ARIGNAR ANNA ZOOLOGICAL PARK
Tamilnadu Forest Department

MASTERPLAN

(2013- 2023)

ARIGNAR ANNA ZOOLOGICAL PARK,
TAMIL NADU FOREST DEPARTMENT, VANDALUR,
CHENNAI – 600 048.

OCTOBER 2013

TAMILNADU FOREST DEPARTMENT

This is to certify that the revised Master plan of Arignar Anna Zoological Park, Vandalur has been prepared and this final version has been approved by Central Zoo authority Ref.No F.No.19-79/92-CZA (238) (Vol.VII) (M)/3109 dated 27.06.2013.

Sl. No	Name	Designation	Signature
1	Thiru.Lakshmi Narayan,I.F.S.,	Principal Chief Conservator of Forests and Chief Wildlife Warden	
2	Thiru.K.S.S.V.P. Reddy, I.F.S.,	Chief Conservator of Forests & Director	

Principal Chief Chief Conservator of Forests& Chief Wildlife Warden, Tamil Nadu

Principal Chief Conservator of Forests
22 OCT 2013
Chennai-600 015.
& Chief Wild Life Warden

Chief Conservator of Forests & Director
Arignar Anna Zoological Park

21 OCT 2013

TAMILNADU FOREST DEPARTMENT

CERTIFICATE

This is to certify that the following officers working in Arignar Anna Zoological Park have been involved in the preparation of this revised master plan. I appreciate their combined effort.

Sl. No	Name	Designation	Signature
1	Thiru.K.S.S.V.P. Reddy, I.F.S.,	Chief Conservator of Forests & Director	
2	Dr.B.C.Archana Kalyani, I.F.S.,	Deputy Director	
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Member Secretary
Central Zoo Authority

Chief Conservator of Forests & Director
Arignar Anna Zoological Park

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

Master Plan of Arignar Anna Zoological Park, Vandalur, Chennai, Tamil Nadu is approved in the 66th Meeting of the Technical Committee of Central Zoo Authority held on 11th June, 2013 subject to the condition that the responsibility of mobilizing the financial resources for implementation of the Master Plan will be sole responsibility of the Forest Department of Government of Tamil Nadu.

26/10/2013

26/6/13

B.S. BONAL
Member Secretary
Central Zoo Authority
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Govt. of India, New Delhi

ARIGNAR ANNA ZOOLOGICAL PARK, VANDALUR, CHENNAI -48.

MASTERPLAN

PART I

CHAPTER-I

1. INTRODUCTION

Zoos are institutions of antiquity and have been changing their institutional philosophy and the modus operandi, to keep pace with the changes in the human perception about the wild animals and natural ecosystems forming part of their habitat. They had their origin as curiosity parks and with passage of time changed to menageries maintained to display to the visitors as many species of wild animals brought from various parts of the globe. They have continued to function in the similar fashion for most part of the history. During this entire era, the longevity of the animals and their welfare was not an area of priority. As such the acquisition of animals from the wild continued unabated.

During recent we have witnessed serious decline in the number of various species of wild animals due to ever increasing demand in the parts and products thereof and the destruction of the in-situ habitats supporting these species. This in turn has accentuated different climatic catastrophes and has started threatening the very existence of mankind.

The increasing climatic and ecological concerns have coerced the zoos to transform themselves in to Conservation Centers and contribute in reversing the dangerous trend of destruction of natural resources by motivating the people to love, care and conserve the wild animals and their habitats and helping in the augmentation of impoverished in-situ wild animals through planned introductions/reintroductions. This management plan is a roadmap for equipping and developing the professional competence in the zoo personnel for discharging the new responsibilities assigned to it. Being the largest zoo of the country and the most well equipped zoo of the country, the zoo can become a role model for other zoos of the country.

1.1. HISTORY OF THE ZOO

1.1.1. Madras Corporation Zoo

The history of Chennai Zoo (formerly Madras) dates back to the year 1855. This was the first Zoo to be formed in India. The idea of collection of animals and maintaining at one place was mooted in 1855 by Dr. Edward Belford of the Madras Museum. He kept a small collection

of animals near the museum itself. The menagerie was later transferred to the Madras Corporation. The animals were housed in a Zoo over an area of 12.03 acres behind the then Moore Market Complex near Central Station for about 125 years (**Appendix 3&4**). The Corporation Zoo was visited and appreciated by many distinguished visitors in those days. Jawaharlal Nehru once visited the Zoo and praised the standard of maintenance, care and effort taken by the then Curator Thiru.Ramanunjalu.

Since the Zoo was quite cramped and did not meet the biological and behavioural needs of the animals, decision was taken to shift the zoo to an alternative site where adequate land to develop the required infrastructure for a modern zoo was available. After detailed investigation the Vandalur Reserve Forest was selected for the purpose. This place sprawling over an area of about 510 ha (in its initial stages) provided an environment similar to natural wilderness which helped to meet the biological and physiological need of the animals and birds. The present area of the zoo is 602 hectare and has requisite natural vegetation for creating the naturalistic environment at the zoo

1.1.2 .Shifting the Zoo to Vandalur

A team of officials of Zoos and Government of Tamil Nadu including the Joint Secretary to the Government, Agriculture Department, Commissioner, Corporation of Chennai & others inspected and unanimously decided to shift the Zoo to Vandalur RF. Subsequently, the Govt. in G.O. Ms. No. 259 F&F dated 07.12.1973 sanctioned a Special Officer in the cadre of DCF with staff to draw up an Integrated Plan to be implemented in stages over a period of 5 years. A Master Plan was drawn up in 1974 by Thiru K. Viswanathan, In G.O. Ms. No. 110 F&F dated 16.02.1979 the Government accepted the recommendation of Dr. Ruben David Committee and ordered the shifting of the zoo & locating at Vandalur. In Para 5, the Government accorded sanction for the project at a total cost of Rs. 300.00 lakhs. Phase I was sanctioned in the same G.O. at a cost of Rs. 105.00 lakhs. The Government in G.O.Ms.No.1258 F&F dated 19.11.1979, sanctioned the staff required for the implementation of the project in the initial stages, which included a Director in the cadre of Conservator of Forest.

Revised layout of the Vandalur Zoological Park was approved by the Government in G.O.Ms. No. 987 F&F dated 02.08.1980. Thiru S.Subbarayalu Naidu Director along with Deputy

Director Thiru N.Ramesan visited UK and other European countries from 1.8.81 to 20.8.81 to study zoo designing.

Constitution of a Governing Board was ordered in Go.MS. No.1027 F&F dated 26.8.81 with a view to shorten the administrative procedure and take quick decisions.

1.1.3 Dream Zoo

The then Chief Minister Dr.M.G.Ramachandran was personally interested in making the Arignar Anna Zoological Park an exclusive zoo. With this objective he suggested that the entrance should be like a natural mountain with waterfalls and that people will enter through a cave and as they enter they must hear lions roaring and bird calls.

For this type of work, no architect could give a concrete design for this type of gate . Therefore late Thiru.P. Angamuthu, Cine Art Director was requested for help. He gladly agreed and prepared a model. To get an idea about how the proposed model would work out on ground, an entrance was constructed at the Trade Fair in the Island Ground Exhibition. This entrance was liked by one and all ,the design was adopted by the Government of Tamil Nadu expeditiously .The task of preparing detailed structural drawings were awarded to the architect Thiru.Raja Singh of M/s.Kingsway Consultants. As there was difficulty in getting the works executed through the private contractors, the execution of the work was handed over to the Tamil Nadu Construction Corporation, who were directed to execute the work on turn-key basis. Special efforts were made by the Zoo Authorities to provide to the zoo animals extensively large enclosures and sprawling lawns to the visitors, without affecting the natural ambience of the zoo. The zoo was opened to the public on 25.7. 85 by Dr M.G Ramachandiran himself with lot of fan fare. All the animals from the Corporation Zoo were shifted to Arignar Anna Zoo and it became one of the most cherished outing destinations for the people of Chennai.

Hon'ble Chief Minister of Tamilnadu continued to take keen interest in the affairs of the zoo. He visited the zoo time and again with other Ministers to inaugurate the Wildlife week celebrations and also to open the newly constructed enclosures viz Lion Safari, walk through Aviary, Reptile House and Nocturnal Animal House, to the public.

On 10.1.90 Mr.Rahul Gandhi S/o Former Prime Minister of India visited the Zoological Park. Particularly he went to Lion Safari and Nocturnal Animal House. On 13.3.90 Dr.M.S.Swaminathan, President, I.U.C.N. and Member, State Planning Commission opened the Common langur enclosure and appreciated the plan of the zoo and the upkeep of animals.

1.1.4 .Evolution of the Zoo

After the inauguration, the first priority of the zoo was to enrich the animal collection of the zoo. Keeping up with the trend prevailing at that point of time, highest priority was given to acquisition of glamorous exotic animals from different parts of the globe. Nevertheless the zoo has done extremely well in upkeep and health care and breeding of the rare and endangered species of the wild animals. The naturalistic and the large animal enclosures facilitated this process. The species that need special mention in this regard are: Sangai (Thamin deer), Swamp deer, Lion tailed macaque, Nilgiri langur, Indian Gaur, Wild dog ,Indian tiger and the Asiatic lion. Amongst avian species that bred successfully in the zoo are Pea fowl , Red Jungle fowl and Kaleej pheasant. Rock Python has also bred well. Other common species also bred well and remained self sustaining for most part of the history of the zoo.

1.1.5. Launch of the Era of scientific development

Soon after its establishment in February 1992, the Central Zoo Authority took upon itself the responsibility of systematic evaluation of the zoos and mitigation of identified inadequacies by providing requisite financial inputs. Improvement of enclosures and the up gradation of the health care facilities. Continued efforts were made to upgrade the professional skills of the zoo personnel at all levels. First Population Habitat Viability Analysis (PHVA) workshop was held at the zoo in 1993, after which planned breeding of the Lion tailed macaque (LTM), with due emphasis on genetic management of the species was taken up. Within last few years, all the animal of the species have been marked. The Zoo has been made a Coordinating Zoo for the conservation breeding of the species. Small grant fellowship project has already been sanctioned and a whole time scientist has been posted to help in executing the project efficiently .Large breeding enclosures have been constructed in off-display area to safeguard the human impacting of the animals. Recently planting of natural seedlings of trees and shrubs brought from the natural habitat of the LTM at Valparai.

1.1.6. Establishment of Rescue center for Circus animals

Central Government banned the training and exhibition of 5 species of animals viz Tiger, Lion, Panther, Bear and Monkey in 1998. To accommodate these animals, Rescue Centers were constructed at 5 zoos of the country, where adequate space was available. Arignar Anna zoo was also identified as a site for the rescue center. Accordingly, a Rescue and Rehabilitation centre was established at the zoo in the year 2000.

1.1.7. Other significant development

1. In 2000 a Zoo school was opened within Arignar Anna Zoological Park campus to educate the general public and the students about wildlife and its conservation.

2. Rat and Mice rearing centre created to support and supply feed to Reptile centre. The project has been quite handy in timely supply of good quality feed to the Reptiles

3. Arignar Anna Zoological Park has opened a website: www.aazoopark.in which gives information on all the salient features of the zoo.

4. A Close Circuit Television (CCTV) installed in the zoo, during the year 2003,to monitor the important activities closely .

5. For Providing greater autonomy to Arignar Anna Zoological Park in management and release of funds "Tamil Nadu Zoo Authority" has been created in the year 2004. It has been duly registered under the society's registration Act, 1975(Tamil Nadu Act 27 0f 1975).

6. The zoo has been admitted as a member of I.S.I.S. A five day hands-on training for the veterinarians and biologists of Indian Zoos on the SPARKS software of ISIS was conducted by the zoo in the year 2010.

1.2 GENERAL

1.2.1. Physical features

AAZP is situated at Vandalur which is 32 Km away from the metropolitan city of Chennai on the GST Road. On the Eastern side of the G.S.T is the zoo over a sprawling area of 602 ha. In the initial stages, the establishment of the zoo was done over an area of 510 hectares including the lands acquired from Revenue Department and Patta lands adjoining the areas selected for establishment of the zoo. Later in 1999 as per the guidelines from the CZA, a Rescue and Rehabilitation Centre was formed over an area of 92 ha. of adjoining RFs taken over from the Research wing.

1.2.2. Geology

The zoo has plain as well as undulating terrain with alluvial soil. The altitude ranges from 31 m to 147 m.

1.2.3. Rock and soil

Adequate land is available within AAZP for expansion of a North South direction. The site is alluvial with rocky patches. The soil offers a minimal condition for planting tree species,

watering, and application of green or organic manure and right choice of species will help to enrich the vegetation.

1.2.4. Flora and fauna in zoo premises

The vegetation of the zoological park is dry evergreen forests. The existing vegetation was scrub forests invaded by weeds and gradually due to sustained efforts it has been planted with dry evergreen species. In some places there are few cashew and Eucalyptus trees. About 138 plant species are found in the area. It was so planned in early stages that the natural vegetation of the areas was to be kept intact except where the enclosures, roads and structures had to be constructed. Further, this entire campus has been protected by construction of compound wall. Therefore, there was absolutely no biotic interference in this area, which has boosted the growth of the vegetation and eventually presented an aesthetic look of a natural forest. In this area several species of animal (Butterflies, Birds, and Mammals) have been identified and documented in **Appendix-5.**

1.2.5. Climate

Climate of Chennai is Tropical. Climate is humid pretty much throughout the year because the city is on the coast. Summers are very hot and humid. The data on the average maximum and minimum temperature, relative humidity and rainfall during January 1993 to December 1994 collected from Dr.A.Manimozhi, Ph.D., thesis showed the highest and the lowest temperature were observed in the month of June & May and December respectively. The June and May average maximum temperature was 36.10+3.37 & 33.63 +1.67 and minimum temperature was 21.68 +0.78.

1.2.6. Rainfall and humidity

The Zoo receives scanty rainfall from the south-west monsoon (Jun-Sep), but gets its bountiful rains from the north-east monsoon from October through December annually. Rainfalls occur usually from October to December. During some seasons, the zoo gets ample amount of rainfall if there are depressions in Bay of Bengal. The average maximum humidity and rainfall was observed in the month of October (80.07+4.88 %) and November (37.78 & 58.33 cm) respectively in both years.

1.2.7. Season

Chennai has mainly two seasons - summer (35°C-42) Apr-Jun (Highest temperature ever recorded is 45°C on 30 May 2003) and monsoon (Oct-Dec).

1.2. 8.Approach

AAZP is situated at Vandalur which is 32 Km away from the metropolitan city of Chennai on the GST Road. The Zoo can be reached by any of the modes of transport.

By Road: Tambaram (7 km)

By Train: Vandalur (Tambaram-Chengleput suburban line)

By Air: Chennai Air Port (15 km)

1.2.9. Demography of the surrounding area

As of 2001 India census, Vandalur had a population of 13,311. Males constitute 54% of the population and females 46%. Vandalur has an average literacy rate of 79%, higher than the national average of 59.5%: male literacy is 85%, and female literacy is 72%. In Vandalur, 11% of the population is under 6 years of age. On the eastern side of the zoo Kolapakkam and Nedunkundram villages are situated.

1.2.10. Legal status of the land

In the initial stages, the establishment of the zoo was done over an area of 510 hectares including the lands acquired from Revenue Department and Patta lands adjoining the reserve forest areas selected for establishment of the zoo. Later in 1999 as per the guidelines from the CZA, a Rescue and Rehabilitation Centre was formed over an area of 92 ha. of adjoining Reserve forests taken over from the Research wing.

1.2.11. Zoo landscape

The entrance of the zoo is located on the G.S.T. Road in the South Westerly direction. The zoo has natural landscape with a small hillock in the center of the zoo with slopes on the eastern and western side. There is a large lake on the western side. The zoo landscape comprises of evergreen and deciduous tree species and dense shrub vegetation. The cover of trees forms a contiguous canopy which provides a conducive environment for the animals and the multitude of visitors. The dense canopy developed over the years has created unique micro climate in the zoo.

1.2.12. Source of pollution

Except the GST road on the Western side and Kelambakkam road on the southern side of the zoo, no other sources of pollution are found around the zoo.

1.3. ZOO POLICIES AND PRINCIPLES

1.3.1. Vision of the zoo

The Vision of AAZP is to have environmentally sensitive people who care for the wild fauna and flora and conserve it for long term welfare of mankind.

1.3.2. Mission of the zoo

1. Conservation of the fauna of Eastern and Western Ghats with special reference to LTM, Nilgiri Langur, Gaur and small mammals.
2. To provide to all the animals housed in the zoo highest standards of housing, upkeep and health care.
3. To provide the zoo visitors opportunities for getting an uninterrupted view of wild animals to develop an empathy towards them
4. To carryout research on different aspects of biology, behaviour and genetic makeup of endangered species of wild animals and facilitate their breeding
5. To provide requisite housing, upkeep and health care to the distressed animals rescued from various source

1.3.3. Strategy for achieving the mission of the zoo

1. To maintain viable population of various species housed at the zoo through appropriate nutrition, housing, health care and behavioural management.
2. Thematic display of healthy and active animals in naturalistic enclosures and facilitate the visitors to appreciate and understand the ecological linkages of nature though use of appropriate signage and interpretation facilities.
3. To provide the zoo visitors an hastle free stay in secure environment and conduct them in the zoo in such a manner that their visit to the Zoo becomes rewarding.
4. To upgrade the technical knowhow and the professional efficiency of the zoo personnel at all levels to implement the aforesaid strategy successfully.

