculata</i>	Hirada	S.F	Slopes, Roadside

List of selected indigenous trees and shrubs

NO	Scientific name	Common name	Nursery	Remarks/Use		
1	<i>Acacia concinna</i>	Shikekai	Gokhale	Medicinal, Slopes		
2	<i>Adhathaoda vasica</i>	Adulasa	Gokhale	Hedges, Medicinal		
3	<i>Asparagus racemosus</i>	Shatawari	Gokhale	Medicinal, Slopes		
4	<i>Carvia callosa</i>	Karwi	S.F	Garden		
5	<i>Clerodendrum serratum</i>	Bharangi	Gokhale	Garden		
6	<i>Colebrookea oppositifolia</i>	Bamani	Gokhale	Garden		
7	<i>Crotolaria retusa</i>	Dingala	Gokhale	Garden		
8	<i>Elaeagnus latifolia</i>	Ambulaki	S.F	Garden		
9	<i>Gymnema sylvestre</i>	Kawali	S.F	Garden		
10	<i>Gymnosporia roadiana</i>	Dhauti	Gokhale	Slopes		
11	<i>Helisteres isora</i>	Murud sheng	S.F	Medicinal, Slopes		
12	<i>Holarrhena pubescens</i>	Pandhara kuda	Empress garden	Forest food		
13	<i>Jasminum auriculatum</i>	Jui	Empress garden	Garden		
14	<i>Jasminum calophyllum</i>	Sayali	Empress garden	Garden		
15	<i>Jasminum grandiflorum</i>	Jai	Gokhale	Garden		
16	<i>Jasminum malabaricum</i>	Kusar	Empress garden	Garden		
17	<i>Jasminum officinale</i>	Chameli	Empress garden	Garden		
18	<i>Jasminum pubescens</i>	Kunda	Gokhale	Garden		
19	<i>Lawsonia alba</i>	Mendi	Empress garden	Hedges		
20	<i>Murraya koenigii</i>	Kadhipatta	Gokhale	Forest food		
21	<i>Pavatta indica</i>	Phapat	Gokhale	Forest food		
22	<i>Piper nigrum</i>	Miri wel	Gokhale	Forest food		
23	<i>Vitex nigundo</i>	Nirgudi	Gokhale	Medicinal, food plant for butterflies		
24	<i>Woodfordia fruticosa</i>	Dhayati	Gokhale	Forest food		

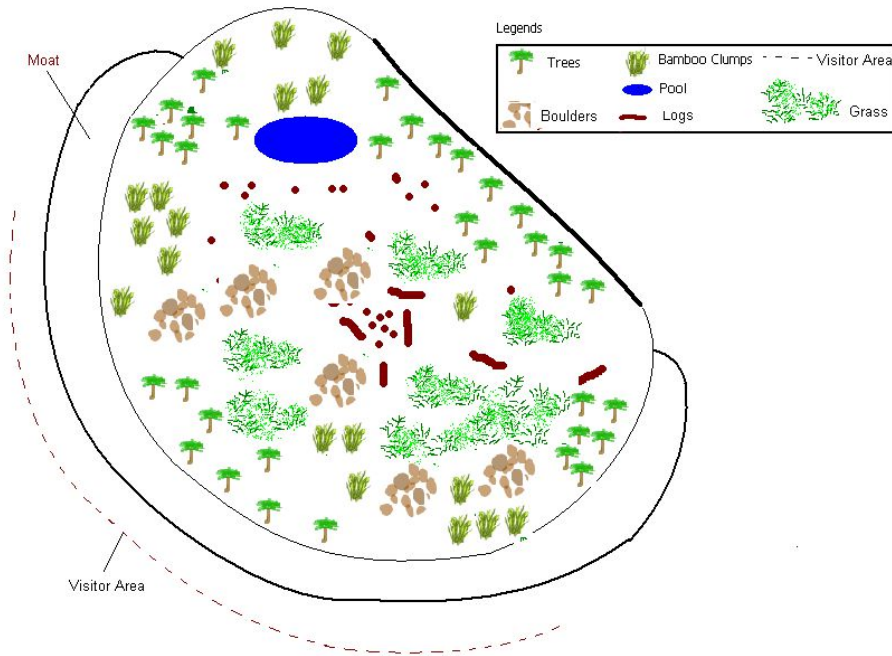
Herbs and Grasses:

NO	Scientific name	Common name	Nursery	Remarks/Use
1	<i>Acorus calamus</i>	Wekhanda	Gokhale	Medicinal, Ponds
2	<i>Bambusa arundinacea</i>	Bamboo	S.F	Slopes
3	<i>Calamus rotang</i>	Vet	S.F	Slopes
4	<i>Celosia argentia</i>	Kurdu	S.F	Forest food
5	<i>Cymbopogon citratus</i>	Gawati chaha	Gokhale	Medicinal, Forest food, Gardens