1.3.4. Animal collection plan

The zoo did prepare a detailed animal collection plan soon after coming into existence , but its main emphasis was on acquisition of exotic species representing different Zoo-Geographic regions, no matter if the collections were biologically and genetically non viable As a consequence the zoo collection is plagued by unpaired animals. However the zoo has done well in having viable collections of endemic species and the endangered species representing

other regions of the country but frequent transfer of the animals, to get exotic animals, has also impacted the zoo population of these animals .However it still has the distinction of having one of the largest zoo collections in the country.

1.3.5. Species displayed at the zoo

Sl.No	Species displayed	Area of the Enclosure (Sq.m)
1	Lily/ Lotus Pond	287.4
2	Black Swan enclosure	1091.18
3	Love bird enclosure	205.98
4	Nilgiri Langur enclosure	693.98
5	Nilgiri Off exhibit enclosure	175.8
6	Lion tailed Macaque enclosure	693.98
7	Lion tailed Macaque cage	111.46
8	Chimpanzee Enclosure	2286.18
9	Savanna Baboon Enclosure	2639.33
10	Common Peafowl Enclosure	166.37
11	White Peafowl Enclosure	252.39
12	Common langur enclosure	1019.38
13	Rhesus macaque, Brown Capuchin enclosure	971.39
14	Cockatoo enclosure	82.41
15	Pheasant Enclosure	216.21
16&17	Parakeet Enclosure	151.33
19	Pheasant Enclosure	47.69
20	Breeding center	269.38
21	Cockatials	51.25
22	Horn Bill	89

23	White bellied Sea Eagle	117.74
24	Goose ,Storks &Cranes	661.37
25	Sarus Crane	807.06
26	Adjutant Stork	936.96
27	Flight less birds	85.59
28	Barking deer	1909.52
29	Black buck	3548.41
30	Spotted deer	3638.64
31	Four horned Antelope	2229.18
32	Hog deer	2225.97
33	Swamp deer	1976.92
34	Common Otter	213.94
35	Sambar	3700.00
36	Tiger	7408.65
37	Asiatic lion	8396.02
38	Nilgai	6107.52
39	Indian Gaur	10867.41
40	Sangai deer	4200
41	Giant Squirrel	438.72
42	Sloth Bear	2337.87
43	Jackal	177.17
44	Himalayan Black bear enclosure	2337.5
45	European Brown Bear	1118.52
46	Lion Safari	190642.58
47	Deer safari	303091.68

48	Bear Safari	30 ha.
49	Gaur Safari	25 ha.
50	Wild dog enclosure	3827.33
51	Wild dog enclosure	3218.91
52	Hyena enclosure	3066.55
53	Wolf enclosure	2839.99
54	Wild ass enclosure	7658.28
55	White tiger enclosure.	1300
56	Jaguar enclosure	593.35
57	Leopard enclosure	263.32
58	Off-site breeding enclosure for tigers	273.43
59	Pointcalimere Birds Sanctuary- Aviary	3216.91
60	Vedanthangal Birds Sanctuary- Aviary	429.16
61	Bio-center	9515.96
62	Vulture enclosure	151.11
63	Kites enclosure	161.24
64	Tortoises & Turtles enclosure	654.94
65	Water Monitor Lizard enclosure	123.38
66	Iguana enclosure	145.22
68	Serpentarium	1226.53
69	Amphibian enclosure	83.51
67,70,71,72,74, 76,90,91,92 & 93	Crocodile enclosures	165.22 to 1213.84
73	Nile Crocodile &	85.03
75	Morelet crocodile	751.58

77	LTM-off exhibit breeding enclosure	2195.59
78	Elephant enclosure	87477.59
79	Wild boar enclosure	2138.18
80	Hippopotamus enclosure	3949.55
82	Pigmy Hippopotamus enclosure	6139.56
83	Kangaroo enclosure	3932.08
84	Giraffe enclosure	7366.41
84a.	Ostrich enclosure	6436
85	Nocturnal Animal House	6556.23
86	Zebra enclosure.	6569.44
87	Aquarium. .	1103.7
88	Butterfly park	331.67
98	NilgiriTahr	2550
99	Rhesus macaque enclosure	1500
100	Conservation Breeding Research Center	50 hac.

Nocturnal Animal House

There were 8 enclosures for nocturnal animals as given below:-

1) Common palm cat (*Paradoxurushermaphroditus*)
2) Jungle cat *(Felischaus)*
3) Small Indian civet cat (*Viverriculaindica*)
4) Binturong (*Arctictis binturong*)
5) Porcupine (*Atherucusmecrourusassamensis*)
6) Indian great horned owl (*Bubo bubobengalensis*)
7) Barn Owl (*Tyto alba*)
8) Indian pangolin (*Maniscrasicaudata*)
9) Slender Loris (*Loris tardigradus*)

1.3.6. Zoo layout

As we enter the zoo, through pathway, there is a lush evergreen lawn on one side and the children's park on the other. Next to this children park, bird enclosures for Muscovy duck and black swan are there. As we proceed further, the enclosures for primates are located. Then the Birds section, where one can see marshy land birds. On reaching this point, we enter into the circular road. This circular road has been formed taking advantage of the natural landscape. A hillock is there around which this circular road has been formed. On the upper portion of this hillock, the enclosures for large carnivores like lion and tiger and on the slopes enclosures for herbivores like Nilgai, Sambar and Deer have been constructed. This arrangement of enclosures was well thought out and executed with a view to depict the prey - predator theme. A visitor can view these enclosures from the circular road itself in a row.

As we move further on the circular road Indian Gaur enclosure is situated. Ahead of this, there are two loop roads. Within these two loop roads Bear section, Panther enclosures and walkthrough aviaries for birds found in Vedanthangal birds sanctuary and Pointcalimere are situated. There is also a branch road at the end of the bear enclosures which leads to Lion safari. Lion safari is situated on the North eastern end of the zoo over 20 ha.

On return to the circular road, Reptile section is situated. There is a branch road here which leads to the Pre-historical Animal Park. On proceeding further, a large enclosure for Elephants on one side and enclosures for Wild boar, Hippopotamus, Pigmy hippo and Rhino are there. Moving further, Nocturnal Animal enclosure is situated. Just beside this, enclosures for Ostrich, Giraffe, Zebra and Kangaroo are there. At the end of the circular road, there is an Aquarium in the shape of a shark with its wide open Gills as its entrance.

For the visitors rest areas have been provided in between each section with amenities such as water points sitting benches etc. Service roads have been formed exclusively for zoo management. These roads are not to be used by the visitors and in most cases not visible to the visitors' eyes. Zoo kitchen stores, Rest House and Quarantine, Veterinary Hospital and workshop for vehicles have been located away from the area of visitors with a separate entry on the southern end.

1.3.7. Theme of display of animals-

As would be apparent from the lay out, that most of the animals enclosures have been located on the basis of the taxonomic classification. At places the enclosures have been grouped on the basis of their zoo-geographic distribution. Specialized enclosures like the Nocturnal house and the serpent enclosure have been located on the basis of the suitability of the site

1.4. UP KEEP OF ZOO ANIMALS-

1.4.1 .Housing of zoo animals

Most of the animal enclosures are not only of adequate dimensions and design to meet the biological requirements and the behavioural requirement of the species housed there in but also has adequate vegetation including tall trees to provide them opportunity to express their specific behaviour, including the availability of withdrawal areas. Artificial perches, nesting boxes, swings, lofts have also been provided in the bird enclosures and the primate enclosures. Hidden feed points are also provided in the bear enclosures to satisfy their exploratory urge.

1.4.2. Nutrition and feed

All the animals housed in the zoo are provided wholesome feed in appropriate quantities so that not only the nutritional requirements are met but the species specific functional needs are met. The diet of each animal is prepared by the zoo veterinarians, keeping due regard to the recommendations of the Indian Veterinary Research Institute. The quality and the quantity of the feed supplied to the zoo animals are checked scrupulously every day by the veterinarians and other senior officers.

1.4.3. Sanitation & hygiene of feeding cells and paddocks

The animal enclosures by and large are congenial to the biological and the behavioural health of the species housed there in, yet the possibilities of animals exposed to microbial infections are always there. To safeguard such eventualities highest standards of sanitation and hygiene are maintained by the zoo. Half eaten food and the meat bones are promptly removed from the feeding cells/kraals and disposed of appropriately. The floors of the feeding cells are washed daily using permissible disinfectants. Periodic spray of lime and turmeric powder is also done in the feeding cells and the kraals. Recently the practice of frequently disinfecting the cell bars/grills, water tubs, lofts and other fixtures of the cells has also been introduced. Moreover in carnivore enclosure Butox is sprayed every month end. The bushes and the shrubs are removed periodically and the surface soil is also scratched, removed and replaced. The surroundings of the

enclosures are kept hygienic. For this network of well-planned sewage lines and dustbins have been provided.

1.4.4, Observing activity pattern & feeding pattern of animals

The animal keepers and the biologists constantly monitor the activity level of the animals their feeding pattern to ensure that all the animals are in perfect health. Record of these observations is maintained in the prescribed format. As soon as they find any animal in the low or showing abnormal behaviour, they apprise the veterinarian of the same promptly through the prescribed channel.

1.4.5. Disease diagnosis and treatment

The zoo veterinarian, soon after getting the report about any animal being in low or not being in normal health, visits the animal at its enclosure and makes the visual examination and physical checkup subject to the feasibility and decides on the line of treatment. If felt necessary the animal is confined in a feeding cell, where blood samples, urine samples and stool samples are taken and analyzed to arrive at the right diagnosis of the disease. The postmortem findings of the animals that had died of the similar symptoms earlier also prove quite handy in arriving the right diagnosis.

As a rule the animals provided treatment at the enclosure and are moved to the hospital as a last resort, in view of the fact that transport of the animals to hospital is quite stressful. All the carnivores enclosures have been provided with squeeze cages to facilitate the veterinarians in handling, examining and treating the animals.

The veterinary set up of the zoo comprises of following personals.

1. Veterinary Officer - 1
2. Assistant Veterinary Surgeon - 2
3. Veterinarian (on contract) - 1
4 . Veterinary Assistant - 1
5. Laboratory Assistant - 1

1.4.6. Veterinary hospital

Established in 1985, the zoo veterinary hospital of Arignar Anna Zoological Park is located in the South-eastern corner of the zoo on Kelampakkam road. The hospital has a well-equipped operation theatre, radiology unit, physiotherapy ward, diagnostic laboratory, hand-

rearing centre, in-patient ward with convalescent yard and quarantine area. The diagnostic laboratory of the hospital has necessary equipment and instruments like semi-auto analyzer, urine analyzer, binocular microscope, hot air oven, and horizontal laminar airflow etc. Clinical samples like blood, serum, feces, urine, skin scrapings are tested for parasitic loads and microbial infections regularly. .

1.4.7. Prevention of diseases and prophylactic treatment

Wild animals/zoo animals have immense capacity to hide the symptoms of diseases and showing normal behavior pattern till they finally fall down because of exhaustion and weakness. At such a stage even the most effective treatment may not yield the expected results. The zoo therefore gives highest priority to the measures that can safeguard against animals getting infections of various diseases. The measures taken in this regard are briefly summarized below-

1. Regular screening of animals for parasitic loads and microbial infections as per schedule prepared for the purpose.

2. Administration of appropriate de wormers to help animals getting rid of the parasitic loads and appropriate vaccines to prevent the microbial infections reaching pathogenic levels.

3. Periodic screening of the animal keepers and other animal handling staff against zoonotic diseases. Those found positive are removed from the animal handling work and provided appropriate treatment.

4. Regular screening of the animal feed for microbial infections and rejecting the feed that is found positive.

5. No animal is admitted to the zoo animal collection unless it has been properly quarantined and found free of any infectious diseases

1.4.8 .Quarantine facilities

The quarantine area houses the new arrivals brought to the zoo for a specified period of time to monitor their health status by clinical examination and laboratory investigation and to rule out contagious diseases. These animals are given prophylactic and curative treatment before moving them to their ultimate destination. At present the quarantine facility can handle large carnivores (lion, tiger and leopard), primates, small mammals and birds.

1.4.9. Conservation breeding

The zoo has been engaged in developing self- sustaining population of various species of animal housed at the zoo. This needs detailed inputs regarding biology behaviour and genetics of individual species. Personal indulgence of personnel, in observing the behaviour and health of animals and timely releasing them in the paddocks has proved to be handy tool in achieving the objective. The zoo has done extremely well in terms of breeding endangered species listed below-

1. Lion tailed macaque (*Macaca silenus*)
2. Nilgirilangur (*Seminopithecus johnii*)
3. Indian Rock Python (*Python molurus molurus*)
4. Brow antlered deer (*Cervus eld eldi*)
5. Indian Peafowl (*Pavo cristatus*)
6. Bengal Tiger (*Panthera tigris tigris*)
7. Indian Gaur (*Bos gaurus)*
8. Indian Wild Dog (*Cuon alpinus*)
9. Jackal (*Canis aureus*)

1.4.10. Maintenance of records

To maintain the required level of genetic diversity amongst zoo bred animals, due safe guards are taken to avoid inbreeding between closely related animals i.e. siblings, mother-son and father daughter. This necessitates maintenance of detailed record of the pedigree of each and every individual of endangered species in the form of Stud-Books. This is a permanent record and stays at the zoo. A studbook card is also maintained keeping the same information, which accompanies the animal where ever it moves. To make the process fool proof, putting identification mark on each animal is mandatory .Detailed guide lines have been issued in this regard by the Central Zoo Authority. Transponders and readers have been supplied to mark the animals of identified species namely Lion Tailed Macaque.

The stud book data is compiled both at the national level and the international level .The national level responsibility has been assumed by Wildlife Institute of India .The global responsibility vests with I.S.I.S. The zoo has joined the I.S.I.S

1.4.11. Zoo Research

The availability of large number of species provides a unique opportunity to the zoo staff to gather reliable data regarding behaviour, biology, nutrition, breeding habits and health management of rare and endangered species of animals not only in captivity but also in the wild. It is in this background that the zoo has always given high priority to the zoo research. Three biologists have been engaged on regular basis to carry out research on various aspects of zoo management. The Central Zoo Authority has provided a further spurt to the research work done by the zoo by way of grant of small studies research fellowships on carrying out research on conservation breeding of endangered species. The university professor and other subject matter specialists have also been involved in these projects.

1.4.12. Rescue and rehabilitation centre

A Rescue Centre in Arignar Anna Zoological Park was constructed in the year 2001 for housing 40 confiscated lions and 20 tigers from circus owners. The project has been funded by the Central Zoo Authority, Ministry of Environment and Forests, Government of India, New Delhi. The zoo has managed the rescued animals extremely well and the zoo staff needs all praises for maintaining highest standards of health care and upkeep However due to over age and senility large number of animals have died. The Rescue center is left now with 4 tigers and 19 lions. Rest of animal cells is vacant. It is proposed to utilize the vacant cells for housing rescued orphaned animals from the wild, seized from the illegal owners and the animals of the zoo which have passed their prime and are of little display and genetic value.

1.4.13. Summer management of animals

During the period of April to June there is intense summer heat. The heat stress to the animal is distinctly visible in the hot summer and the zoo manpower and resources are stretched to the maximum to provide succor and relief to the animals. The zoo staffs mitigate the effect of summer heat by spraying water on the animals by using sprinklers, dowsing animals with water and provide shade and shelter and change in diet. The diet composition is changed during summer and more succulent fruits and vegetables, porridges, cereal and gruel are provided to the animals. The zoo has been able to prevent deleterious effect of the soaring summer temperature by cooling the environment around the animals. The summer management plan is drawn up

keeping the requirement of the species and every effort is made to take advance action to prevent any sickness to the animals.

1.4.14. Monsoon and winter management of animals

The change in the climate from the hot humid summer to the wet monsoon and winter cold affect a large number of animals in the zoo.

The season makes the animals vulnerable to diseases and therefore prophylactic measures to control the disease are required. Moreover the physical environment around the animals is to be maintained for the welfare of the animal.

During monsoon and winter the following measures are initiated.

1. Provision of rain shelters in animal cells and kraals.
2. Bedding materials and loft to prevent chillness.
3. Periodical change of water in troughs and moats to prevent water born diseases and providing warm water to certain animals
4. Allowing sunlight by opening up tree canopy in the animal enclosure to provide additional warmth to the animals
5. Vaccination against contagious diseases in and around the zoo.
6. Regular de-worming to prevent parasitic infections.
7. Spraying of Butox in Carnivore enclosures.

1.5 ANIMAL SUPPORT INFRASTRCTURE

1.5.1 Food store and Kitchen

Supply of food to the animals of more than 140 species all having different nutritional requirement both in terms of variety and quantity is a real challenging job. The quantity of daily food requirement of animals at Arignar Anna zoo is as follows-

1.	Non - Perishable food articles	190 kg
2.	a. Perishable food articles b. Fruits like apple, banana, etc., (in nos.)	320 kg
3.	Meat, Chicken & Fish	750 kg
4.	Cattle Feed	430 kg
	Green fodder	2000 kg

The procurement of the feed is done through the process of tenders. The successful tenderer make the supply of perishable food items ,meat chicken and fish on daily basis and nonperishable items are supplied on fortnightly/monthly basis. The green fodder is mainly harvested from the zoo fodder farm and it is self sufficient. Responsibility of receiving the food items vests with the Forester, who works under the supervision of Range Officer III.The Veterinary Officer, inspects the quality of feed received regularly. The responsibly of quantity verification is of the A.C.F and the Deputy Director. The Kitchen and the Store of the zoo are adequately equipped to safely store the feed items, prepare the food and distribute the same to animal enclosures.

1.5.2. Water supply

The following are the sources of supply for the zoo**(Appendix.8).**

1. Palar water supply by TWAD, 2. Open wells 13Nos, 3. Bore wells 5 Nos.

Palar Water supply

In G.O. MS No.408 F&F Department dt. 26.3.1980 the Govt .have issued instructions to the MD, TWAD Board to arrange for the supply of 3 lakhs gallons (13.64 lakhs liters) of water per day from Alandur Pallavaram water supply scheme.

This comprehensive water supply scheme for pumping water from Mannivakkam pumping station by a branch line to the zoo was sanctioned at a cost of Rs. 14.45 lakhs and has been installed; it requires Rs. 67,800 for its annual maintenance. Further in GO MS No.117 F&F Depot Dt. 31.1.1984 additional expenditure of Rs. 1.31 lakhs was also sanctioned for the above work. Now the daily supply of water is around 2 to 3 lakhs liters per day.

Open Wells

There are 13 open wells from which water is being drawn daily for use. The list of the open wells is given below. Near by -

1.	Office Building	15 HP Submersible
2.	Otteri	15 HP Submersible
3.	Birds cages	7.5 HP Jet Motor
4.	Quarters site	7.5 HP Jet Motor
5.	Rest area 42	5 HP Monoblock
6.	Lion Safari	5 HP Jet
7.	Pump House	15 HP submergible
8.	Pre Historic Animal Park	12.5 HP Turbine
9.	Veterinary Hospital	5.5 HP Monoblock
10.	Transit enclosure	7.5 HP Jet
11.	Rest area 83	5.0 HP Monoblock
12.	Fodder Bank	5 HP Submergible
13.	Rescue centre	5 HP Monoblock

Bore wells

There are 5 bore wells dug as shown below.

1.	Director Office Building	3 HP Jet
2.	Entrance	Not in Use
3.	Bore well near Museum	- Do -
4.	Otteri Fodder Bank	- Do -
5.	Vandalur lake to Quarters Side	- Do -

But only one bore well is yielding i.e. near Director's Office Building. Other 4 bore wells are not in use due to non - availability of water. Measures may be sought for re-functioning of the bore wells if found economical. Otherwise the possibility of locating and digging new bore wells using scientific methods may be established.

The quantum of water tapped from the open wells and bore wells is about 1 lakhs liter per day.

1.5.3. Storage and distribution of water

There are six ground level water tanks at the locations mentioned below-

1. Quarters site
2. Lion and Tiger enclosures (Main tank - Circular tank)
3. - Do - (Rectangular Tank)
4. Bear enclosure
5. Elephant Enclosure
6. Fodder Bank

There are six OHT with 20000 Lit capacities each

1. near Office Building
2. near Bear Enclosure
3. Near No. 1 pump house
4. near Prehistoric Centre
5. near Rest Area 83
6. Near Rescue centre.

The network of distribution is from the ground level water tanks at elevated place above Tiger enclosure. The main line runs all-round the circular road.

1.5.4. Electricity

There are 3 substations of 11 KV each at present with 11 panel boards distributed in the zoo. There is a vast wiring network spread over the entire zoo premises. Sketches showing the existing HT & LT lines with power points have been prepared and given in **Appendix - 9.**

1.5.5. Zoo Sanitation

The visitors are screened in the entrance for all polythene and every effort is made by the zoo to keep the area plastic free. The solid waste generated by the visitors and other operation of the zoo is mostly biodegradable. The waste is deposited in the dustbin spread all over the zoo. A garbage collection vehicle is deployed to collect all garbage and to dump in the garbage disposal yard where it is decomposed. At the time of inception of the zoo all waste were dumped in the yard without much segregation. The animal waste comprises of bones from meat, fecal matter and waste feed items. The bones are collected separately and decomposed while fecal matter and waste feed items are collected daily and dumped in the waste disposal and decompose yard.

1.5.6. Sewerage disposal

In G.O.Ms No.226 Forest and Fisheries Department dt. 9.3.1988 proposal were prepared by the TWAD Board for provision of sewerage scheme to the zoo and was approved at a cost of Rs. 43 lakhs and Rs. 70,000/- for annual maintenance.

Guidelines were given for drainage scheme as follows.

The waste water from animal enclosure, water points, Children Park, Rest Areas, Veterinary Hospital, canteens will be drained into the sewerage system and rain water through channels and storm water drain to percolation pond and lakes. Apart from the water used for cleaning the fecal matter, leftover food etc., have to be drained off into the sewerage system. The water in the moat and the ponds within the enclosures will also have to be drained off to maintain hygienic conditions. For the visitors to the zoo, public conveniences will be provided in about twenty points. Hence, all these waste water and refuse have to be properly drained out then treated and let into Fodder Bank on Southern side of the zoo where grasses and fodder trees will be raised.

The staff quarters are built in 7 hectares and proper sewerage is also to be provided for the colony. The runoff water during the rains will have to drain to percolation pond and tank through the storm water drains.

Further clarification was also given as follows:

a) Monkey islands 4, 5, 6 and 7 will be with wet moats. Water from these moats may be let into Otteri tank since the water in these moats will not be contaminated with animal droppings. All the moats will not be drained at the same time and capacity of drain pipe may be designed taking one having maximum capacity.

b) The quantity of the water in Otter moat will be about 16,000 lit and it has to be drained and filled regularly.

c) Sewerage from Aquarium need not be considered at present. This will be joined later to the present sewer line from kitchen cum store.

d) The sewage from staff quarters need not be taken to fodder Banks area along with the main sewerage line. If level permits an oxidation pond can be formed in the area below Otteri Lake (adjoining GST Road) for sewerage treatment. The sewer lines from the toilets in Rest Areas 51, 70 and 83 will be connected to the sewer line.

The sewage system was constructed during 1989 - 90. But this was not maintained and the sewerage lines are not functioning properly and require repair and maintenance.

1.5.7. Security section

The zoo as such has no separate security system. The respective unit officers are responsible for maintaining the security in their respective jurisdictions. Range officer in-charge closely monitors the security. On a turn basis every Range is carrying on night rounds/patrolling in the Zoo.

1.6. VISITOR MANAGEMENT

During the initial years, the number of visitors was quite limited. As the zoo has evolved in its animal collection and civic amenities and visitor facilities, the number of visitors has also shown a constant rise.

The visitor statistics for 13 years is given below:

Year	Adult	Children	Total Visitors	Total Collection (Rs. in Lakhs)
1999-00	5,73,551	1,50,942	7,24,493	46.33
2000-01	6,42,695	1,56,858	7,99,553	50.64
2001-02	4,74,867	1,48,454	6,23,321	38.22
2002-03	5,16,297	1,95,297	7,11,589	82.80
2003-04	5,06,668	1,87,924	6,94,592	98.13
2004-05	5,36,010	1,68,049	7,04,059	118.73
2005-06	6,35,021	2,13,802	8,48,823	133.47
2006-07	9,08,450	2,69,454	11,77,904	185.30
2007-08	11,43,754	3,04238	14,47,992	225.66
2008-09	9,38,526	2,07,482	16,46,129	303.88
2009-10	13,26007	3,20,123	16,04,216	402.86
2010-11	14,99,946	3,10,900	18,10,846	469.98
2011-12	16,61,087	3,41,458	20,02,545	515.20
2012-13	18,12.172	3,99,959	22,12,131	673..95

The number of visitors is not distributed equally throughout the year .There are peaks and troughs. The peak is during college holidays and festivals like Pongal. During the month of January and May the number of visitors exceeds two lakhs. Average visitation per day is around 5000 persons.

Since such a large number of visitors are coming to the zoo, it is incumbent that the zoo provides adequate parking place, requisite number of ticketing counters enough visitor sheds and earmarked visitor paths with necessary direction sign boards that can make their visit to the zoo hustle free and enjoyable. Off course adequate number toilets, drinking water points and cafeterias are also necessary. The zoo has been making sincere endeavors to upgrade the visitor facilities at the

zoo up to the expectations of the visitors. An additional Parking area has been opened opposite to the Rest House adjoining the Rescue centre. There are 20 Ticket counters provided to manage large number of visitors. A dining place with 100 chairs have been provided between the parking area and entrance site.

1.6.1. Parking area improvement-

At present, about 6400 sq.m. of space has been set apart for parking vehicles and buses. The area is proving inadequate to meet the need of parking the buses and cars on peak rush days .Therefore additional area of 3600 sq.m. have been year marked for parking purposes along the Vandalur - Kelambakkam Road may be reserved for future expansion

1.6.2. Visitor reception

The visitor reception center is a composite building housing the ticket counter, rest room, telephone booth, Education and Information Centre, Restaurant, cloak room, Interpretation Centre and Auditorium. There is sufficient space outside for parking of buses and private vehicles.

The visitors are given an orientation briefing about the zoo at the entrance itself. An electronic display board has been installed where information about the zoo is displayed. A briefing is arranged by the Zoo Education and Reception Station.

1.6.3. Visitor transport

The length of the roads running through the zoological park is 4.5 km of which 2.2 km isplastic mixed bitumen road laid during 2012-2013. A visitor has to cover this distance to see all the enclosures. This is too long a distance to cover, particularly after a tedious journey to the zoo, which is situated at a distance of 32 km from city. As an important visitor facility, transport within the zoo is arranged by operating 10 Battery operated vehicles (Road Trains) and 10 TATA ACE vehicles, to go around the zoo and visit the animal enclosures. The trip is so arranged that a visitor gets down at every important point from where they walk and see the animals and then align the vehicles. The halt at each such point last for 5 minutes. The time taken for a zoo round is one hour and 15 minutes.

For visiting the lion safari, 4 Battery Operated Vehicles are available. These vehicles have been provided with specially designed grills to ensure safety of the visitors.

1.6.4. Visitor amenities

The zoo endeavours to provide all the essential basic facilities to the visitors to make their visit an enriching experience. The following facilities have been provided to the visitors:

1. Rest areas having sheds, sitting benches, green lawns and Gardens
2. Supply of cool drinking water at many points
3. Catering facility by TTDC and Aavin Ice cream parlour and TANTEA MPDA, Doddabetta Stall.
4. Sitting benches under shady trees
5. Walk path and hedges in front of enclosures
6. Battery powered vehicles to go around the zoo and to the safari area
7. Natural landscape with lawns, and gardens.
8. PCO & First aid facility
9. Well maintained toilets at several places
10. Interpretation Centre to educate people
11. Guides and zoo Interpretation by zoo club members
12. Zoo school for children.
13. Zoo Education programme for school children
14. Easy approach by buses and trains from any part of city and suburbs
15. Dustbins at several places.
16. Children's corner with a variety of play things.

1.6.5. Visitor protection

To ensure absolute protection to the visitors live hedge barriers and steel barricade have been provided in front of all cages and animal enclosures. In most of the moat enclosures, the moat wall itself serves as barriers between the animal and visitor, in addition to the live hedges. This barrier besides being a protection measure also prevents the visitors from coming close to the animal.

1.6.6. Visitor education and awareness programme

Arignar Anna Zoological Park has formulated innovative conservation education and awareness programmes. Zoo has become a conservation centre providing facilities for learning about nature and its complex processes. The Education and Research wing have developed special customized programmes for students and public for nature education and interpretations.

1.7. ZOO EDUCATION

1.7.1. Training of trainers - Teachers Education Programme

Regular teachers training programme are conducted in the zoo school based on a special education module developed by the Education and Research wing. The course is designed to give them a general outlook about the Philosophy and theme of conservation and the Ex-situ and In-situ conservation programmes. Visit to the various animal sections in the zoo facilitates learning of themes and concepts of conservation. Teachers are provided with course materials and handouts for study and reference. The teachers imbibe knowledge and are able to disseminate to their students in the school. The teachers training programme is well received and appreciated by the School and Colleges. Since 1998 over 82 Teachers training programme for 7634 teachers have been organized.

1.7.2. Zoo school

The zoo school is a unique concept implemented in AAZP to bring large number of school and college students to the zoo and give them opportunity to learn about wild life and its value. This programme is run on request by the schools and colleges. Since inception in 1998, 397 students training programmes covering 30288 students were organized. During the year 2012-2013, 204 programmes for 22230 students have been conducted.

Students visit the zoo in large numbers as part of the school excursions and their memories of the zoo endure for a long time. The Zoo club and Zoo school offer them opportunities to learn about the animals their behaviour, biological requirement, reproductive cycle and need for conservation. Students are encouraged to study and observe the animals of their choice and to record observation in specially designed formats. The firm foundation developed during these exercises will go a long way in shaping the attitude of our future generation towards nature conservation.

1.7.3. Zoo outreach programme

This programme is being conducted at the selected school premises to teach the role of Zoos in Conservation of endangered species management. The participants were provided with publications from Zoo on various aspects of nature and Wildlife Conservation. During 2012-2013, 8 programs for 1500 students have been conducted.

1.7.4. Zoo club

The Zoo club was started in 1998 with the objective of encouraging voluntary service for the improvement and development of zoo. There are about 140 students volunteers who have been regularly rendering services for zoo work. The volunteers were initiated into service by a crash course on zoo management. The volunteers were assigned the work of helping animal keepers, zoo education dissemination to visitor, zoo sanitation and documentation. The programme received overwhelming support from the student community. Appreciation certificates are given to the volunteers.

The Zoo News Letter, quarterly publications gives an insight into the improvement and development activities of the zoo. Six volumes have been published till date. The news letter is circulated to all zoos for sharing information and experience in the management of the zoo.

1.7.5. Zoo website

Arignar Anna Zoological Park has opened a website www.aazoopark.in which gives information on all the salient features of the zoo. The website has several sections as enumerated below.

a	Objectives	g	Visitor amenities
b	Eco-education	h	Virtual tour
c	Special attraction	i	Animals information
d	Animal health care	j	Other information
e	Zoo rules	k	Kids section
f	Special features		

The website contains comprehensive information on all aspects of zoo management. The website is our window to the world and anyone can access the information easily. Website information updating is to be done regularly so as to be useful to the users.

1.7.6. Zoo guide

Zoo guide is an important document providing information about zoo to the visitors. Arignar Anna Zoological Park has in collaboration with Centre for Environment Education (CEE) prepared a very informative and illustrative zoo guide. The "Zoo guide" has a map for guiding visitors to the animal enclosure, through a network of roads. Information on zoo ethics and animal is contained in the guide. The guide was released on 27.06.2000 and is an important visitor aid

1.8. ZOO ADMINSTRATION

1.8.1. General zoo administration

The Government has sanctioned staff for establishment and development of Arignar Anna Zoological Park in G.O.Ms.No. 125/ E&F Department dated 19.11.1979.

The existing staff pattern of the zoo comprises of the following category of staff

Sl. No	Staff pattern	Staff
1	Management staff	Director, Deputy Director, Assistant Director, Range Officers, Forester, Forest Guard and Forest Watcher
2	Administration staff	Superintendents, Assistants, Junior Assistants, Drafting Officer, Junior Engineer, Office Assistants
3	Animal care staff	Biologists, Animal keepers, Mali, Feed Distribution helper, Night watchman
4	Veterinary care staff	Veterinary Officer, Veterinary Asst. Surgeon, Para Medical staff
5	Maintenance staff	Sweeper cum scavenger, Mali, Electrician, Plumber, Pump Operator
6	Transport staff	Drivers

1.8.2. Duties and responsibilities of zoo staff

1. Director

Being the administrative head of the organization, the director is responsible for ensuring that all the operations of the zoo are carried out efficiently and in a time bound manner .He has been delegated necessary financial and administrative power to discharge this responsibility. He is assisted, Deputy Director, Assistant Director and other staff in ensuring that all the zoo operations are carried out efficiently

2. Deputy Director

Apart from attending to office work and assisting the Director in supervising various works, the Deputy Director will pay special attention to

1. Various works proposed, and under execution
2. Breeding of endangered species
3. Exchange of animals including transport
4. Training programme
5. Theme parks
6. Scientific work carried out by Biologist
7. Interpretation, digital display and Interactive System at the entrance.

3. Assistant Director

The ACF will pay attention to

1. Horticultural works including planting of dry ever green species in Vandalur hills and Biological Park.
2. Electricity
3. Water supply
4. Watch and ward
5. Maintenance of enclosures water moat, and rest areas
6. Visitor amenities, including ticketing
7. Zoo opening and closing including animal enclosures

The duties and responsibilities of the Rangers, Biologist and Animal Keepers and the proposed changes are discussed below:

4. Rangers

Rangers are the field level executives. There are at present 5 rangers who report immediately to the next higher officer viz. ACF, then to DD & Director. Of these 5 Rangers, Ranger I & II are exclusively in charge of Animal and Birds Enclosures. Ranger III is in charge of Transit and quarantine area, apart from looking after feed transport, Horticulture, Fodder, Fruit orchard, Plantation and Rescue Centre. Ranger IV is in-charge of Visitor reception, Entrance and amenities, Zoo school programme. Ranger V is in-charge of Sanitation, Electricity, Water supply and Stores.

The workload involved in animal care is enormous and therefore the 3 Rangers utilized exclusively for looking after the animals and birds and are assisted by two Foresters in this regard. They report directly to the Dy.Director

Rangers IV and V are responsible for all the works other than animal keeping namely, transport, visitor facilities, entrance complex, maintenance of building and roads, electricity, water supply, parking, plantation, sanitation, etc. The ACF is responsible for supervising their work and keeping the Deputy Director and Director informed of the same.