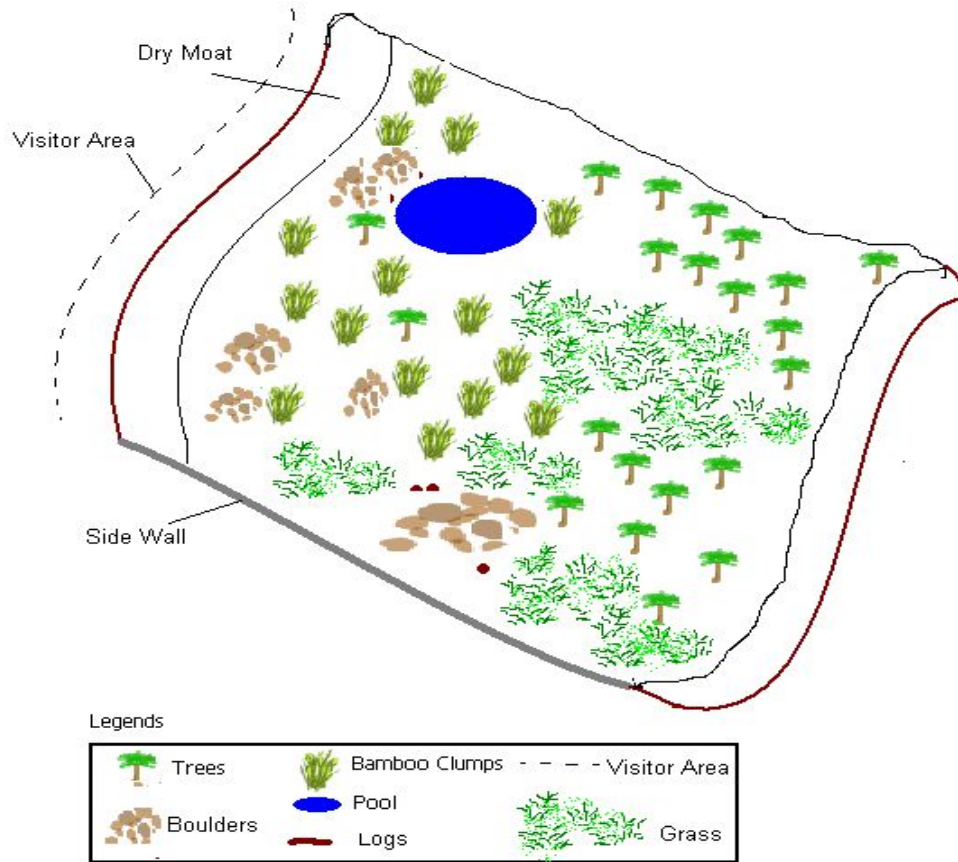
Appendix 15

Moat and drawing of each animal enclosure

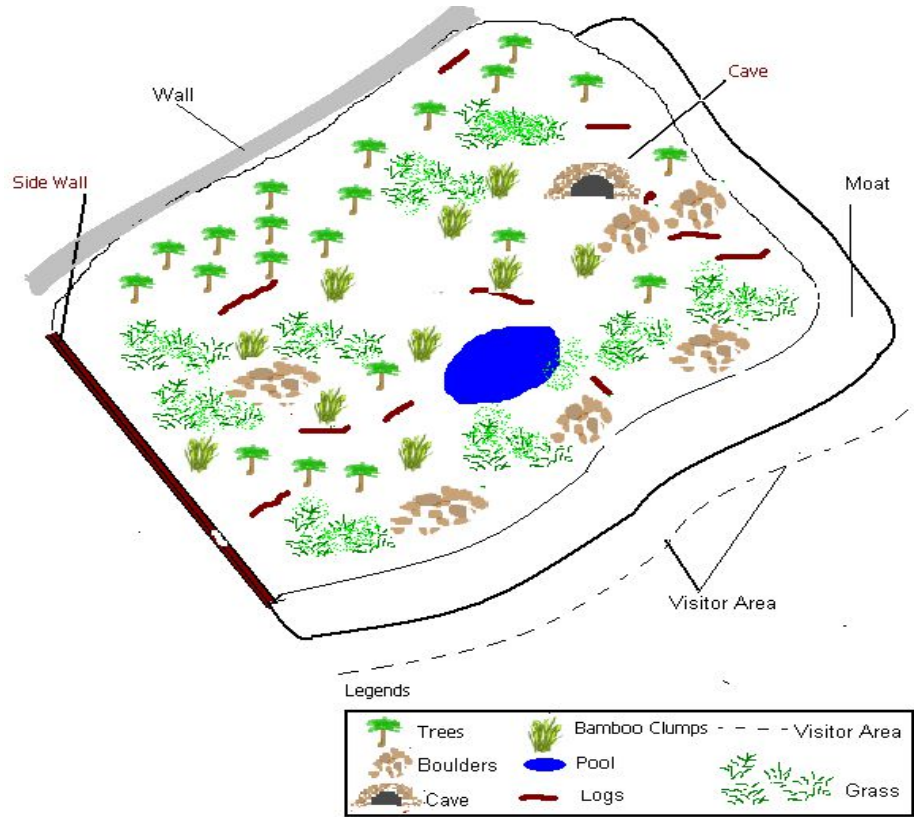
Bear enclosure



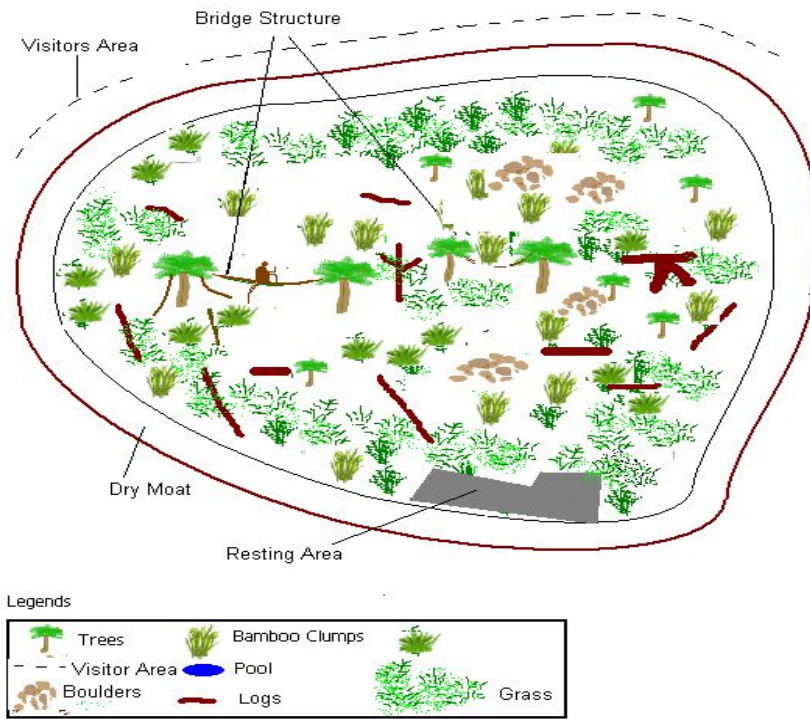