5. Biologists

The 3 biologists now deal with matter relating to Animal Exchange, Education, Research, Interpretation and Training, Outreach Programme, Zoo club, Record keeping - stud book etc. They report direct to the DD & then to Director.

The main work of the Biologists is to contribute to the scientific management of animals held in the stock of the zoo by way of keeping a close watch on upkeep, feeding, behaviour and breeding of the animals and meticulously recording and analyzing the observations and make suitable suggestions for improving the health and breeding potential of the animals ,prevention of diseases and behavioral management. .For this purpose they maintain regular interaction with the Veterinary Doctor, Rangers in-charge of animal enclosures and animal keepers . The Animal Keepers, though unqualified academically, can make invaluable suggestions on animal management issues

6. Animal Keepers

There are 85 animal enclosures. The strength of Animal Keepers now is 52. Some more labourers are also engaged on daily wages for animal keeping.

1.8.3. Up-grading the technical skills of zoo personnel

The management of zoo animals is highly specialized. Constant exposure to the modern trends in animal housing, upkeep and health care is provided to the zoo personnel of all levels. Two week training programmes for the zoo directors and zoo supervisors are organized every alternate year by the Central Zoo Authority .Animal Keeper training courses are carried out at regional level. Special training programmes for Zoo Veterinarians are carried out periodically with the assistance of IVRI and other eminent Veterinary Institutes .One zoo director and one zoo veterinarian are deputed to a three week course at Jersey Wildlife Preservation Trust .U.K. Several officers from the zoo have participated in such courses. Annual conference of zoo directors is also held every year to discuss various technical issues. Zoo also holds in house workshops for the keepers periodically.

Besides these regular training programmes workshops on various technical aspects are also conducted regularly .Few important workshops are mentioned under

Year	Conference / training programme	Participants
1998	Infrastructure facilities for wildlife vet medicine at Coimbatore	Veterinary Asst Surgeon
1998	International Zoo education conference Trivandrum	Director
1998	Hands on training workshop on identification of amphibian's field technique and taxonomy at Kamproley, Karnataka.	Biologist
1999	International Symposium on Lion tailed Macaque at Mysore	Director and Biologist
1999	Principles of wild avian medicine and surgery at Chennai	Biologist and Vet Officer
1999	Seminar on endemic and endangered plant and animal species on Eastern and Western Ghats	Director and Biologist
1999	Training in Tranquilization techniques at Chennai	Veterinary Officer, Ranger, Forests and Forest Guards
1999	Training on `Recent trend in Zoo Management' at Hyderabad and Tirupathi	Animal Keepers
2000	Workshop on captive breeding husbandry and management of king cobra at Mahabalipuram	Vet Surgeon, Biologist and Animal keepers

Year	Conference / training programme	Participants
2001	Workshop on techniques in keeping and care of amphibians in captivity at AAZP	Director and Field Staff
2004	1. Five days in house training on captive animal management at AAZP. 2.One day in house training on how to behave with visiting public at AAZP	Animal Keepers Zoo Drivers
2007	1.Regional workshop towards developing master plan for zoo education in India.Organised by CZA&CEE,Ahmedabad at AAZP, Chennai 2. Hands on training on Avian influenza to the vets working in Indian Zoos at AAZP.	Director & Biologists Director, Veterinarians & Biologists
2008	1.Endangered species recovery course at Durrell Wildlife Conservation Trust, Jersey, UK 2. Hands on training on Animal Record Keeping System (ARKS) held at Pune. 3. Workshop on disaster management plan held at Kanpur Zoo.	Veterinarian Biologist Director.
2009	1.Workshop to prepare 'Ex-situ and in-situ Conservation action plan' for the Amphibians 2.Veterinary aspects of conservation breeding of endangered animals in the zoos held at New Delhi 3.Training of veterinary work force on preparedness, control and containment of Avian Influenza held at Chennai	Biologist Veterinarian Veterinarian
2010	1.Workshop on Conservation, Education and Zoos held at Patna 2.National workshop for Zoo Biologist on 'Management of endangered species' held at Bhubaneswar 3.ISIS SPARKS Training Course, held at AAZP	Biologist Biologist Assistant Director, Veterinarians, Biologists
2011	1.Ex-situ wildlife conservation – Marketing, Fundraising and Resource management held at Hyderabad 2.Workshop on Chelonian healthcare and	Director Veterinarian

Year	Conference / training programme	Participants
	Management held at Chennai 3.National Conference on Wildlife Health and Forensics held at Jabalpur 4.Workshop for Zoo Veterinarians on 'Protocol for the veterinary care and safety of wild animals during transportation with special reference to deer species 5.American Association of Zoo Veterinarians Annual Conference held at Kansas City, IL, USA	 Veterinarian Veterinarian Veterinarian
2012	1.ISIS - ZIMS Training Course held at Chhatbir Zoo, Chandigarh 2.Workshop on Conservation, Education and Zoos held at Bhopal	Biologist Biologist

Besides formal training programmes, in house workshops of zoo staff are also organized regularly to evaluate the management status of the zoo animals and are deciding the strategy to mitigate the inadequacies.

1.8.4. Residential facilities-

The zoo has a good residential complex spread over 2.5 hectares of land with appropriate support infrastructure for all categories staff as per details given below-

1.	Director - 'A' Type	1
2.	Deputy Director - 'B' Type	1
3.	Assistant Conservator - 'C' Type	1
4.	Veterinary Officer- 'C' Type	1
5.	Assistant Engineer, Rangers, Superintendent, Veterinary Assistant surgeon - 'D' Type	7
6.	Forester, Assistant, Typist - 'E' Type	12
7.	Forest Guard, Basic Servant - 'F' Type	12+12
8.	Combined quarters for Mali's etc. 'G' Type	12
Total		**59**

The residential complex is separated from the zoo by a compound wall and does not have any direct opening to the zoo.

1.8.5. Animal keeper's welfare and safety

Animal keepers are supplied with one set of working dress (uniform) every year. Male animal keepers are supplied with khaki shirts and trousers. Female animal keepers are supplied with Khaki sarees and blouse. Field shoes, caps, gloves are supplied. Rain coats are supplied once in five years. Masks are supplied to avoid infection. Washing allowance of Rs. 30 per month is paid. To ensure safety of animal keepers 2 door system is followed strictly while feeding animals. In order to ensure proper cleanliness soaps are supplied to the Animal keeper once in a week/fortnight..

Periodical medical checkup is done at present in co-ordination with voluntary health service organizations like Sankara Nethralaya, Hindu Mission, Global Health Care Govt. Hospital Tambaram etc.,

1.8.6. Governing board

In order to deliberate and discuss management and development issues of the zoo and to take decision and timely action a Governing Board was constituted in 1981 with the following members:

1.	Secretary to the Govt. F&F Dept.,	Chairman
2.	Secretary to the Govt. RDLA Dept.,	Member
3.	Secretary to the Revenue Dept.	Member
4.	Secretary to the Govt. Finance Dept.	Member
5.	CCF	Member
6.	Director, AAZP	Member – Secretary

Zoo experts shall be co-opted as member as and when necessary for any specific matters. (GOMS No. 1027 F&F dated 26.8.81).

The Governing Board was reconstituted in GOMS No. 365 E&F dated 22.12.1998 with the following members.

1. Secretary to the Govt. E&F Dept.	Chairman
2. Secretary to the Govt. Finance Dept.	Member
3. Secretary to the Govt. Rural Devp. Dept.	Member
4. Secretary to the Govt. Animal Husbandry & Fisheries Dept.	Member
5. PCCF	Member
6. CWLW	Member
7. Director AAZP	Member-Secretary

8. Zoo experts and other members will be co-opted whenever needed. The Governing Board has held 34 meetings for discussion and approval of the agenda items for the management of the zoo.

1.8.7. Zoo Authority of Tamil Nadu

In accordance with the guidelines from the CZA and with an objective to facilitate supervision, control and management of AAZP and for flow of funds for development and improvement activities, the Government of Tamil Nadu approved Zoo Authority of Tamil Nadu in the G.O.Ms.No.314 E & F (FR-V) Department dated: 03.12.2004. A copy of Government order is appended in **APPENDIX-13.** The Governing board of Zoo Authority of Tamil Nadu has been reconstituted as below on 06.03.2013 to administer the Parks more efficiently.

The objectives are:

1. To develop and maintain AAZP and Children's Park in a self sustaining manner by receiving and utilizing the funds from Central and State Government etc.
2. To create understanding and awareness about Flora and Fauna through educational programmes
3. To undertake research on wildlife

4. To procure animals for zoos or exchange of animals and

5. To help in animal collection and exchange programme for all other zoos in Tamil Nadu.

The constitution is as follows:

1.	**Hon'ble Chief Minister of Tamil Nadu**	**Chairperson**
2.	Hon'ble Minister for Forest	Vice-Chairperson
3.	Secretary to the Government, E&F Department	Chairman
4.	Secretary to the Government, Finance Department	Member
5.	Secretary to the Government, Animal Husbandry and Fisheries Department	Member
6.	Principal Chief Conservator of Forest	Member
7.	Vice –Chanceller, Tamil Nadu Veterinary and Animal sciences University, Chennai	Member
8.	Director of Environment	Member
9.	Commissioner, Tourism Department	Member
10.	Chief Wildlife Warden	Member
11.	Director, AAZP	Member Secretary

1.9. MISCELLANEOUS

1.9.1. Zoo meteorological station

One rain gauge has been installed near the Rest House. Rainfall statistics are collected and recorded. The temperature and humidity data is also collected. The rainfall statistics for two years are given below

Year	Total no. of rainy days	Total rainfall in mm
20111 – 2012	24	500.40
2012 – 2013	6	60.00

1.9.2. Zoo orchard

A fruit orchard has been raised opposite to the veterinary hospital. Fruits normally required for the animals have been raised in the orchard. Many of the species planted have come

up well such as Coconut, Guava and Mango. The fruits raised in the orchard meet part of the requirement of the zoo animals and the rest is procured from the supplier.

1.9.3. Monkey menace and rodent menace-

Ungulates and birds are provided concentrates in open Kraals and feed cells .Both monkeys and rodents population keep on frequenting the zoo in search of food.Even the half eaten food left by the visitors in the vicinity of the cafeterias and restaurant also lure monkeys to the zoo. Zoo has been making active efforts to capture monkeys and eliminate rodents. However the population of the rodents keeps on building up and poses serious threat to the zoo animals as the former acts as carrier of tuberculosis and later as carries of Leptospirosis .Not only that, rodents do significant damage to the eggs of endangered species of birds, particularly vultures and pheasants.

CHAPTER - II

2. APPRAISAL OF THE FUNCTIONING & INFRA-STUCTURE OF THE ZOO

(STRENGTHS AND WEAKNESSES)

The main criteria for the performance of a zoo in India, fixed by the Recognition Of Zoo Rules 2009 are (1) the capability of the zoo to establish and sustain population of physically, genetically and behaviourally healthy animals of the species held in its stock by the zoo, (2) providing in the zoo naturalistic environment to provide the zoo visitors a communion with nature (3) making the visits to the zoo rewarding and memorable and thereby inculcating amongst them an empathy for wild fauna and flora. Arignar Anna Zoological Park being one of the largest and well managed zoos of the country has several areas of strength because of which it has made a significant contribution to the ex-situ conservation of endangered species of wild animals and development of conservation awareness. Undoubtedly the progress at some of the fronts has not been up to the expected levels due to certain inherent weaknesses. While deciding the future strategy the zoo should optimize the gains from the areas of its strength and mitigate the weaknesses. With this objective detailed appraisal of the various aspects of the functioning of the zoo and the available infrastructure is being done in this chapter.

2.1. ZOO LANDSCAPE

The undulating topography with a hillock in the center and the rich natural vegetation stocking the major part of the zoo provides the zoo visitors a real window in to nature. The layout of the road, animal enclosures and other infrastructure has also been finalized in such a manner that the continuity of the natural vegetative cover is maintained. Somehow during recent years lot of cement and concrete has gone in to construction of visitor paths around the enclosure and the visitor resting area. Series of dingy enclosures of crocodilian species without adequate green buffer also do not look naturalistic. These eye sores will have to be redressed over a period of time in a planned manner. Keeping with the prevailing trend at the time of construction of the zoo extensive plantations of ornamental trees has been done, which does not fit with the landscape of the zoo. The same need to be phased out expeditiously.

2.2. ZOO ANIMAL POULATION

The brief resume of the inventory of animals held in stock by the zoo is given under-

Year	Opening Balance	Births	Acquisitions	Disposals	Deaths	Closing Balance
2010-11	1379	73	9	49	98	1314
2011-12	1314	113	13	7	43	1390
2012-13	1390	57	31	22	54	1402
Total	**-**	**243**	**53**	**78**	**195**	

The animals housed at Arignar Anna Zoological Park during the period 2010-11 to 2012 -13 **(Appendix.6)** pertain to 147 species of which 48 species form part of Schedule I&2 of Wild Life(Protection) Act and 65 species form part of Schedule III&IV of the Act. 34 species are of exotic origin. The status of the population of the three categories is given under-

Species pertaining to Schedule I&II of the Act

Year	Opening Balance	Births	Acquisitions	Disposals	Deaths	Closing Balance
2010-11	376	10	5	10	29	352
2011-12	352	57	-	-	3	406
2012-13	406	33	6	20	23	402
Total	**-**	**100**	**11**	**30**	**55**	**-**

Species pertaining to Schedule III &IV of the Act

Year	Opening Balance	Births	Acquisitions	Disposals	Deaths	Closing Balance
2010-2011	910	56	4	39	65	866
2011-2012	866	53	13	7	34	891
2012-2013	891	22	17	2	20	908
Total		**131**	**34**	**48**	**119**	

Species of exotic origin

Year	Opening Balance	Births	Acquisitions	Disposals	Deaths	Closing Balance
2010-2011	93	7	0	0	4	96
2011-2012	96	3	0	0	6	93
2012-2013	93	2	8	0	11	92
Total		**12**	**8**	**0**	**21**	

The perusal of above figures reveal that the population of the animal species forming part of Schedule I&II have shown a rise of about 2% during the period 2010-11 to 2012-13.Animals of the species in the other two categories have not been able to maintain the original level. The name of the species under each category, which have increased in number is as follows-

1. Species forming part of Schedule I&II- palm civet, sangai, gaur, jackal, lion tailed macaque, porcupine, white tiger, pea fowl, salt water crocodile, reticulated python and rock python, total 11 species out of 48 or say 23%.
2. Species forming part of Schedule III&IV sambar, hybrid lion, duck manila, night heron, white pea fowl, pelican grey, red jungle fowl, painted stork ,total 8 species out of 75 species or say 11%.

3. Species of Exotic origin-Ostrich and hippo, total 2 species out of 34 or say 6%.For identification of the primary reasons for the stagnation/decline in population of various species are briefly summarized below.

Species forming part of Schedule I&II

(a) All the species of birds except pea fowl and sea eagle are unsexed and are represented by single animals. Sea eagle is represented. There can be several species not breeding.

(b) Out 28 species of mammals 8 species are represented by single/unpaired animals. Of the remaining 20 species, 12species have bred during last 3 years. The status of the population of these species is briefly summarized under-

2.3. LAY OUT PLAN OF THE ZOO

The CZA approved concept plan of the Arignar Anna Zoological Park is amended in A**ppendix 2**. Since no major change is required in the theme of the zoo, the existing lay out plan of the zoo will be followed in future also, subject to following changes-

1. The zoo will not have more than one display enclosure for any species. Excess animals if any would be housed in off display area

2. Enclosures for planned breeding of identified endangered species would be located in the conservation breeding/research areas.

3. Three new enclosures would be constructed for larger cats i.e. tiger, lion and panther in the conservation area. Existing lion enclosure would be used for housing wild ass after suitable modification. Tiger enclosure would be modified for rotational display of sambar. Continued display of such a large number of Sambars throughout the year, results in total annihilation of the vegetation of the enclosure.

4. The elephants would be shifted to a larger enclosure of about 25 hectares across the Road

5. Some modifications need to be made in the crocodile section to make the animal enclosures more naturalistic and to provide a green buffer

6. Provision of Quarantine wards will be made away from the hospital and the main zoo area.

2.4 .ANIMAL HOUSING ENCLOSURES IN THE DISPLAY AREA

As already mentioned in Chapter-I of the plan, paddock of most of the animal enclosures in the zoo are of adequate size and have enough vegetation to meet the behavioural requirement of the species housed there in. Even the feeding cells and night shelters are of appropriate dimensions. However, many of them are quite dingy and unfriendly to Keepers. These also have inadequate ventilation and light. Some of them will have to be redone and remaining would need modification.

Animals in most of the animal paddocks are subject to 360 degree viewing. The cement concrete moat walls and the feeding cells stand out predominantly and mask the naturalistic environment of the zoo. Green buffer between the adjacent animal enclosures is also lacking.Location of some of the viewing points have been located too close to the feeding cells Extensive and planned planting of native species of trees. shrubs and bamboos will have to be done to limit the viewing of animals by the visitors to less than 33% of the periphery of the moat, camouflage the cement concrete structures and give an immersion effect at the visitors viewing points.

Feeding kraals of most of the enclosures of ungulates have been located within the paddocks and the keepers have to walk through the animal herd to put in the feed in the kraal .It not only results in impacting of animals but is risky to the keepers Further it looks quite unaesthetic. Most of the kraals will have to be redone in such a way that these are not visible to the visitors and can be approached by the keeper without entering the main paddock. The physical contact between the keepers and animals should not be allowed unless doing so is essential for saving the life of the animal.