1) White tiger enclosure



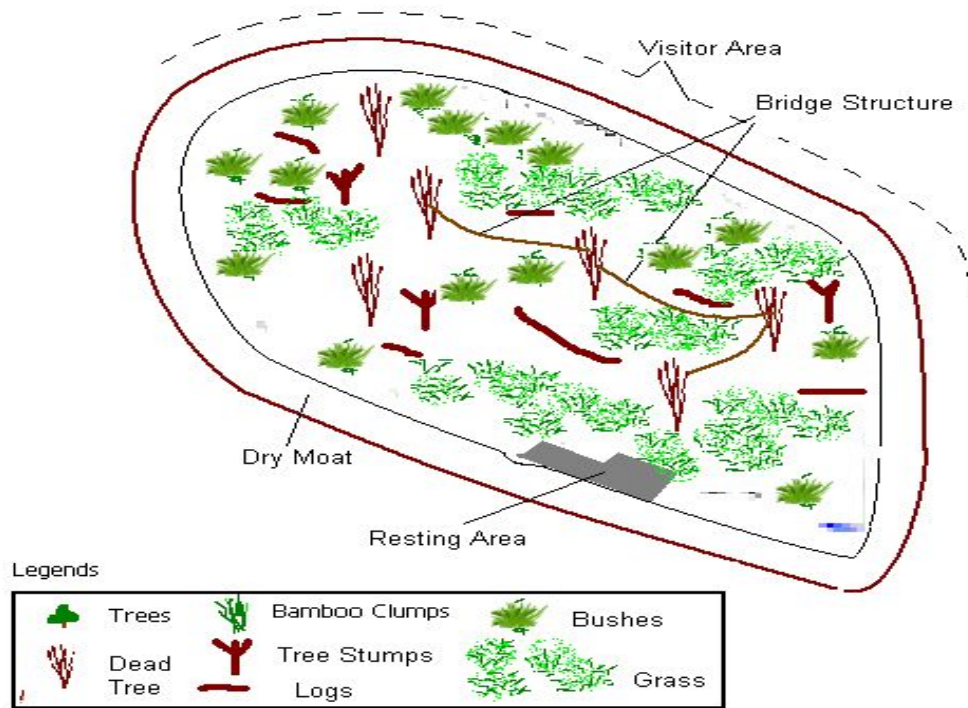
2) Bengal tiger enclosure



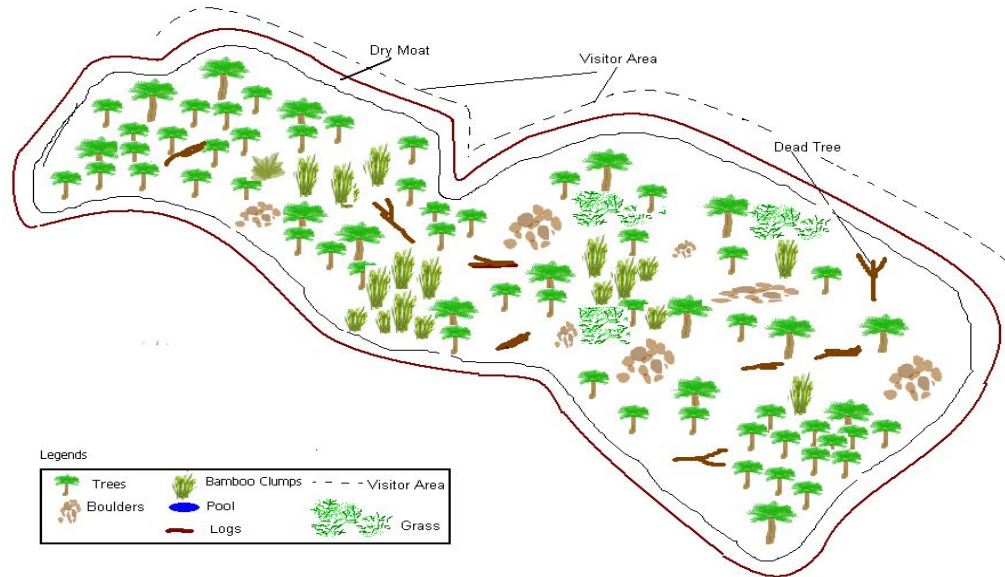
3) Rhesus enclosure



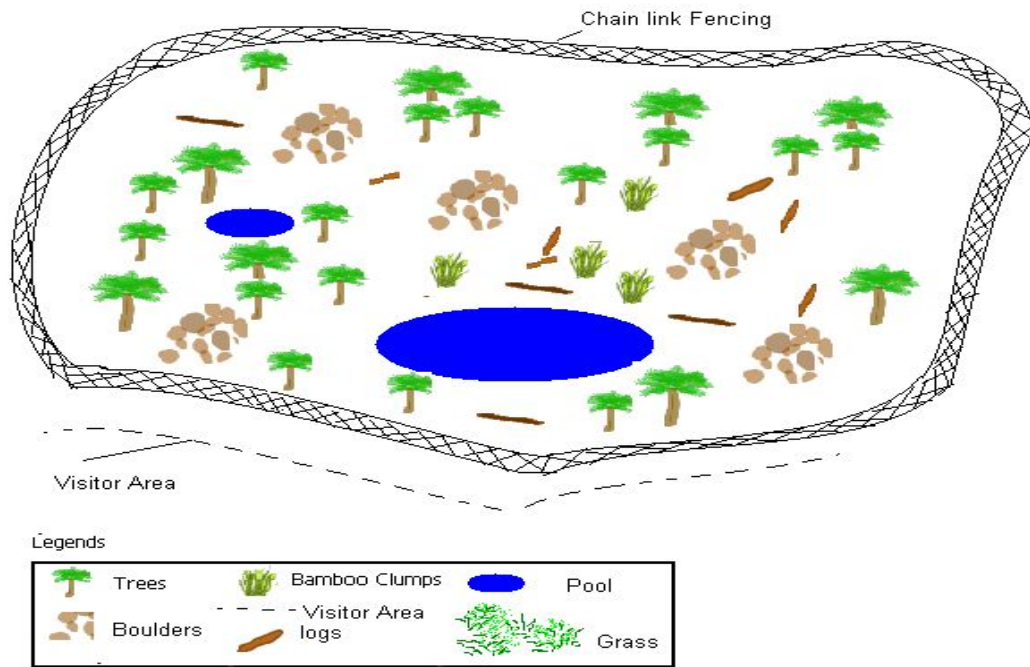