Brief evaluation of various animal enclosures is given under **(Appendix.7).**

2.4.1. Enclosure No 1, 2&4 Lotus/Lilly Pond, black swan enclosures and love bird enclosure

Both the enclosures are in the shape of water pools open to visitors and are not congenial to housing of any species of birds. Could be maintained as Lilly and Lotus ponds .Better option would be to do away with them and merge with the existing Children Park. The whole area could

be converted in to an open air interpretation center, where interactive devices could be provided to communicate a conservation message to the children. The love bird enclosure should also be done away with and merged in the interpretation center.

2.4.2. Enclosure No 6-10, 13-14 Primate enclosures

But for enclosure number 6 off exhibits Nilgiri langur breeding cage, enclosure number 8 Lion tailed macaque cage and enclosure number 13 Brown capuchin cage, all the primate enclosures have paddocks of appropriate dimensions and could continue as such. However the feeding cells of the Nilgiri langur enclosure are unfriendly to the keepers as well as the animals. Feeding cells of other species need to be modified by way of providing sky lights, improved ventilation and provision of lofts/perches.

The chimpanzee paddock has a wet moat. Keeping it clean is quite cumbersome job and involves wastage of lot of water. Because of drinking of water, the chimpanzees are exposed to serious health risks. Therefore the moat needs to be made dry.

Rope swings, ladders and wooden platforms in paddocks look quite unaesthetic and should be done away with. Large trees and their branches meet their behavioural needs fully .If required dry tree boles could also be planted.

Nilgiri langur cage and lion tailed macaque cage should be done away with and the animals moved to the conservation breeding area. The cage housing Capuchin could be modified to make it congenial to natural behavior of the species.

Planting of bamboos and suitable species of trees and shrubs should be done between enclosures of different species of primates to serve as green buffer and camouflage the animal houses and keeping the animal viewing by the visitors with in permissible limit.

2.4.3. Enclosure No. 11&12, 15-27, Bird enclosures

Enclosure 11-12-Two enclosures have been recently constructed but are roundish in shape which exposes the birds to visitors from all sides leaving no with drawl area. Behavioral enrichment is lacking. The enclosures need to be redone at a new site in the bird section in

appropriate design .These enclosures could be converted into visitors rest shade. Otherwise it could be converted into green area.

Enclosure 15 to 27 is having out dated designs which are not congenial to the species housed there in. These need to be reconstructed in a planned manner according to designs approved by the Central Zoo Authority.

2.4.4 .Ungulate enclosures No.28—33, 35, 38, 39 .40

Paddocks of all the enclosures mentioned above are of appropriate size and have adequate vegetation to meet the behavioural requirement of species housed there in. The moats need to be modified at identified place to bring an immersion effect. The kraals have to be redone at appropriate site, at a distant point from the visitor viewing point, in such a manner that the feed could be put in the kraal by the keeper without entering the paddock. The kraals should be covered on top with chain link to prevent the crows, macaques and the predators from getting in to the kraal. Such an arrangement would prevent the macaques and crows from contaminating the animal feed and the predation of fawns by the jackals

2.4.5. Tiger and lion enclosures

The tiger enclosure would be converted in to an ungulate enclosure by reducing the size of the moat and demolishing the animal houses .The feeding kraals of the sambar enclosures would be located at such a point that the animals from the kraal could be left in any of the two enclosures as per management needs. The lion enclosure would be modified for display of wild ass.

2.4.6. Common otter enclosure

The enclosure is in bad shape and has to be redone adopting appropriate design and using proper quality of glass. Effective water recycling plant will also have to be provided.

2.4.7. Giant squirrel enclosures

The enclosure of Giant squirrels should at least 2-3 trees enclosed in the enclosure to meet the behavioual requirement of the species. The enclosure could be in the shape of aviary covered on top by fiber glass .Design to be finalized in consultation with CZA.

2.4.8. Bear enclosures- enclosure No.42, 44 and 45

The three bear enclosures are appropriately designed and of adequate size .Non breeding of sloth bear, despite adequate number of animals is an area of concern. The enclosure should have only two males and three females. Excess animals could be moved to a new enclosure to be constructed in the off display breeding area.

2.4.9. Carnivore enclosures-enclosures No. 43, 50-53, 55- 58

Enclosure no43 was meant for housing the jackals is inadequate in size. The animals have been housed in enclosure no 50 which is appropriate for housing jackals from every angle. Similarly the enclosure no51 which houses wild dog is quite appropriate .Planting of bamboos and trees round the enclosure to limit the animal viewing with in permissible limit and camouflaging the excessive cement and concrete is required. Standoff barriers would have also to be designed appropriately.

Enclosure number 52 and 53 are appropriate for housing Hyaena and wolf. Need face lift including the desilting of the moat.

White tigers are at present housed in enclosure number 55, which is inadequate to house the large number of animals there in. It is proposed to modify the enclosure no.54 to house the white tigers .Enclosure number 55 and 58 could be taken out of the display area and used for further breeding of white tigers in a planned manner. Enclosure no 56 is fit to house jaguar. Enclosure no 57 need to be amended to house of Leopard cat.

2.4.10. Safari parks- Enclosure No.46 -49

Both, the deer safari and the lion safari are adequate in size and appropriately designed. Feeding cells of lion safari are also appropriately designed. The deer safari should have at least 4- 5 feeding platforms scattered over the entire safari. This would minimize the instances of fighting at the time of feeding and help dividing the deer population in to sub groups scattered over all parts of the safari and would make a naturalistic presentation to the visitors. At present the visitor’s road of the lion safari goes too close to the feeding cells. Seeing the lions close to

feeding cells deprives the visitors of the thrill of being in a lion safari. The alignment of the road should be changed in such a manner that the lions are seen by the visitors in naturalistic environment. This would require better nutritional and behavioural management. The lion safari does not have an emergency exit, which must be provided expeditiously.

Areas earmarked for bear safari and gaur safari are appropriate but the population status of the two species does not permit these safaris being operational. There is a great demand of gaur in the zoos falling within the habitat range of the species. Zoo will try to get other animals that are required to make its collections viable in exchange of Gaur.

2.4.11. Pointcalimere and Vedanthangal bird sanctuaries No. 59 &60

Enclosure no 59 and 60 exhibit the migratory birds commonly seen in Vedanthangal and Pointcalimere.

59A	-	Pointcalimere Birds (Egrets, Ibises, Spoonbills, Flamingoes and Storks)
59B.	-	Pointcalimere Birds (Pelicans and egrets)
59C.	-	Herons
59D	-	Rosy pelican
60		Six species of water birds

The aviaries are neither naturalistic nor congenial to the birds housed there. Water circulation system is also no effective. Preying of birds is also a serious problem. The aviary is to be constructed de-novo. The area of the enclosures has to be increased and the barriers made predator proof. The designs of the enclosures have to be finalized in consultation with experts to bring some reflection of the sanctuaries in the enclosures.

2.4.12. Bio-centre No. 61.

Rectangular shape aviary extending over an area of about 0.5 hectares. Repair of the chain link fixed at the top of the aviary has been a continuous pain in the neck .The aviary could be redesigned using the fiber glass at the top and providing adequate behavioural enrichment. Selection of species for display has to be made keeping due regard to the conservation of the species and communication of loud and clear conservation message. At present the species are being introduced in an ad hock manner. The visitors' path, water stream and behavioural

enrichment have to be upgraded. The toe wall of the side fence and the lower 2-3 feet of chain link have to be rodent and snake proof. The whole enclosure may have to be redone on the same lines as suggested for water bird aviaries.

1.4. 13. Vulture enclosure No.63 & Kites enclosure No. 62

Both the enclosures are not suitable for the species housed there foundation of the enclosures have to be rodent proof so that eggs laid by the birds are not damaged. The height and the area of the enclosure have also to be increased. The enclosures have to be constructed de-novo as per expert's advice. .

2.4.14. Tortoises & Turtles enclosure No. 64

Non congenial to the animals and require de-novo reconstruction.

2.4.15. Water Monitor Lizard enclosure No. 65

Further modification required to make the enclosure suitable for housing the Water Monitor Lizard.

2.4.16. Iguana enclosure No. 66

The enclosure will be demolished.

2.4.17. Serpentarium No. 68

The serpentarium has been renovated recently but suffers an inherent defect to the effect that the visitors see in the glass more of their reflection than the snakes housed in the animal cell. Further the white glazed tiles fixed on the walls of the visitors' gallery and the animal cells give a sterile look to the enclosure. Following improvements are needed to make the enclosure look naturalistic and facilitate the visitors to view the snakes clearly and appreciate their ecological significance-

1. White tiles to be replaced by buff coloured tiles both in the keepers gallery and the animal cells

2. Wall of animal cells painted with pictures of natural habitat housed there in and the lateral wall near the entrance gate be used for providing biological and ecological information about the snakes.

3. Potted shrubs like crotons placed in animal cells to give them naturalistic look

4 .Viewing glasses to be re-fixed at appropriate angle to minimize reflections in the viewing glass. Light intensity in the viewing gallery reduced to improve the visibility of snakes in the animal cell.

5**.** Air conditioners fitted in the King Cobra cells to be removed as the same would condition the snakes and make them unfit for release in the wild.

2.4.18. Amphibian House No.69

The existing Amphibian house has to be redesigned and constructed to make the enclosure animal friendly..

2.4.19. Crocodile enclosures No.66, 67, 70-76, 91 &92

Due to sudden gift of exotic species of crocodiles from the Chennai snake park, the zoo has constructed several enclosures which are quite small in size. The moats are also quite high and the children cannot see the animals. Minimum prescribed size of enclosure of crocodilian species under the Recognition of Zoo Rules is 400 Sq.m. The size of the water body is 150 Sq.m. All enclosures except enclosure number 72, 74&75 are smaller than prescribed dimensions. All other enclosures will have to be modified and enlarged in dimensions by merging the neighboring enclosures. Arrangement for water recycling will also have to be made .Basking areas where the animals can lie in the sun light and lay eggs will have to be provided.

2.4.20.. Elephant enclosure No. 78

Elephants have to be housed in off display area across the road. Minimum area for the enclosure has to be 25 hectares. The practice of Mahouts moving with the elephants round the clock would have to be done away with.

2.4.21. Wild boar enclosure. No. 79

This is a good enclosure for housing Wild boar .Both the design and the dimensions of the paddock are ok. The Kraal has to be modified.

2.4.22. Hippopotamus enclosure No. 80

The feeding cells of the enclosure need improvement. The water circulation system also needs to be upgraded. In the animal house doors are being damaged by the animals. . Water pool has to be redesigned

2.4.23. Pigmy Hippopotamus enclosure No. 82

Pigmy hippopotamus enclosure was originally designed for Rhinoceros. This enclosure is being used for exhibiting Pigmy hippopotamus. The animal house and enclosure require modifications.

2.4.24. Kangaroo enclosure No. 83

It will be merged with Ostrich enclosure after suitable modifications.

2.4.25. Giraffe enclosure No. 84.

Good enclosure. In the Animal house the roof has to be extended to give more protection from rain. The slope of the animal moat on the animal side has to be paved with unfinished stone pieces so that the animal does not enter the moat.

2.4.26. Ostrich enclosure. No. 84a

Good enclosure. Size of the enclosure is sufficient. Open yard is 16000 Sq.m. is sufficient. At present Ostriches are naturally breeding and taking care of chicks.

2.4.27. Nocturnal Animal House No. 85

Require modification. Before entering the main enclosure the visitors should spend some time in a specially created interpretation gallery with dim light. This will help the visitor's eyes to get accustomed to dim light and they can see the animals better. To provide the animals adequate exposure to the sun suitable outdoor enclosures should be provided in the back yard of the animal cells and the animal should be allowed to stay in the outdoor enclosures after visiting hours for the nocturnal house. The nocturnal house should be open to visitors from 11 AM to 5PM. The species to be kept in the nocturnal house should be common palm civet, small Indian civet, jungle cat, flying squirrel, jungle owlet, barn owl and porcupine. Binturong is an arboreal animal and should be displayed in a well-designed outdoor enclosure with one or two large trees to meet the behavioral requirement.

2.4.28. Zebra enclosure. **No. 86**

Appropriate enclosure for display and housing of zebra, behavioural enrichment need to be upgraded

2.4.29. Aquarium No. 87

There are 31 exhibits. They are well maintained.

2.4.30. Butterfly Park No.89

The existing butterfly park has to be demolished completely and new butterfly park with minimal use of cement concrete and greater reliance on planting host plants, shrubs and trees.

2.4.31. Spare enclosures No.94, 95, 96 & 97, 98, 99

These were meant for housing the small mammals. Designs are out dated and can be demolished .Enclosure number 98 could be used as off display enclosure for excess Gaur.

2.4.32. Otteri Lake . No.104 – a bird sanctuary within Arignar Anna Zoological Park

Otteri Lake is situated inside the Arignar Anna Zoological Park, which spreads over on extent of 7 hectares. This lake attracts a large number of migratory birds in October, November and December. About 70 of terrestrial and aquatic birds congregate here during the season. This lake has to be desilted and deepened. Plantation of species like *Barringtonia* and *Acacia nilotica*, *Eugenia jambolana*, *Teminalia arjun*a and *Trewia* sp should be done on the fringes of the lake. Fish seedlings should also be released in the lake to attract fish eating birds. At present, this lake is surrounded by a variety of trees. The bushes and tree may be trimmed to give a better view of the lake to the visitors. Further, the entire area can be provided with walk- in platforms and observation towers with binoculars in footpath. An Interpretation Centre will be constructed at the entrance of the lake to high light the ecological role of wetlands and the aquatic birds.

2.5 NUTRITION

The zoo makes every effort to provide all the species housed in the zoo adequate and appropriate feed to meet the nutritional and functional requirements of the animals but the zoos of the country have differing views about the quantity of food and the ingredients to be given to animals of various species. IVRI has prepared detailed guide lines on the subject. The same need to be followed.

Checking of the feed at present is done by several officers but the pinpointed responsibly has not been assigned to any officer. One veterinarian and the Assistant director should check the quality and the quantity of feed every day. They should give a certificate to this in the feed register.

2.6 .SANITATION AND HYGIENE IN THE ANIMAL ENCLOSURES

1. Zoo personnel make every effort to clean the feeding cells expeditiously and disinfect the feeding cells/kraals effectively but system for effective monitoring is not in place. The schedule of disinfection of the feeding cells and the paddock should be displayed in every feeding cell and the date of compliance be indicated on the same.

2. Antiseptic foot baths have not been provided at the entrance to the feeding cells. Keepers have not been provided with overalls gumboots to be worn at the time of feeding the animals. They

handle the animal feed and the animals in their normal uniform. Both the inadequacies are brought with the danger of microbial infection to the feed and animals

3. Feeding kraals being open at top facilitates the monkeys and crows sharing the animal feed and infecting the same with the microbes of infectious diseases.Kraals need to be covered on top with chain link of appropriate size.

2.7. PREVENTION OF DISEASES

1 .Screening of Keepers against the zoonotic diseases is being done in a very casual manner. Detailed list of the zoonotic diseases has not been prepared. The keepers are screened only for tuberculosis under a normal health check up scheme.

2. Prophylactic treatment is given to the zoo animals but the schedule for the same is not on display. System for monitoring the same has not been established.

3. Checking of the quality of the animal feed is done by the ranger, A.C.F, Dy. Director and the veterinarians but none of them certify the same on the feed register

4 .Feed samples are screened for microbial infection but the periodicity of the same has not been fixed. Ideally each consignment of ration received from the zoo should be screened.

2.8. DISEASE DIGNOSIS AND HEALTH CARE

1**.** Keepers are maintaining the diary of their observation about the behavior of the animals. However the Veterinarians and the Supervisors rarely go through these diaries and record their observations. But for forest guards, they do not maintain their own diaries. Therefore the advantage of the observations made by them is not available for disease diagnosis.

2**.** Periodic screening of the blood of the animals for infectious diseases is not done. Some system has to be put in place for taking blood samples from the animals randomly but frequently.

3. The viscera of the animals taken after the postmortem is not being sent for forensic and pathological examination for arriving on a definite conclusion about the cause of death.

The data available in the record of the zoo that several animals of species like Gaur, Black buck, Barking deer, Lion tailed macaque have died due to in fighting. The number of

animals going beyond the carrying capacity of the enclosure is the reason. Separation of sub-adult males from the herd at appropriate age can be crucial in reducing the mortalities. The protocol issued by the CZA on upkeep and health care of zoo animals on the basis of the recommendation made by IVRI should be followed in letter and spirit.

2.9 .VETERINARY HOSPITAL- TREATMENT OF ANIMALS

1. The zoo has three veterinarians .Two of them have joined recently and hardly have any experience in treating the wild animals. This is counter - productive.

2. The hospital has no reference library, which is a serious bottle neck in the treatment.

3. In –patient wards of the hospital are not congenial to the animals. Carnivores in patient wards are excessive.

4. Hospital does need necessary equipment however there would not be much advantage of buying very costly equipment, which is seldom used. The x- ray machine that has been installed is of no use without a radiologist. Developing a working arrangement with the veterinary college and outsourcing some of the services would be a better alternative.

5. Zoo does not have well equipped ambulance which hinders with expeditious treatment of animals

6. The postmortem room is dingy and substandard and need to be improved and upgraded

7. The documentation of the disease diagnosis and treatment of animals is not up to the prescribed standards

8. The Veterinary staff is in adequate to cope up with the work load in the hospital.

2.10. QUARANTINE FACILITIES

At present the zoo does not have quarantine facilities and the inpatient wards are being used for quarantining the new arrivals at the zoo .This is risky both for the sick animals kept in in-patient wards and the new animals arriving at the zoo. Infections of diseases from sick animals can pass to the animals under quarantine and vice versa. A new quarantine ward should be constructed away from the hospital in such a location that the new animals can be taken to the quarantine without passing through the zoo.