4) Bonnet macaque enclosure



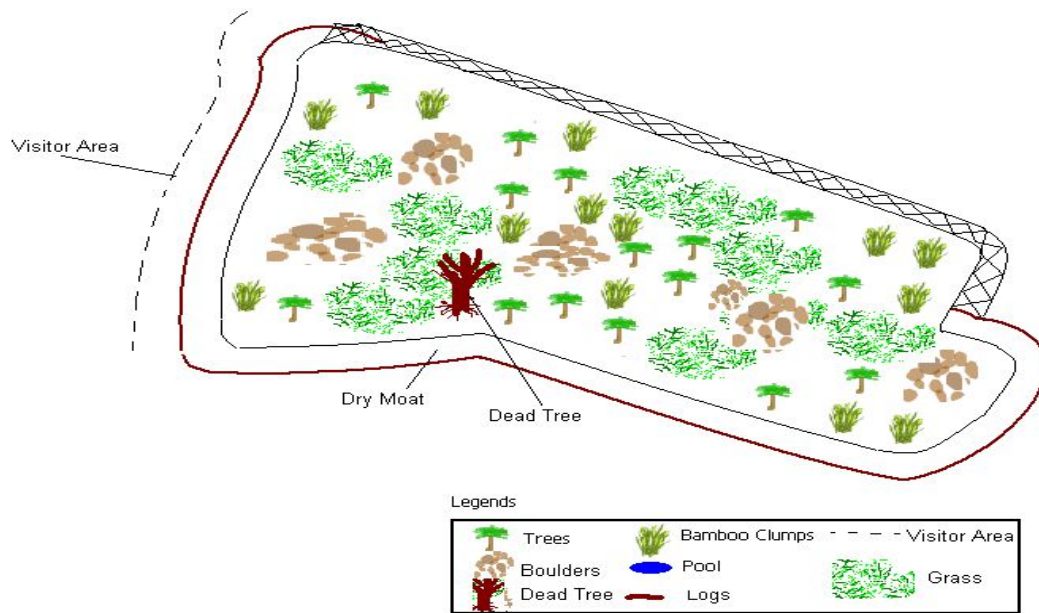
5) Elephant enclosure



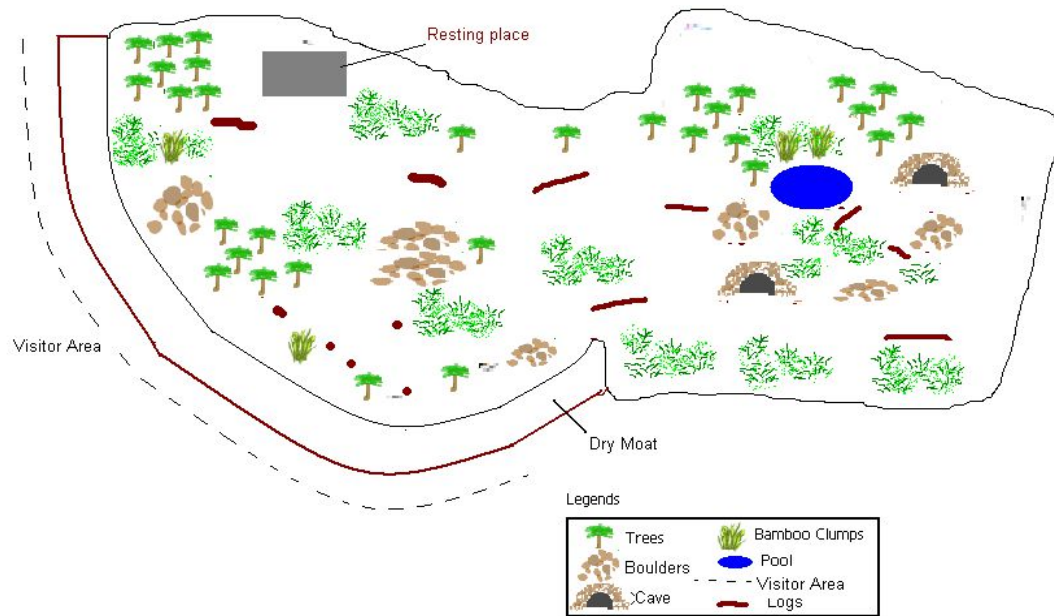
6) Leopard enclosure



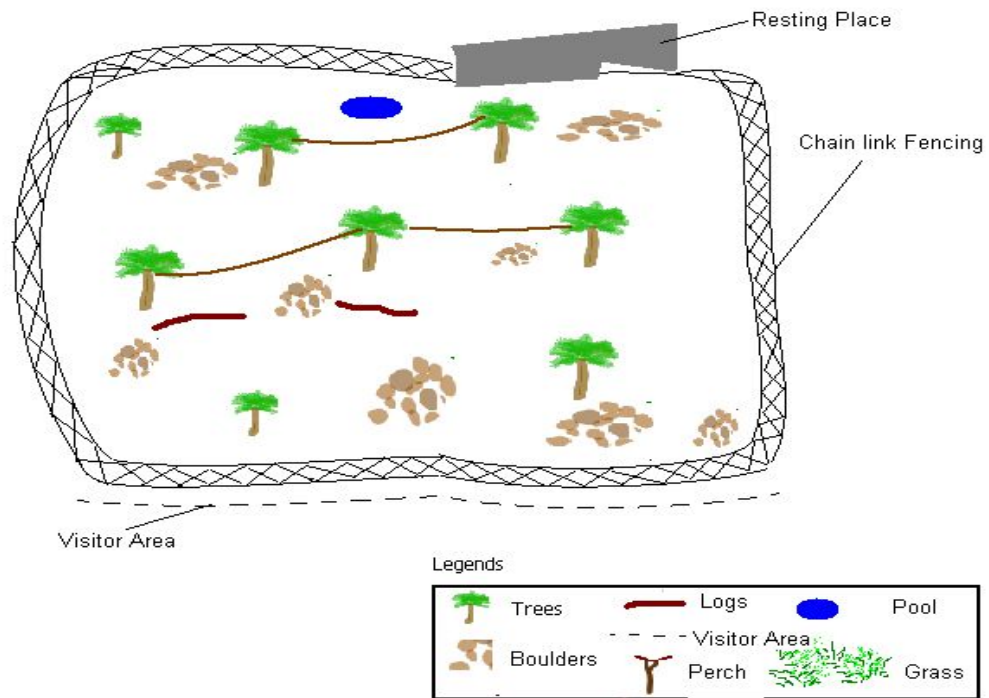
7) Jackal enclosure



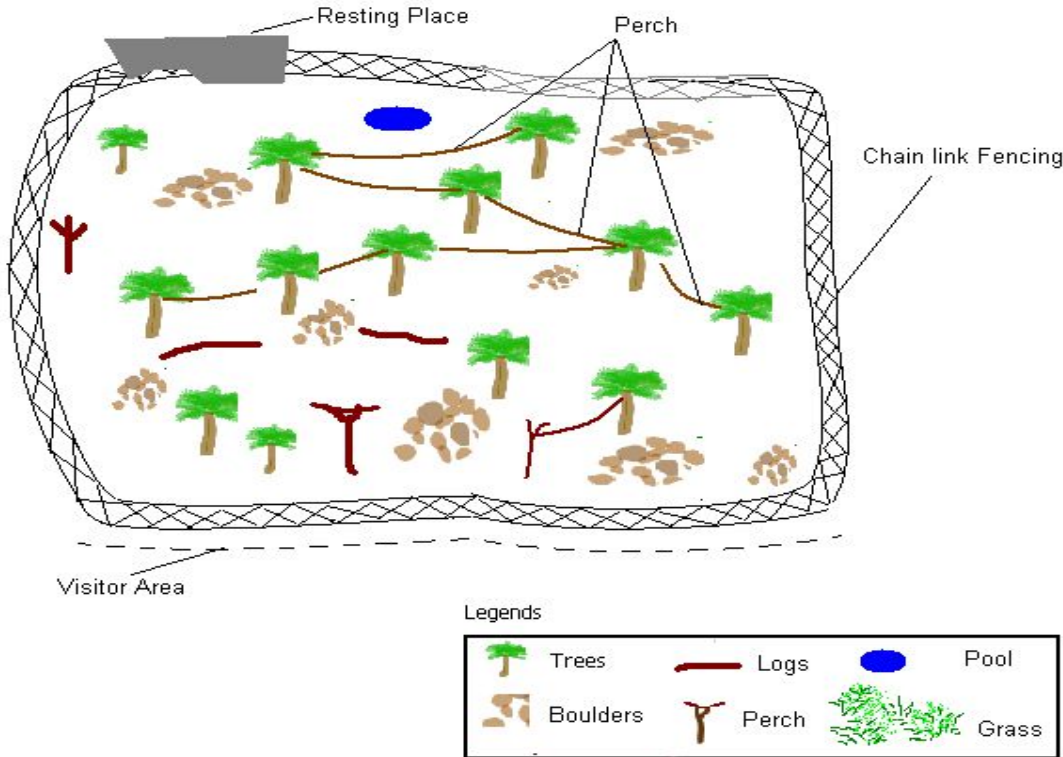
8) Wolf enclosure



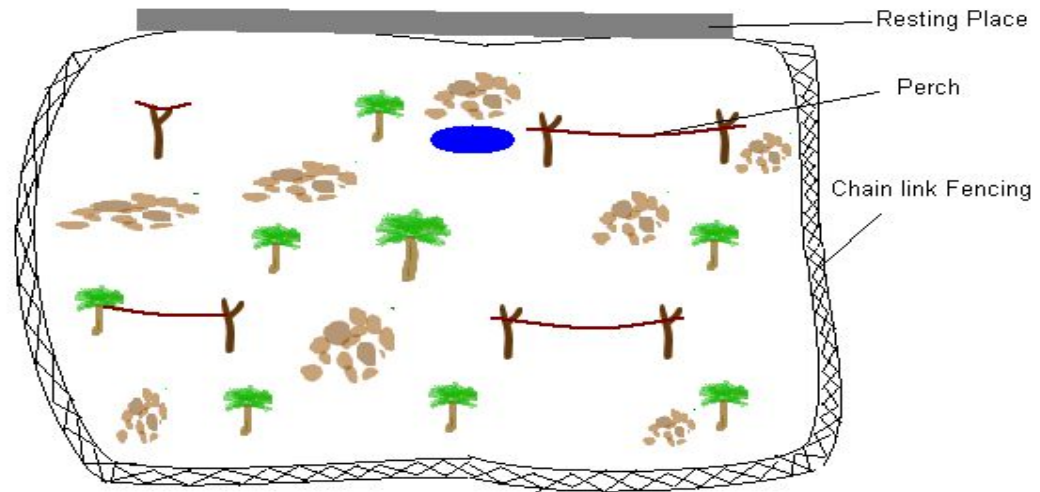
9) Vulture enclosure



10) Eagle enclosure