2.11. FEED STORE AND KITCHEN

1. The zoo store is being used at present to store of the feed as wells other store items. It should be used exclusively for storing feed items.

2. The mouse farming unit within the store campus can be a source of infections .The feed store should be rodent free

3. The kitchen of the zoo is dingy and dark .Needs modification and upgrading. Provision of gas should also be there,

2.12. SANITATION SECTION

Dust bins used for disposal of garbage by and large are nonfunctional. The Zoo should provide of appropriately designed garbage bins at appropriate location so that the bio degradable and non bio degradable and metallic waste can be segregated. These should be covered at top and located at appropriate distance from the animal enclosure. Compost pits need some modification for making the composting process more effective, expeditious and hygienic.

2.13. SECURITY SECTION

Recently there was intrusion into the zoo from Nedunkundram area and there was theft of Rosy Pelicans. To prevent such intrusions, the security wall need to be strengthened by providing alarm system barbed wire string along "Y" angle post over the compound wall and installing an alarm system .CCTV can also be installed in the area around stores ,hospital ,gate and the office.

Security of the zoo after the closure of the zoo needs higher priority. The zoo should keep adequate number of security guards and supervisors during this period either by creating posts on a regular basis or outsourcing the security services. **S**urprise checking by rangers and senior officers, off course, is crucial

2.14. WATER SUPPLY SECTION

The future requirements of water will be around 6 to 7 lakhs liters per day, as against the present requirement of 4.5 lakhs liters per day. Under Palar water scheme, the quantum of supply is only 2 to 3 lakhs liters per day as against the projected capacity of 13 lakh liters per day. Appropriate measures have to be taken for realizing the full potential of the scheme

2.15. ELECTRICITY

Underground power cables lines have been laid out in part of the zoo area to prevent loss of electricity and security of the zoo animals. The work need to be executed in the remaining area also Zoo has to make sincere efforts to reduce the power consumption in the zoo by innovative changes in the zoo designing and showcasing power saving devices like alternative sources of energy particularly use of solar panels and biogas.

2.16. VISITOR AMENITIES

During recent years, zoo has taken several initiatives to upgrade the visitor facilities at the Zoo. A new gate has been constructed at a prominent location to ensure that visitors do not miss the zoo and over shoot on the high way. The parking area has been made more congenial and convenient to the vehicle owners coming to the zoo. Ticketing facilities have been relocated at a convenient place and the number of ticketing windows have been appropriately increased .A cloak room has been provided at the gate to facilitate them to travel in the zoo with minimum luggage. First aid facilities have also been provided at the Gate. The roads being used as visitors' path have been upgraded and adequate number of BOVs has been commissioned to take the visitors round the earmarked route. The vehicles stop at designated stations and give the visitors adequate time to see the animals of all the enclosures in that area. For the visitors who prefer to walk on foot round the zoo adequate number of drinking water points and refreshment kiosks have been provided. The restaurants and the cafeterias have also been made visitor friendly by enforcing the highest standards of sanitation and hygiene.

As the number of visitors is rising constantly and on public holidays there is great rush on the visitor paths, the possibility of developing two to three sub-loops and dedicating certain required number of BOVs on each sub loop will have to be explored. The vehicle fare can be included in the zoo entry ticket itself and the zoo visitors should be allowed to hop in and hop off the vehicles as and where the visitors feel like.

To facilitate the visitors to reach the zoo conveniently, the STATE TRANSPORT CORPORATION is connecting the zoo directly to all the important localities of the city. There are around 100 bus shuttle connecting various important locations with Vandalur Zoo. During Festival

days there are extra 50 shuttles arranged by PTC. The possibilities of having a monorail between Vandalur Station and the zoo gate should be explored

As the zoo extends over extensive area, the possibilities of visitors walking on foot getting lost are always there..Hence fixing up zoo map at prominent locations and indicating the direction of main enclosures and the zoo gate has been done with some signage . This needs further up gradation.

2.17. ZOO EDUCATION

The zoo has made significant efforts to upgrade the zoo education infrastructure including installation of a modern interpretation center near the gate and informative sign boards at most of the enclosures .However there is scope for lot of improvement. Some suggestions are given under-

1. Font of letters on the sign boards to be increased to make it convenient to read them. Information provided on each board has to be made more concise and pin pointed so that loud and clear conservation message is communicated to the visitors.
2. Interactive interpretation facilities should be provided in the interpretation center, children area near the gate and near the visitors viewing points at the enclosures.
3. Pre-recorded running commentaries should be displayed in the visitor vehicles to inform about the ecological and biological information about the animals on display in the zoo.
4. A zoo guide **(Appendix.12)** service should be introduced in the zoo. Young graduates should be motivated, trained and registered to serve as zoo guide at the zoo at notified professional charges. Their technical skills should be constantly upgraded through training and periodic examinations .Zoo education officer should develop technical package for them.
5. Keepers and zoo Rangers should also be encouraged to talk to the zoo visitors and provide relevant information about the upkeep and health care of zoo animals.

2.18. BREEDING OF ENDANGERED SPECIES

The zoo has done well in breeding of endangered species particularly the Lion tailed Macaque. Nilgiri langur, Indian Gaur, Wild dog. However no concerted efforts have been made for planned genetic management and safeguard against inbreeding depression. No new blood has been introduced for the last 25 years or so. Zoo must liberally part with the existing stock to any zoo that can offer animals of wild origin in exchange. Remaining animals could be used for

display purposes .Planned breeding in the conservation area should be confined to the breeding stock comprising all the unrelated animals. Each animal in the breeding programme has to be marked and moved out of the zoo in such a way that no genetically related animals can breed.

Special efforts have to made by the zoo to breed the species that have not done well in the past.This would require strengthening the breeding pool by getting new animals of the species, nutritional management, hormonal therapy and if necessary artificial insemination. It goes without saying that all planned breeding programmes will have to be carried out in the area, ear marked for conservation breeding.

All the enclosures in the conservation breeding area will have to be designed as per behavioral needs of the species. Since the area is closed to visitors, moated barriers are not required. Chain-link fence of *appropriate dimensions would serve the purpose.*

2.19. RECORD KEEPING

The zoo as member of ISIS is doing well by maintaining data of animals under planned breeding programme in the format prescribed by the ZIMS but it does not exonerate the records mandated by the Recognition of Zoo Rules i.e. Stud Book, Animal history sheet and treatment card for each animal of the programme.

Observations on the behavior of each animal is crucial for successful husbandry and breeding, Provision of CCTV may help the process .Deployment of research assistance for the purpose under project mode may have to be adopted

2.20. CONSEVATION BREEDING-

The zoo is a coordinating zoo for Nilgiri Langur and Lion Tailed Macaque. Basic principles of breeding of endangered species would apply here but a detailed breeding plan would have to be prepared for meticulous genetic management of the animals. The two species of animals will have to be moved to other participating zoos as per guidelines issued on the subject.

2.21. ZOO RESEARCH

The zoo has 3 whole time biologists who have been collecting data on biology and behavior of various species of wild animals and published papers from time to time **(Appendix.11)**. However these papers have provided very little management inputs to the zoo .Zoos have been competing with each other to have as many species in their stock. Scientific literature has information regarding upkeep and health care only for the species that are

traditionally housed in zoos. Due to little information on housing, upkeep and biology, behavior & breeding of lesser known species the performance of the zoos is quite poor in respect of the species. Concerted research efforts on some of the species by selected zoos have totally changed the picture. Pigmy hog, Pangolin, Red panda, Mouse deer and Vultures which hardly survived in zoos for decades together have not only been successfully bred but substantial populations of these species have also been built and the captive bred animals have also been reintroduced. In this background the zoo must have an off display breeding center /research center where scientific studies must be conducted on housing, upkeep, health care, breeding behaviour of lesser known species. Director to oversee the scientific work at the research station. One veterinarian, two biologist should be put in position to assist the Deputy Director. Research assistants should be engaged in research projects to be executed on following aspects of zoo management—

1. Optimum dimensions of the enclosures and the behavioural enrichment needs of various species of zoo animals
2. Nutritional needs and upkeep of lesser known species of zoo animals
3. Breeding biology and genetics management of endangered species of smaller mammals birds and reptiles
4. Signage and interpretation facilities
5 .Health care and optimizing the breeding potential of the animals of endangered species

2.22. RESCUE FACILITIES

The rescue center of the zoo has at present housing facilities only for tiger and lions that had passed their prime. Majority of these animals have already died. Remaining animals would also die in next few years. The zoo is unlikely to get so many large cats in the near future. The zoo will have to take a well- considered decision about the future use of the area. One of the options is to keep only such number of large carnivores as are received as rescued animals from the wild. Remaining feeding and paddocks could be demolished. Night shelters and paddocks for ungulates and primates could be constructed in the area earmarked for the rescue center far away from the carnivore area. Alternatively the empty carnivore cells could be dedicated to the lion safari which can be shifted from the main campus to this area .The rescue center could then be constructed in the lion safari area. The first option seems to be more feasible.

2.23 .INTRODUCTION OF ZOO BRED ANIMALS INTO IN-SITU POPULATIONS

The zoo has large number of captive bred lion tailed macaques and Nilgiri langur which have a very narrow genetic base. Using all the animals for future Conservation Breeding programme is not desirable. The zoo could part away with at least half of the animals and use one or two pairs in the conservation breeding programme and rest for display in the zoo. The animals that the zoo wants to part away can be used best for release in the wild following the IUCN guidelines under the supervision of the experts. Animals would have to be kept for quite some time in a soft release area for imparting skills to fend themselves in the wild.

Zoo has very large population of free ranging Sambar and Spotted deer. It would be worthwhile to release these animals in suitable wildlife habitats after D.N.A screens and PC R screening. Post release monitoring and effective protection are mandatory and imparting the fending skills at a soft release center will also have to be done

2.24. GENERAL ZOO ADMINISTRATION SECTION

Zoo management is multi- faceted science. On one hand it involves scientific management of the species of animals housed in the zoo for ensuring optimum biological productivity and on the other hand requires communication skills of highest degree to sensitize the zoo visitors to adopt sustainable life styles and support the national conservation efforts. Dealing with the millions of visitors that visit the zoo and satisfying their expectations again is an herculean task and needs highest administrative acumen. Dealing with the complex problems of zoo requires very close monitoring and supervision. This requires adequate number of technically competent and experienced senior level officers. Arignar Anna Zoological Park is singularly fortunate zoo in the country to have requisite number of senior officers in position .Central Zoo Authority has taken considerable pains to upgrade the technical skills of the officers through various trainings and workshops. However the benefits of these efforts are more often than not lost by frequent transfers of the officers. Government must put some mechanism in place including provision of in-situ promotions to ensure that officers posted in the zoo have minimum tenure of five years.

The zoo has one Assistant Conservator of Forests, one Deputy Director and one Director. The report of the Range Officers has to pass through two levels before reaching the level of Director. Such a long chain command/communication is counter- productive. Assigning the Assistant Director and Deputy Director specific areas of responsibilities and make them report to Additional Director who in turn reports to Director can bring greater efficiency in the working. Assistant Director, Veterinarians could also report to the Additional Director. It would be appropriate to redesignate the Assistant Director as Animal Curator and give him the responsibility of feeding and upkeep of the zoo animals as well as maintenance of animal enclosures .Range officer -I ,Range officer-2 and Range officer III should report to him and redesignated as Assistant Animal Curators .The Deputy Director should have the responsibility of zoo education and interpretation, visitor management, visitor amenities , planning & coordination and cooperation with other organizations. Coordination with Veterinary College and research labs assigned clinical investigation should be the responsibility of the Assistant Director and Veterinarians. Biologists should also be assigned clear cut responsibilities i.e. avian species, carnivores, mammals and reptiles.

Zoo keepers are the king pivot of the animal management .Most of them work quite sincerely but they have no promotional prospects. They join as keepers and retire as keeper .Zoo should create some posts of senior keepers and 3 posts of head keepers. Minimum educational qualification for recruitment to the post of keeper must also be fixed.

Zoo management needs specialized skills and scientific inputs on animal biology, health care and the zoo education .However at present no incentives are available to zoo staff to upgrade their basic qualifications and technical skills by obtaining higher degrees. No concerted efforts have been made in this regard by any zoo personnel, except the biologists. Provision of lump sum honorarium to the staff that enhance their technical and educational qualification should be made in the zoo rules**.**

PART-II

CHAPTER-I

1. FUTURE MANAGEMENT OF THE ZOO

Degradation of the rich biodiversity of the Eastern Ghats and the Western Ghats over the years has seriously impacted the life supporting processes of the nature and the state of Tamil Nadu in the recent past has faced severe environmental catastrophes like Tsunami and cyclones. Drought and famines are getting more pronounced. In the best interest of the long *term* welfare of the people, this negative trend has to be reversed and concerted efforts have to be made to restore the productivity of the soil, availability of the water in the river and the environmental security of the coastal areas. This laudable objective can be achieved only through the support of all the stake holders including the people at large. Being the largest zoo of the country, Arignar Anna Zoological Park must make a significant contribution in achieving this laudable goal.

1.1 .VISION OF THE ZOO

Tamil Nadu with biodiversity rich Ghats, rivers with perpetual supply of clean water, fertile agricultural fields and safe coastal zone areas

1.2 .MISSION OF THE ZOO

1. To create amongst the zoo visitors an empathy for wild animals that motivates them to care, protect and conserve the wild animals and their habitat

2. To assist the wildlife conservation authorities in augmenting and rejuvenation of impoverished in-situ populations of endangered species

3. To provide the orphaned, disabled and confiscated wild animals, unfit for release in the wild, a high quality of life and comfortable living

1.3. STRATEGY FOR REALISING THE MISSION

1.3.1. Sub mission .1

1.To develop and maintain self -sustaining populations, comprising of physically, genetically and behaviourally healthy animals, .of all the species of wild animals of all the animals housed by the zoo,

2 Thematic and planned display of the animals in nature simulating environment and in enclosures that are congenial to their physical health and the display of their species specific behaviour.

3. To provide at each enclosure appropriate signage and interpretation facilities that can enable zoo visitors to appreciate and understand the ecological linkages between various species of fauna and flora and its role in maintaining the life supporting processes of nature intact

4 To facilitate the visitors in having an opportunity to view animals in various enclosures in a hassle free manner and secure and congenial environment so that the visit becomes memorable and rewarding

1.3.2. Sub mission .2

1 To carry out planned conservation breeding programme of the species endemic to the region, especially Lion tailed macaque and Nilgiri langur to raise animals of the species that are physically, genetically and demographically fit for release in to the wild

2.To assist other zoos in conservation breeding of other endangered species particularly Gaur, wild dog ,wolf, giant squirrels and pied horn bills by way of donating animals to broaden the founder base and providing technical details on upkeep ,health care and husbandry.

1.3.3. Sub mission .3

To create necessary quarantine and housing facilities to accommodate the rescued animals and provide necessary upkeep and health care facilities for them

1.3.4 .General conservation measures

1 Take innovative measures to minimize the carbon foot printing of various zoo operations including efficient disposal and use of wastes and minimizing the use of cement concrete through adoption of green methodology

2. To conserve water and electricity through use of water recycling equipment and power saving devices and show casing the same to the visitors

1.3.5 .Upgrading the professional skills of the zoo personnel at all levels

1. Putting in place a mechanism of close monitoring of all the operations pertaining to various aspects of the management of the zoo and meticulous recording of the same
2. Regular analysis of the data and initiate measures to redress the inadequacies through in house meetings, training programmes and holding workshops of experts.

CHAPTER -II

2. DEVELOPING AND MAINTAINING SELF SUSTAINING POPULATIONS

Appraisal of the zoo population of various species clearly reveals that the population of most of the species is either stagnating or declining due to non- viable numbers. The main focus of the plan would be on having at least two males and 3 females of every species .The animals have to not only be behaviourally compatible but also capable of breeding. To get such a number and such animals is going to be very challenging task particularly for the species that are available in limited numbers .Therefore the list of the species to be included in the collection plan of the zoo has to be prepared meticulously keeping due regard to the conservation objective, availability of animals and past performance of the species in the zoo. The congeniality of the climate of Chennai is also an important prerequisite.

Taking all the aforesaid factors into consideration following collection plan has been finalized for the zoo

2.1. ANIMAL COLLECTION PLAN FOR THE ZOO

Sl. No	**Name of the species**	**Existing Number**				**Minimum No .of animals to be maintained**			**Optimum number of animals**			**Animal to be disposed or acquired**		
		M	**F**	**U**	**T**	**M**	**F**	**T**	**M**	**F**	**T**	**M**	**F**	**T**
Schedule I and II														
	BIRDS													
1	PEAFOWL (*Pavo cristatus*)	5	3	4	12	2	5	7	6	14	20	1	7	8
2	SEA EAGLE WHITE BELLIED (*Haliaeetus lecogaster*)	1	1	0	2	2	5	7	6	14	20	1	4	5
	MAMMALS													
1	ASS WILD INDIAN GHORKHAR (*Equus heminous khur*)	1	1	0	2	2	3	5	4	6	10	1	2	3

2	BEAR SLOTH (*Melursus ursinus*)	4	4	0	8	2	3	5	4	6	10	0	0	0
5	BLACK BUCK KRISHNA MRIG (*Antilope cervicapra*)	2	5	0	7	2	3	5	4	6	10	0	0	0
6	JUNGLE CAT(*Felis chaus*)	0	1	0	1	2	5	7	6	14	20	2	4	6
7	SWAMP DEER (*Cervus duvauceli*)	1	2	0	3	2	3	5	4	6	10	1	1	2
9	LORIS SLENDER (*Lydekkerianus*)	1	1	0	2	2	5	7	6	14	20	1	4	5
10	PALM CIVET CAT (*Paradoxure hemaphroditus)*	3	3	4	10	2	5	7	6	14	20	0	0	0
11	DEER BROW ANTLERED (*Cervus eldi eldi)*	2	1	0	3	2	3	5	4	6	10	0	2	2
12	DOG WILD (DHOLE) (*Cuon alpinus)*	4	5	0	9	2	5	7	6	14	20	0	0	0
13	ELEPHANT INDIAN (*Elephas maximus)*	4	0	0	4	2	3	5	4	6	10	0	3	3
14	GAUR INDIAN (*Bos gaurus)*	4	6	0	10	2	3	5	4	6	10	0	0	0
15	JACKAL (*Canis aureus*)	3	3	0	6	2	5	7	6	14	20	0	2	2
17	GREY LANGUR (*Semnopithecus thersites)*	1	2	0	3	2	5	7	6	14	20	2	2	4
18	LANGUR NILGIRI (*Semnopithecus johni*)	5	9	2	16	2	5	7	6	14	20	0	0	0
19	LEOPARD / PANTHER (*Panthera pardus*)	3	2	0	5	2	3	5	4	6	10	0	1	1
20	LION INDIAN(*Panthera leo persica)*	1	0	0	1	2	3	5	4	6	10	2	2	4
21	MACAQUE BONNET (*Macaca radiata)*	2	1	0	3	2	5	7	6	14	20	0	4	4
22	MACAQUE LION	9	10	3	22	2	5	7	6	14	20	2	0	2

	TAILED(*Macaca silenus)*													
23	MACAQUE RHESUS (*Macaca mulatta)*	19	13	0	32	2	5	7	6	14	20	13	0	13
24	OTTER COMMON (*Lutra lutra)*	1	1	0	2	2	5	7	6	14	20	1	4	5
25	PORCUPINE BENGAL (*Atherucus mecrourus assamensis)*	3	3	0	6	2	5	7	6	14	20	0	2	2
26	SQUIRREL FLYING	1	0	0	1	2	5	7	6	14	20	1	4	5
27	SQURREL GIANT MALABAR / INDIAN (*Rutufa indica*)	1	1	0	2	2	5	7	6	14	20	1	4	5
28	WOLF(*Canis lupus)*	0	0	0	0	2	5	7	6	14	20	2	5	7
29	GRIZZLED GIANT SQUIRREL (*Ratufa macroura*)	1	1	0	2	2	5	7	6	14	20	1	4	5
30	TIGER BENGAL WHITE (*Panthera tigris tigris)*	3	6	0	9	2	3	5	4	6	10	0	0	0
31	TIGER BENGAL (*Panthera tigris tigris*)	1	2	0	3	2	3	5	4	6	10	1	1	2
	REPTILES													
1	COBRA INDIAN (*Naja naja)*	0	0	3	3	2	5	7	6	14	20	1	3	4
2	CROCODILE - GHARIAL (*Gavialis gangeticus*)	2	2	0	4	2	5	7	6	14	20	0	3	3
3	CROCODILE MARSH (MUGGER) (*Crocodylus palustris*)	0	0	115	115	2	5	7	6	14	20	20	20	40
4	CROCODILE SALT WATER *(Crocodylus porosus*)	1	0	1	2	2	5	7	6	14	20	1	4	5
5	MONITOR LIZARD / COMMON INDIAN (*Varanus bengalensis*)	1	1	0	2	2	5	7	6	14	20	1	4	5
7	PYTHON INDIAN ROCK	0	0	9	9	2	5	7	6	14	20	0	0	0

	(*Python molurus molurus)*													
8	PYTHON RETICULATED (*Python reticulatus*)	0	2	20	22	2	5	7	6	14	20	1	1	2
9	SNAKE KEELBACK CHECKERED (*Xeno chrophis piscator*)	0	0	7	7	2	5	7	6	14	20	0	0	0
10	SNAKE RAT / DHAMAN (*Ptyas mucosus*)	0	0	10	10	2	5	7	6	14	20	0	0	0
11	VIPER RUSSEL'S (*Vipera ruselli*)	0	0	3	3	2	5	7	6	14	20	2	2	4
12	KING COBRA (*Ophiophagus hannah*)	1	0	0	1	2	5	7	6	14	20	1	5	6
	Schedule III,IV &Exotics													
	BIRDS													
1	CASSOWARY (*Casuarius unappendiculatus*)	1	0	0	1	2	5	7	6	14	20	1	5	6
2	SULPHUR CRESTED COCKATOO(*Cacatua gaterita)*	1	1	0	2	2	5	7	6	14	20	1	4	5
3	CRANE DEMOISELLE (*Anthropoides virgo)*	0	0	2	2	2	5	7	6	14	20	1	4	5
4	CRANE SARUS *(Grus antigone)*	1	1	0	2	2	5	7	6	14	20	1	4	5
5	SHELDUCK COMMON(*Tadora tadora)*	0	0	3	3	2	5	7	6	14	20	1	3	4
6	RUDDY SHELDUCK (*Tadora ferruginea)*	0	0	7	7	2	5	7	6	14	20	0	0	0
7	COMB DUCK (*Sarkidiornis melanotus*)	0	0	1	1	2	5	7	6	14	20	1	5	6
8	EGRET LITTLE (*Egretta garretta*)	0	0	80	80	2	5	7	6	14	20	0	0	0
9	OSTRICH (*Strutheo camelus*)	1	1	6	8	2	5	7	6	14	20	0	0	0
10	EMU (*Dromaius novaehollandiae*)	1	1	0	2	2	5	7	6	14	20	1	4	5

11	GOOSE (*Anser anser)*	0	0	3	3	2	5	7	6	14	20	1	3	4
12	GOOSE WHITE (*Anser anser*)	1	0	10	11	2	5	7	6	14	20	0	0	0
13	BAR HEADED GOOSE (*Anser indicus*)	0	0	4	4	2	5	7	6	14	20	1	2	3
14	HERON EASTERN GREY (*Ardea cinerea*)	0	0	16	16	2	5	7	6	14	20	0	0	0
15	HERON NIGHT (*Nycticorax nycticorax*)	0	0	129	129	2	5	7	6	14	20	20	20	40
16	HERON POND (*Ardeola grayii*)	0	0	3	3	2	5	7	6	14	20	1	3	4
17	IBIS WHITE (*Threskiornis aethiopica)*	0	0	6	6	2	5	7	6	14	20	1	1	2
18	MACAW RED & GREEN (*Ara chloroptera*)	0	0	1	1	2	5	7	6	14	20	2	4	6
19	PARAKEET ALEXANDRIN (*Psittacula eupatria*)	6	4	0	10	2	5	7	6	14	20	0	0	0
20	PARAKEET RED BREASTED *(Psittacula alexandri*)	0	0	1	1	2	5	7	6	14	20	2	4	6
21	PARAKEET ROSE RINGED (*Psittacula krameri*)	10	15	47	72	2	5	7	6	14	20	10	10	20
22	PARAKEET ROSE RINGED (MUTANT)(*Psittacula krameri*)	7	3	0	10	2	5	7	6	14	20	0	0	0
23	PARAKEET MALABAR (*Psittacula columboides)*	0	2	5	7	2	5	7	6	14	20	0	0	0
24	PARAKEET BLOSSM HEADED (*Psittacula cyanocephala*)	1	0	15	16	2	5	7	6	14	20	0	0	0
25	PARROT AFRICAN GREY (*Psitacus erithacus)*	1	1	0	2	2	5	7	6	14	20	1	4	5
26	PARROT ELECTUS (*Electus roratus)*	1	1	0	2	2	5	7	6	14	20	1	4	5

27	ROSELLA EASTERN (*Platycerus exinus)*	0	1	0	1	2	5	7	6	14	20	2	4	6
28	PARROT REDWINGED (*Aprosmictus erythropterus)*	1	1	0	2	2	5	7	6	14	20	1	4	5
29	CONURE JANDAYA (*Aratinga jandaya)*	1	1	0	2	2	5	7	6	14	20	1	4	5
30	CANURE SUN (*Aratinga solstitiatus)*	1	1	0	2	2	5	7	6	14	20	1	4	5
31	PEAFOWL WHITE (*Pavo cristatus)*	2	3	11	16	2	5	7	6	14	20	0	0	0
32	PELICAN GREY (*Pelecanus philippensis*)	0	0	17	17	2	5	7	6	14	20	0	0	0
33	PELICAN ROSY / WHITE (*Pelecanus onocrotalus*)	0	0	5	5	2	5	7	6	14	20	1	1	2
34	REDJUNGLE FOWL (*Gallus gallus murghi)*	4	3	2	9	2	5	7	6	14	20	0	0	0
35	GREY JUNGLE FOWL(*Gallus gallus sonneriti*	1	1	0	2	2	5	7	6	14	20	1	4	5
36	RED SPUR FOWL(*Galloprdix spadicea)*	0	0	0	0	2	5	7	6	14	20	2	5	7
37	PAINTED SPUR FOWL (*Galloperdix lunulata)*	0	0	0	0	2	5	7	6	14	20	2	5	7
38	GREY PARTRIDGE (*Francolinus pondicerianus)*	0	0	0	0	2	5	7	6	14	20	2	5	7
39	RINGNECKED PHEASANT (*Phasianus colchicus)*	2	2	0	4	2	5	7	6	14	20	0	3	3
40	PHEASANT GOLDEN (*Chrysololphus pictus)*	1	1	0	2	2	5	7	6	14	20	1	4	5
41	PHESANT SILVER (*Lophura nyethemera*)	2	3	0	5	2	5	7	6	14	20	0	2	2
42	STORK PAINTED (*Mycteria leucocephala*)	0	0	109	109	2	5	7	6	14	20	0	0	0
43	VULTURE WHITE BACKED	0	0	2	2	2	5	7	6	14	20	1	5	7

	BENGAL(*Gyps bengalensis*)													
	MAMMALS													
1	BABOON SAVANA (*Papio cynocephalus*)	2	0	0	2	2	5	7	6	14	20	0	5	5
2	CAPUCHIN BROWN (*Cebus apella)*	2	1	0	3	2	3	5	4	6	10	0	2	2
3	CHIMPANZEE (*Pan troglodytes*)	1	3	0	4	2	3	5	4	6	10	1	0	1
4	DEER BARKING MUNTJAC (*Muntiacus muntjak)*	6	6	4	16	2	5	7	6	14	20	0	0	0
5	DEER HOG (*Axis porcinus)*	6	7	2	15	2	5	7	6	14	20	0	0	0
6	DEER SAMBAR (*Cervus unicolor)*	31	52	8	91	2	3	5	4	6	10	20	20	40
7	DEER SPOTTED (CHITAL) (*Axis axis)*	5	23	8	36	2	3	5	4	6	10	3	13	16
8	GIRAFFE (*Giraffa cameleopardalis*)	1	1	0	2	2	3	5	4	6	10	1	2	3
9	HIPPOPOTAMUS *Hippopotamus amphibius)*	2	2	0	4	2	3	5	4	6	10	0	1	1
10	HIPPOPOTAMUS PIGMY (*Choeropsis liberiensis*)	2	0	0	2	2	3	5	4	6	10	0	3	3
11	HYAENA STRIPPED *(Hyaena hyaena)*	3	2	0	5	2	5	7	6	14	20	1	3	3
12	JAGUAR *(Panthera onca)*	1	0	0	1	2	3	5	4	6	10	1	3	4
13	LION HYBRID (*Panthera leo)*	12	9	0	21	2	3	5	4	6	10	0	0	0
14	NILGAI / BLUE BULL (*Boselaphust tragocamelus*)	1	4	0	5	2	3	5	4	6	10	1	0	0
15	WILD BOAR (*Sus scrofa)*	1	3	0	4	2	3	5	4	6	10	1	0	0
16	ZEBRA GRANT	0	2	0	2	2	3	5	4	6	10	2	1	3

	(*Equus burchelli bohemi*)													
	REPTILES													
1	CAIMAN SPECTACLED (*Caiman caiman)*	0	2	0	2	2	5	7	6	14	20	2	1	3
2	AMERICAN ALIGATOR (*Crocodylus missippiensis)*	2	0	0	2	2	5	7	6	14	20	0	5	5
3	SIAMEST CROCODILE (*Crocodylus siamensis)*	1	1	0	2	2	5	7	6	14	20	1	3	4
4	POND TURTLE INDIAN(*Melanochelys trijuga*)	0	0	19	19	2	5	7	6	14	20	0	0	0
5	KRAIT COMMON INDIAN (*Bungarus caeruleus*)	0	0	2	2	2	5	7	6	14	20	2	3	5
8	SNAKE GREEN (*Ahaeutulla nasutus*)	0	0	6	6	2	5	7	6	14	20	1	1	2
9	SNAKE KEELBACK STRIPPED (*Amphiesma stolata)*	0	0	4	4	2	5	7	6	14	20	1	2	3
10	COMMON INDIAN TREE SNAKE (*Dendrelaphais tristis*)	0	0	2	2	2	5	7	6	14	20	2	3	5
11	TORTOISE INDIAN STAR (*Geochelone elegans)*	0	0	13	13	2	5	7	6	14	20	0	0	0
12	VIPER SAW SCALED (*Echis carinata*)	0	0	3	3	2	5	7	6	14	20	2	2	4
13	RED EARED TURTLE (*Chrysemys scripta elegans)*	0	0	5	5	2	5	7	6	14	20	1	1	2

2.2. MAKING THE ZOO POPULATION SELF-SUSTAINING

Zoo needs to optimize the population growth of every species housed in the zoo by improved husbandry. The first and foremost requirement for this is to have no un-mated animals in the zoo. Mates for single animals will be obtained on highest priority, even at the cost of reducing the number of species housed at the zoo

Sexing of the unsexed animals should be done on priority basis with the help of physical examination of zoo animals. Where it is not found to be effective, endoscopy should be resorted to. If that is also not found effective DNA fingerprinting will be done and it would be ensured on priority basis. Regular assessment of the age of the animals would also be done and the animals that have passed their prime would be moved to the rescue facilities and new animals that are at their prime would be acquired and displayed in the zoo. The biologists would monitor the behaviour of the animals on a regular basis and the non-compatible animals would be replaced by compatible animals**.** Where replacement of animal is not possible, hormonal therapy/assisted reproduction will be resorted to. Experience has shown that many species which do not breed in display enclosures sometimes breed in off display area. Therefore the zoo would endeavor to provide off-display enclosures for most of the endangered species which are in conservation breeding programme.

2.3. GENETIC MANAGEMENT

Sincere efforts would be made to make a detailed breeding plan for various endangered species housed in the zoo to prevent inbreeding altogether. Even in cases of prolifically breeding species which live in herds at least one new male would be introduced every year .It need not be highlighted that this would need concerted efforts **to** get the animals from other zoos either on exchange basis or on breeding loans .Dy. director of the zoo shall be made personally responsible for this.

2.4. MAINTAINING THE BEHAVIOURAL VIABILITY

All out efforts would be made by the zoo to minimize human impacting of animals. The feeding kraals/feeding cells would be so designed that there is no physical /visual contact between the animal and the keepers at the time of feeding. The kraals should be so screened by the green cover that the visitors and the animals cannot see each other. Behavioural observation of the animals in conservation breeding enclosures should be done through CCTV causing minimal imprinting on the animals.

2.5 MINIMIZING MORTALITIES

The zoo veterinarians shall keep a close watch on the newly born young ones and see whether the mother is taking due care of the young ones and resort to hand rearing once they are sure that the

mother is not attending the young ones properly. The task should be done without disturbing the mother, where necessary help of CCTV should be taken. They should update their skills on neo-natal health care including availability of suitable baby feeds and maintain requisite stock of the same.

Periodic screening of animals should be done and appropriate preventive measures should be taken. Detailed procedural matters on the subject have been discussed in the chapter on animal upkeep and health care.

CHAPTER-III

3. DISPLAY OF ANIMALS AND IMPROVED HOUSING

3.1. ZOO LAYOUT PLAN

The existing lay out plan, which is based on taxonomic classification, has worked quite well Therefore the same is being adhered to. Few anomalies would be redressed by making following changes in the lay out plan -

1. Lion and tiger will be moved to the new enclosure proposed to be constructed in the carnivore section. New panther enclosure would be constructed near the lion and tiger enclosure.

2. Wild ass would be moved from the Carnivore Section to the herbivore section in the enclosure where the lion is housed at present, after appropriate modifications in the enclosure.

3. White tiger would be moved to the existing wild ass enclosure after making appropriate modifications in the enclosures

4 .No species would have more than one display enclosure. Excess animals beyond the carrying capacity of the display enclosures would be moved to new enclosure in the off display area. Enclosures in off display area will have no moats.

5. Detailed lay out plan of the bird section would be finalized on need basis in consultation with design experts

It is proposed to move the elephants from the existing enclosure to a larger off display enclosure, which would form part of the rescue center. Detailed map depicting the revised lay out plan of the zoo is given in **appendix.1.**

3.2. IMPROVEMENT OF ANIMAL HOUSING

No.1- Lotus / Lily pond and No 2 Black swan enclosure-

Both the enclosures would be merged and developed as Lily Pond

No. 4. Love birds enclosure.