11) Peafowl enclosure

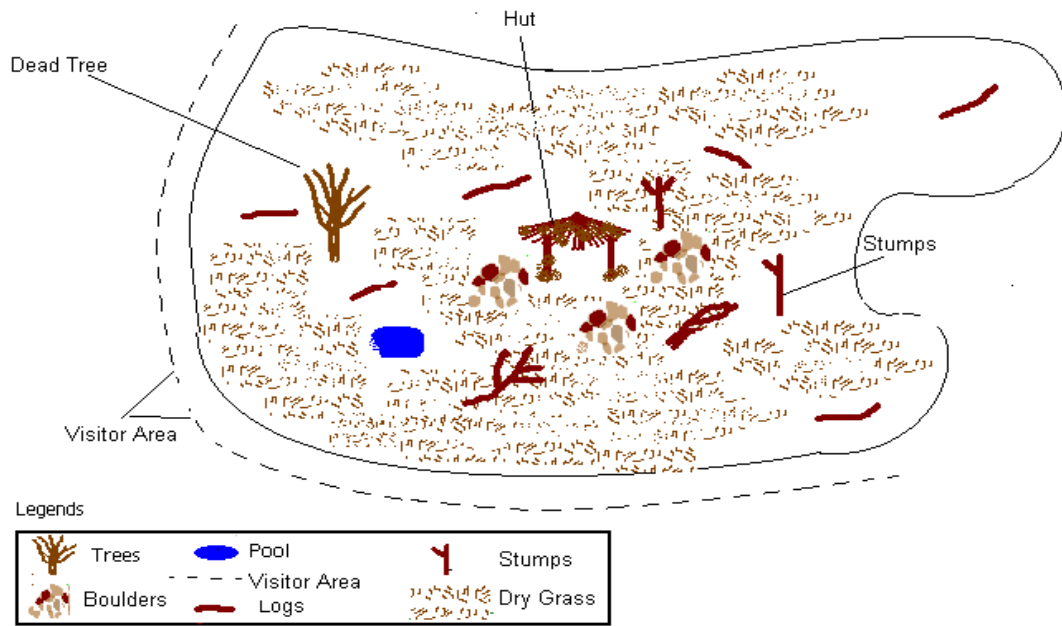


Legends

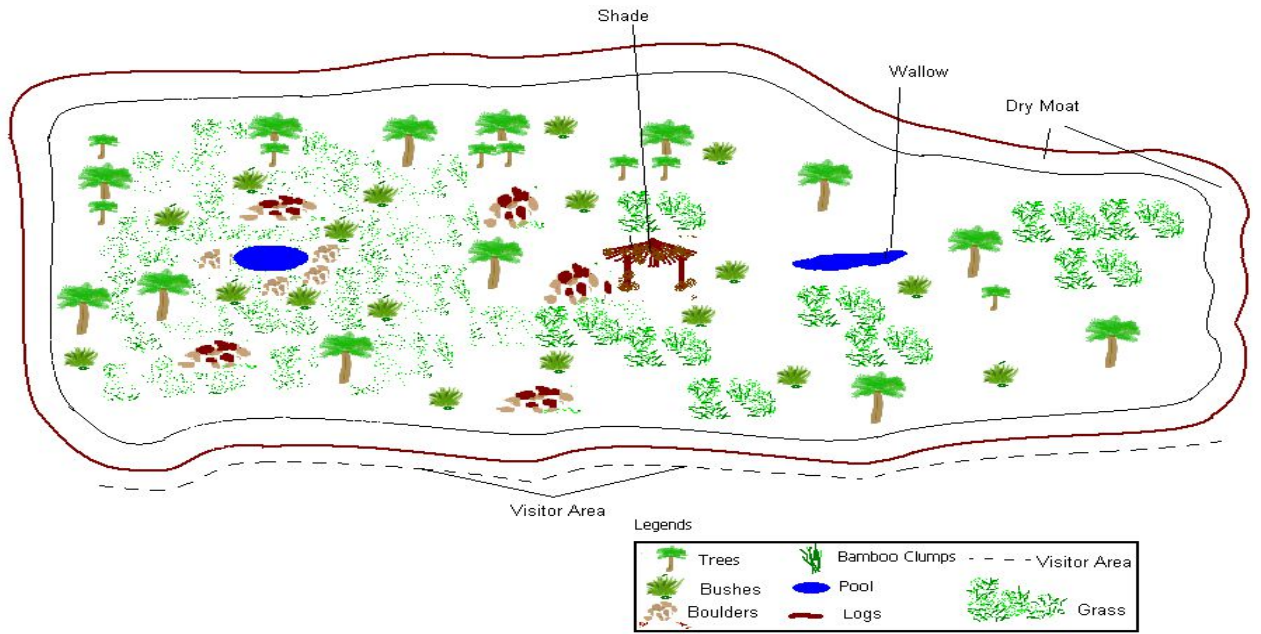
	Trees		Bamboo Clumps		Pool
	Boulders		Perch		Grass
			Visitor Area		



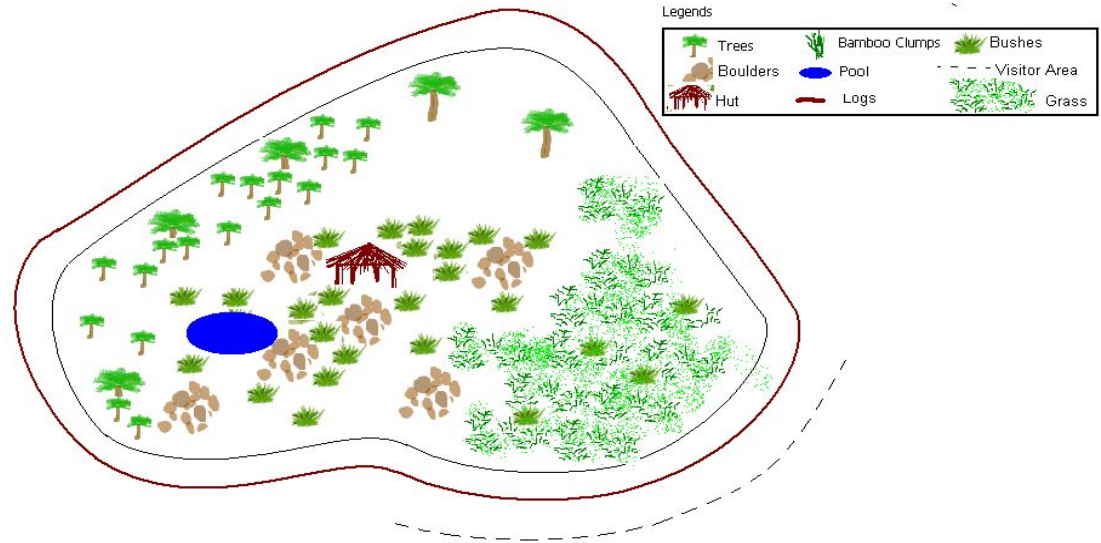
12) Porcupine enclosure



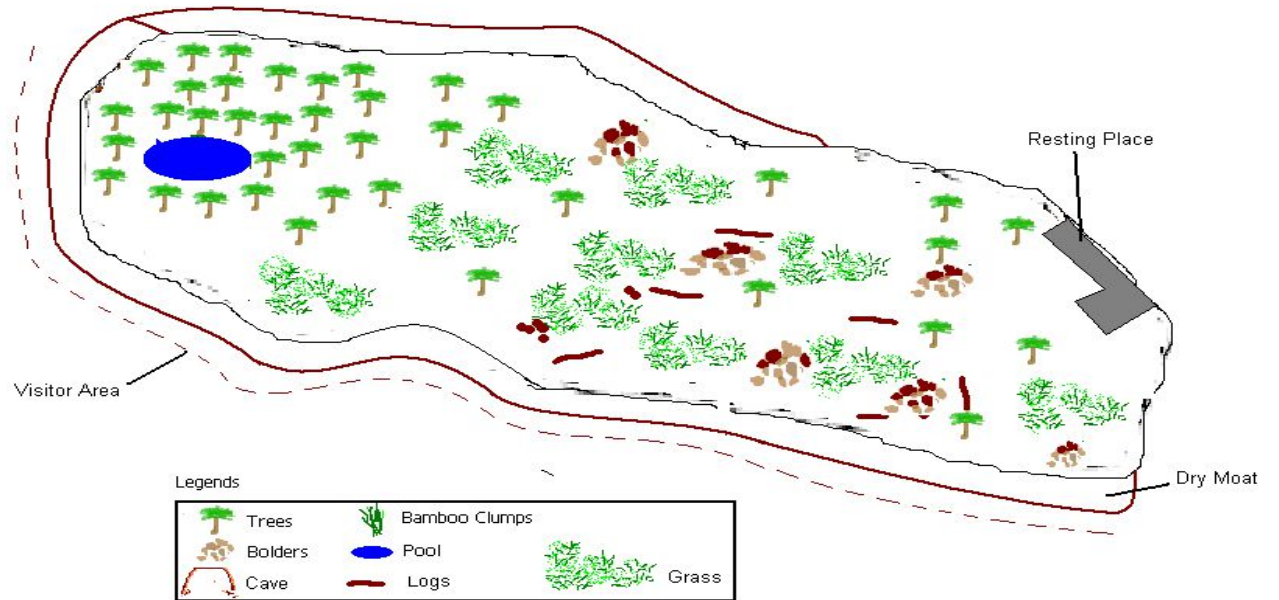
14) Sambar enclosure



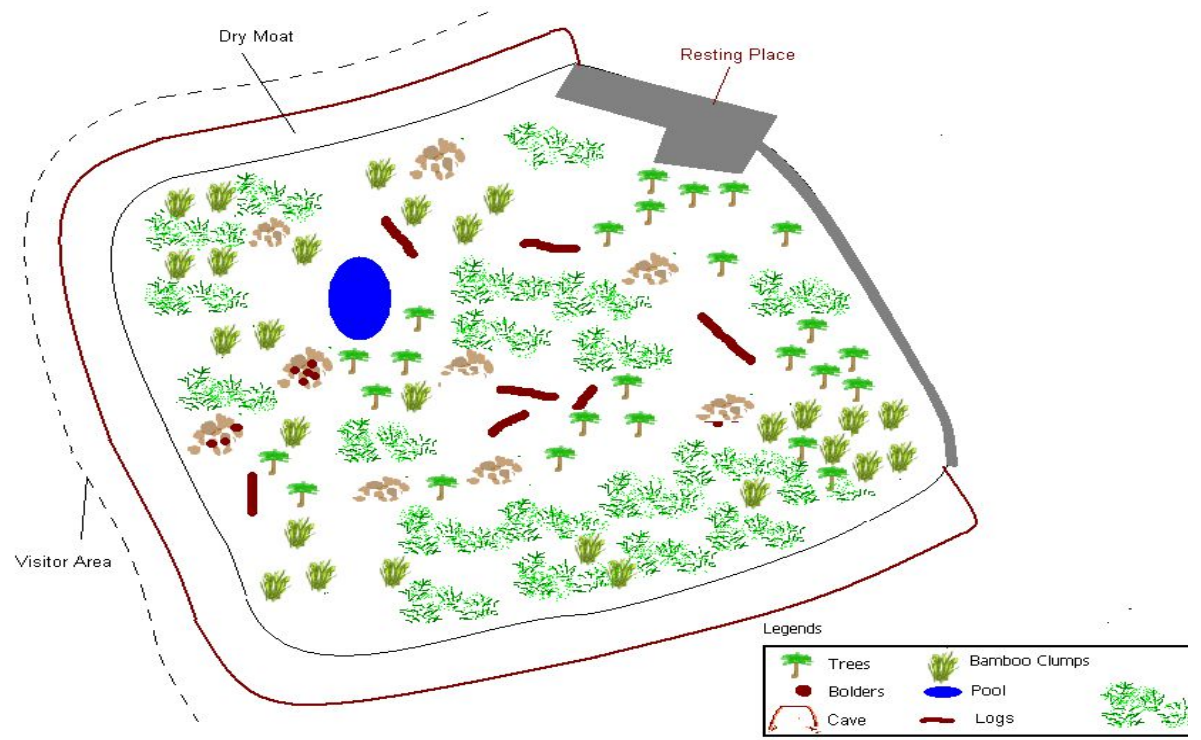
15) Spotted deer enclosure



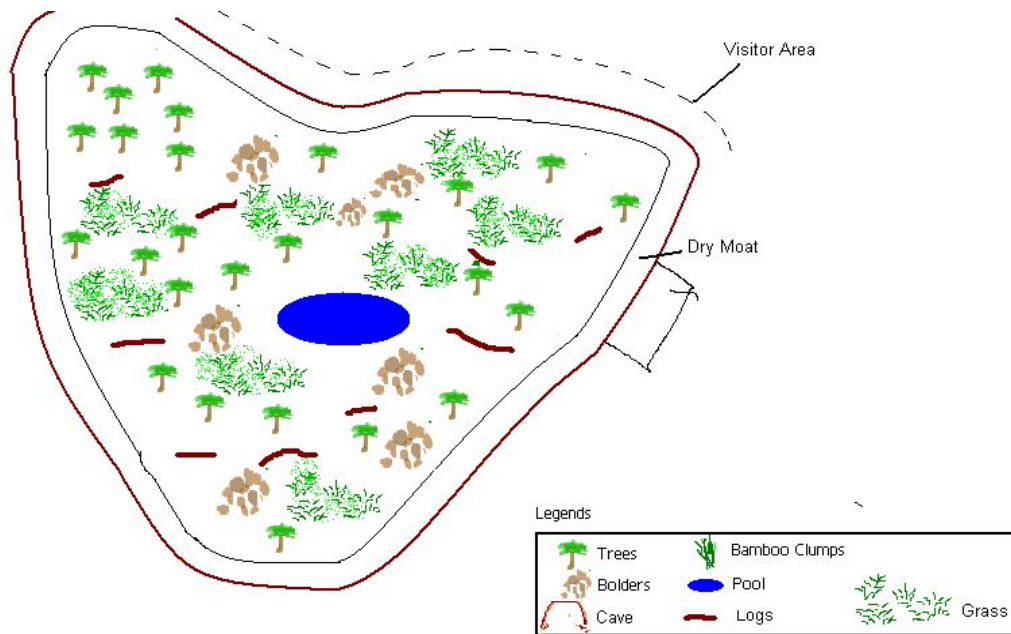
16) Black buck enclosure



17) Four horned antelope and Blue bull enclosure



18) Chinkara enclosure



Appendix- 16

The names & species of Butterflies that will be breeding in the netted enclosures built for them in the Park .

Family - Papilionidae (Swallowtails)

S.No	Colloquial Name	Scientific name
1	Common Rose	<i>Pachliopta Aristolochiae Fabricius</i>
2	Tailed Jay	<i>Graphium Agamemnon Linnaeus</i>
3	Lime Butterfly	<i>Papilio Demolens Linnaeus</i>
4	Common Mormon	<i>Papilio Polytes Linnaeus</i>

Family - Pieridae (Whites or Yellows)

S.No	Colloquial Name	Scientific name
5	Common Emigrant	<i>Catopsilia Pomona Fabricius</i>
6	Mottled Emigrant	<i>Catopsilia Pyranthe Linnaeus</i>
7	Common Jezebel	<i>Delias Drury Eucharis</i>

Family - Nymphalidae (Brush-footed butterflies)

S.No	Colloquial Name	Scientific name
8	Tawny Coster	<i>Acraea Viola Fabricius</i>
9	Common Leopard	<i>Phalanta Phalantha Drury</i>
10	Common Castor	<i>Ariadne Merione Cramer</i>
11	Lemon Pansy	<i>Junonia Lemonias Linnaeus</i>
12	Plain Tiger	<i>Danaus Chrysippus Linnaeus</i>
13	Common Indian Crow	<i>Euploea Core Cramer</i>
14	Glassy Tiger	<i>Parantica Aglea Stoll</i>

Family - Lycaenidae (Blues)

S.No	Colloquial Name	Scientific name
15	Zebra Blue	<i>Leptotes Phinius Fabricius</i>
16	Red Pierrot	<i>Talicauda Nyseus</i>

Family - Hesperidae (Skippers)

S.No	Colloquial Name	Scientific name
17	Spotted Flat	<i>Celaenorrhinus Leucocera Kollar</i>
18	Grass Demon	<i>Udaspes Folus Cramer</i>

List of species of butterflies that will be free in the butterfly garden

Sr. No.	Common name of butterfly	Scientific name of butterfly
1	Common rose	<i>Pachilocta aristolochiae</i>
2	Common mime	<i>Chilasa clytia</i>
3	Crimson rose	<i>Pachilocta hector</i>
4	Lemon butterfly	<i>Papilio demoleus</i>
5	Common mormon	<i>Papilio polytus</i>
6	Common bluebottle	<i>Graphium sarpedon</i>
7	Tailed jay	<i>Graphium agamemnon</i>
8	Common jezebel	<i>Delias eucharis</i>
9	Blue mormon	<i>Papilio polymnca</i>
10	Indian cabbage white	<i>Pieris canidia</i>
11	Common gull	<i>Cepora nerissa</i>
12	Common / Lemon emigrant	<i>Catopsilia pomona</i>
13	Common grass yellow	<i>Eurema hecabe</i>
14	Common pierrot	<i>Castalium rosimon</i>
15	Zebra blue	<i>Syntarucus plinius</i>
16	Pale grass blue	<i>Pseudozizeeria maha</i>
17	Lime blue	<i>Chilades laius</i>
18	Gram blue	<i>Euchrysops cnejus</i>
19	Red pierrot	<i>Talicauda nyseus</i>
20	Plain tiger	<i>Danaus chrysippus</i>
21	Blue tiger	<i>Tirumala linniae</i>
22	Glassy tiger	<i>Parantica aglea</i>
23	Common Indian crow	<i>Euploea core</i>
24	Common evening brown	<i>Melanitis leda</i>
25	Common / angled castor	<i>Ariadne ariadne</i>
26	Common leopard	<i>Phalanta phalanta</i>
27	Yellow pansy	<i>Junonia lemonius</i>
28	Chocolate pansy	<i>Junonia iphita</i>
29	Blue oakleaf	<i>Kallima horsefieldi</i>
30	Common sailor	<i>Neptis hylas</i>

31	Common baron	<i>Euthalia aconthea</i>
32	Twany coster	<i>Acraea terpicore</i>
33	Danaid eggfly	<i>Hypolimnas misippus</i>
34	Malabar spotted flat	<i>Celaenorrhinus ambareesa</i>

List of the flora existing in the butterfly garden

Sr. No.	Common / Scientific name
1	<i>Aristolochia indica,</i>
2	<i>Cinnamomum zeylanicum</i>
3	<i>Machilus sp.</i>
4	<i>Citrus sp.</i>
5	<i>Aegel marmelous</i>
6	<i>Murraya koenigi</i>
7	<i>Wild lime and oranges</i>
8	<i>Annona squamosa</i>
9	<i>Polyalthia longifolia</i>
10	<i>Michelia champaca</i>
11	<i>Dendrophthoe sp.</i>
12	<i>Brassica oleracea var. capitata</i>
13	<i>Capparis sp.</i>
14	<i>Cassia siamea</i>
15	<i>Cassia fistula</i>
16	<i>Butea monosperma</i>
17	<i>Bauhinia racemosa</i>
18	<i>Pithecellobium dulce</i>
19	<i>Albizzia sp.</i>
20	<i>Sesbania aculenata</i>
21	<i>Zizyphus mauritiana</i>
22	<i>Plumbago sp.</i>
23	<i>Karvi</i>
24	<i>Oxalis corniculata</i>
25	<i>Tephrosia sp.</i>
26	<i>Nelsonia sp.</i>
27	<i>Acacia sp.</i>

28	<i>Pisum sativum</i>
29	<i>Gram</i>
30	<i>Bryophyllum</i>
31	<i>Calotropis sp.</i>
32	<i>Ageratum conyzoides</i>
33	<i>Tylophora carnosa</i>
34	<i>Cryptolepis buchanani</i>
35	<i>Ceropegia sp.</i>
36	<i>Nerium sp.</i>
37	<i>Ficus religiosa</i>
38	<i>Ficus benghalensis</i>
39	<i>Ficus racemosa</i>
40	<i>Ficus elastica</i>
41	<i>Sandpaper tre</i>
42	<i>Oryza sativa</i>