The enclosure would be demolished and taken into green zone through planting

Enclosure No 6-10 and enclosure No 13-14 Primate section

1. Off exhibit Nilgiri langur enclosure, Lion tailed Macaque cage and Rhesus macaque cages will be demolished and the area merged through planting appropriate species. New moated enclosures would be constructed as per need. However no species would be displayed in more than one enclosure

2.Animal houses of Nilgiri Langur enclosure ,Lion tailed macaque enclosure and Chimpanzee enclosures would be demolished and constructed De novo making the same animal friendly, keeper friendly and nature merging at locations away from the visitor viewing points.

3. The moat of the Chimpanzee enclosure would be converted in to dry moat of appropriate size and dimension.

4. All artificial perches would be removed from primate enclosures. The behavioural enrichment would be provided to the animals through planting of suitable species .To supplement the perches dry tree stumps of appropriate dimensions would also be fixed.

5. Efforts to make the visitor viewing points would be made nature merging through plantation of appropriate species. The hard exteriors of the feeding cells and moat walls would be camouflaged through plantation of suitable species.

6. Green buffer comprising of bamboo, shrubs and trees of suitable species of optimum size would be created

7. Enclosures for peacocks are neither animal friendly nor suitably located from theme point of view .The species need to be shifted to enclosures of appropriate dimensions to be constructed in the bird section.

8. Savanna Baboon enclosure is quite suitable for housing lion tailed macaque. Lion tailed macaque would be moved to the Savanna baboon enclosure. Common langur would be moved to lion tailed macaque enclosure and the Savanna baboon which is a represented by a single animal would be moved to some smaller enclosure.

Enclosure No 15- 27 Bird enclosure-

All the enclosure in these enclosures are not only dingy but are also non-congenial to the species housed therein. Zoo proposes to demolish all the enclosures and construct new enclosures. The location and the design of the enclosures would be decided on the basis of species specific behaviour The bird section will have two subdivisions namely Indiana and Exotic, The Indiana will have four exhibits namely

1. Galliformes- pea fowl, grey jungle fowl, red spur fowl, painted spur fowl and grey partridge
2. Psittaciformes – Alexandrine parakeet, rose ringed parakeet, plum headed parakeet, Malabar parakeet, blossom headed parakeet and red breasted parakeet
3. Ducks, cranes, storks, pelicans, ibis, and herons

. 4 .Horn bills

The Exotic Subdivision will have two or 3 exhibits namely

1. Pheasants
2. Cockatoos, macaws, parrots, rosella and canures.
3. Flightless birds-Emu, Cassowary, Ostrich

All the bird enclosures except the aquatic bird enclosures and the flightless bird enclosure would be built on rodent proof foundation and have RCC flooring with about 1 meter soil deposit over the floor to facilitate planting of dwarf trees and tree branches to serve as perches. The birds would be provided adequate withdrawal area with appropriate nesting boxes. Planting of reeds would be done in Pheasant and fowl enclosures to provide a cover for the birds. Some stone chips will be provided at the floor of the pheasant enclosures. Green buffers would also be provided between various exhibits.

The aquatic bird enclosure would be a large top covered aviary with a flowing water stream with varying level of water and appropriate species of trees and shrubs after combining enclosure number 59-60

The flightless bird enclosures would have a design similar to ungulate enclosure but would not exceed 1000 SQ METER in size. The feeding cells would be made rodent proof

Ungulate Enclosure No-28—33, 38 and 40

The paddocks of all the enclosure are adequate in size and have requisite vegetation for behavioural enrichment .However the feeding kraals are neither appropriately designed nor

appropriately located. Hence these need to be demolished. New Kraals would be constructed outside the paddock at a location far away from the visitors viewing point but close the wall of the paddock so that animals get direct access to the paddock through an appropriately designed gate. The moat on the road side will be slightly realigned to bring in immersion effect on the visitors viewing point. Planting of bamboo and suitable tree species would be done in the paddock to camouflage the harsh surfaces of moats and the kraals. Green buffers would also be created between all the enclosures.

No. 34.Common otter enclosure

The existing enclosure would be demolished and an appropriately designed enclosure would be constructed with an arrangement of underwater viewing of the animals. This would need a toughened glass of adequate strength which can withstand the pressure of high water column and effective water recycling plant.

No. 35.Sambar enclosure and 36 .Tiger enclosure

Since the zoo has large number of Sambars ,the paddocks of both the enclosures will be used for housing and display of Sambars. The tiger feeding cells will be demolished and the space used for construction of suitably designed feeding kraals of adequate size to house and feed the sambars which have a provision to release the sambars in both the enclosures. The animals would be displayed in the two enclosures on rotational basis giving each enclosure the time to rejuvenate and regenerate. The moats would be realigned to give in immersion effect at the visitors viewing point. Planting of bamboo and other suitable species would be done to camouflage the hard exteriors of the enclosure

No. 37.Asiatic lion enclosure

The feeding cells and the moat of the enclosure would be modified to house blue bull making changes that have been proposed for ungulate enclosure.

No. 38 .Nilgai enclosure

Required modifications for accommodating Wild ass will be carried out in the enclosure, particularly construction of appropriately designed. Feeding cells, camouflaging the hard exteriors provision of green buffer and giving immersion effect at the viewing point. .

No.39. Indian gaur enclosure

The enclosure of adequate size for housing and displaying five to six animals. Appropriately designed feeding cells are to be constructed at such a location that these are not visible from the visitor viewing point. Modification of moat to give immersing effect on the visitors viewing point and planting of suitable trees to camouflage the hard exteriors and meet the behavioural needs of the species would be done. To accommodate excess animals a new enclosure for Gaur will be constructed in off the display area.

No. 41. Giant squirrel enclosure

Size is sufficient. The two enclosures should be adequately enriched and nest boxes and baskets should be provided.

No. 42.44 and 45 Sloth bear, Himalayan bear and European brown bear

Enclosures are appropriately designed and have paddocks and feeding cells of adequate size .However the number of Sloth bear is beyond the carrying capacity of the enclosure. An enclosure to accommodate the excess animals is to be made in off the display area. Modification of moat to give immersion effect to the viewing point and planting of tree trunks to meet the behavioural requirement of the bear to be done. No artificial lofts to be there.

No.43. Jackal enclosure

The enclosure is very small. It will be demolished and the jackals will be shifted to the adjacent wild dog island enclosure.

No. 46. Lion safari

The Lion Safari is of appropriate in size and has adequate vegetation. However the chain link fence needs massive repairs. Provision of a 2meter high fence should be made around the existing fence to serve as second line of defense against the lions getting out of the safari due to breach in the peripheral fence. Provision of an emergency exit gate should also be made.

At present the visitor road passes too close to the animal feeding cells, this minimizes the wilderness experience. The road should be realigned in such a manner that the feeding cells are

not visible to the visitors. The feeding cells of the safari need major improvements to make them animal friendly and keeper friendly

No. 47. Deer safari

The safari is located at a very suitable site and has adequate vegetation. It gives the visitors a real wilderness feeling. However the experience is marred by the feeding kraals close to the visitor's route .The feeding kraals should be made outside the main enclosures on the lines suggested for ungulates enclosures. The kraals should be constructed at 2-3 locations to keep the animals dispersed over the entire safari. Some spotted deer could also be released in the safari. No hog deer should be released because of the possibilities of hybridization of spotted deer and hog deer. Because of the dense vegetation the black bucks should also not be released in the area.

No.49.Gaur safari & No.48 .Bear safari

Gaur is an endangered species and is very much in demand for display in various zoos of the country .There is no point in having a Gaur safari. The zoo does not have adequate number of Sloth bear to have a safari .Under the circumstances, the area of two safaris may be used as natural vegetation zone

No. 50. Wild dog enclosure

Good enclosure. Jackals will be housed after suitable modifications.

No. 51. Wild dog enclosure

Size of the Animal House is sufficient. Open yard of 800 sq.m. is sufficient. A new animal house with two rooms and a yard has been added adjacent to the existing house. As a part of Co-ordinated breeding programme, an off-exhibit chain link fenced enclosure with appropriately designed night shelter having six feeding cells will be constructed in the conservation breeding area for planned breeding of the species..

No. 52. Hyena enclosure and No.53 Wolf enclosure

Both the enclosures are appropriately designed and need no major modification.Ofcourse routine maintenance will have to be done.

No. 54. Wild Ass enclosure

The wild ass is to be shifted to the ungulate section. The enclosure would be modified and used for displaying white tiger.

No. 55. White Tiger enclosure

Good enclosure and would be used as off –display enclosures for excess white tigers

No. 56. Jaguar enclosure

Good enclosure. One male jaguar is kept alone. The enclosure will be used as long as the animal lives. After the death of the lone animal, it will be demolished.

No. 57. Leopard enclosure

Good enclosure. Size of the Animal House is sufficient. Open yard of 600 sq.m is sufficient. In order to bring all big carnivores in a group, a new enclosure has been marked in the lay out plan along with tiger and lion enclosures. Later Leopard cat will be housed in this enclosure with suitable modification.

No. 58. Off- sight breeding enclosure for tigers

Good enclosure. Size of the Animal house is sufficient. Open yard of 600 sq.m. is sufficient. This will be used as an off-sight breeding enclosure for tigers.

No. 59- 60. Point Calimere Bird sanctuary, Vedanthangal bird sanctuary and the bio-park

All the three enclosures will be combined and reconstructed as a large aquatic bird aviary with appropriate height and walk through facilities.

No. 61. Biological Park

This aviary is one of the largest and highest aviary in the country but has not been used effectively and now not used as walk through aviary. There are frequent breaches in the chain

link roof and upper portions of side chain link fences. To remedy the situation in the upper portion of the aviary the chain link fence would be made of the fiber glass. The visitor path in the aviary would have barriers of appropriate size on both sides of the path. Lot of trees and shrubs would be planted in the aviary to serve as perches for the birds.Aviary would be used to display Peacock, partridges, and the native flight birds. Planned breeding of such species will have to be done in the preparatory phase.

No. 62. Vulture Enclosure & No.63. Kites enclosure

These enclosures will be constructed de-novo with rodent proof foundation, adequate width and height and natural enrichment,

No. 64. Tortoises & Turtles enclosure

Require renovation.

No. 65. Water monitor lizard enclosure

Further modification required to house the animals. A pair of Water Monitor lizards will be procured as per the animal collection plan.

No. 66. Iguana enclosure

The enclosure will be demolished.

No. 68. Serpentarium

The White glazed tiles have to be removed from the walls of the cells and replaced with 3 dimensional painting of the habitats of the species. The floors of the cells will have adequate mud where dwarf coloured plants like crotons would be planted. The angle of the viewing glass should be slanted inwards to improve the visibility of the snakes. Educational signage will also have to be upgraded Natural ventilation should be improved to moderate the temperature in rains. Air conditioners from the King Cobra enclosures would be removed as they look quite un-naturalistic

No.69. Amphibian house

The existing Amphibian house has eight glass fronted tanks to house different common varieties of amphibians. It is kept vacant now. The enclosure need to be renovated. But before making it operational, the zoo will have to perfect the breeding technology for the species to be housed and displayed so that zoo does not take animals from the wild repeatedly.

No-67, 70-76, 91 & 93. Crocodiles and Alligators

Due construction of enclosures for accommodating large number of exotic species, the crocodile display area has become a honey comb of dingy enclosures non-congenial to the crocodile species housed there in. Most of the enclosures are smaller in dimensions than the prescribed size. The water pools are also too small and no sandy areas are available to animals for basking. The perimeter wall is too high due to which children cannot see the animals. The marsh crocodile enclosure, Ghariyal enclosure and 2-3 other enclosures are o.k. The remaining enclosures would be modified and brought to desired dimensions by merging the neighbouring enclosures and ensuring that visitors see one enclosure at a time. The harsh exteriors of the enclosures will have to be camouflaged by appropriately designed standoff barriers.

No.77. LTM off exhibit breeding enclosure

It is located in the rear portion of the Reptiles exhibits (prehistoric animal park). Two dry moated spacious enclosures have been constructed under co-ordinated breeding programme. Plenty of seedlings were planted. Off display enclosures for conservation breeding need not to be moated. Even large paddocks are not required. Large kraals covered with chain link on top with few trees enclosed would suit the purpose of planned breeding better.

No. 78. Elephant enclosure

The area of the enclosure need to be increased to about 25 hectares in compliance with the recommendations of the expert committee. Part of rescue center will be used for the purpose

No. 79. Wild boar enclosure

Wild boar would be shifted to ungulate section after making new enclosure and the existing enclosure will be used for housing some other species after suitable modification.

No. 80. Hippopotamus enclosure

The animal house and enclosure require modifications including the provision of a strong door Water is to be changed frequently. For the ease of viewing the animals new water pools have to be constructed in the center of the paddock. An appropriately designed water recycling plant will have to be installed to keep the water pool clean and free of fecal matter.

No. 82. Pigmy Hippopotamus enclosure

Pigmy hippopotamus enclosure was originally designed for Rhinoceros. This enclosure is being used for exhibiting Pigmy hippopotamus. The enclosure would have to be constructed de novo adopting a suitable design for the species

No. 83. Kangaroo enclosure

This enclosure is to be merged with Ostrich enclosure after suitable modifications.

No. 84. Giraffe enclosure

Good enclosure. The moat will have to be modified suitably so that the animals can enter the moat and come out at will. Glass viewing points will be provided at one or two points. Rest of the moat screened with green vegetation

No. 84(a). Ostrich enclosure

Good enclosure. Size of the enclosure is sufficient. Needs no major modification.

No. 85. Nocturnal Animal House

Visitors require their eye sight conditioned before entering the main nocturnal animal house .Therefore, there should be a chamber with dim light, with necessary interpretation signage about nocturnal animals which can keep visitors busy for few minutes. There should be no light in the visitors' gallery. The animal cells should have adequate light to get clear view of the animals in the cells which should have mud floor and enough perches with paintings depicting natural habitats of the animals in the background. There should be provision of appropriately designed outdoor enclosures attached to the back wall of each animal cell where the animals get adequate exposure to the sun up to 11AM and after 5 PM every day. Nocturnal house should be open to the visitors only from 11AM to 5 PM. Species to be displayed in the nocturnal house should be porcupine, palm civet ,jungle cat ,leopard cat and owls. Binturong being an arboreal animal does not do well in small cells and should be kept in the enclosure with large trees. One of the spare enclosures will have to be modified for the purpose.

No. 86. Zebra enclosure.

Good enclosure. Size is sufficient. Artificial ant hill may be constructed with brown coloured cement for the animals to rub their body. A ramp should be provided to facilitate the visitors in reaching the viewing point from the road

No. 87. Aquarium.

There are 31 exhibits. They are well maintained.

No.88. Butterfly Park (Proposed)

Arignar Anna Zoological Park is already having a small butterfly park facility where we have planted 45 host plants (Annexure-I) in an area of 0.5 Acre. The visits of butterflies are increasing every year. Last year 45 species have been identified in the garden. The site for new butterfly garden is identified adjoining to the Otteri lake of Arignar Anna Zoological Park and efforts to improve the availability of host plants. A small interpretation will also be made.

No.89. Butterfly Park

The existing butterfly park has to be demolished completely.

No.94, 95, 96 & 97 Spare enclosures

These are meant for small mammals like Mouse deer, Indian fox, Nilgiri marten and hog badger that may be exhibited in future. Requires construction of animal houses.

No. 98. Nilgiri tahr

This species has been assigned to AAZP as species coordinator under co-ordinate conservation breeding programme. Since climate of Chennai is not congenial to the health of Nilgiri tahr ,it is dropped from the animal collection plan. The enclosure will be demolished as per the instruction of CZA.

No.99. Rhesus macaque enclosure

So far no separate enclosure was available for Rhesus macaque. A new moated enclosure with animal house has been constructed and the species is exhibited as a large troop.

No.100. Conservation Breeding Research Centre

As per the instruction of Central Zoo Authority conservation Breeding Research Centre was proposed near LTM conservation breeding centre and it is marked in the Zoo lay out plan of this Master plan.

No.101. Proposed lion enclosure

As per the recommendation of Sub –group ‘A’ on expert group on Zoo designing of CZA a new enclosure will be constructed as per the lay out plan.

No.102. Proposed tiger enclosure

As per the recommendation of Sub –group ‘A’ on expert group on Zoo designing of CZA a new enclosure will be constructed as per the lay out plan.

No.103. Proposed panther enclosure

As per the recommendation of Sub –group 'A' on expert group on Zoo designing of CZA a new enclosure will be constructed as per the lay out plan.

No.104. Otteri lake – a bird sanctuary within Arignar Anna Zoological Park

Otteri Lake is situated inside the Arignar Anna Zoological Park, which spreads over on extent of 7 hectares. This lake attracts a large number of migratory birds in October, November and December. About 70 species visit this lake. Both terrestrial and aquatic birds congregate here during the season. This lake can be developed into a water bird sanctuary by carrying out works such as desilting and deepening of the lake, a forestation for providing roosts and perches, creating mound by dredging some areas inside the lake etc. To attract more birds *Barringtonia* and *Acacia nilotica* saplings could be planted and fishes released into the lake. At present, this lake is surrounded by a variety of trees. The bushes and tree may be trimmed to give a better view of the lake to the visitors. Further, the entire area can be provided with walk- in platforms and observation towers with binoculars in footpath. An Interpretation Centre will be constructed at the entrance of the lake to give details about the migratory birds, when they normally visit the lake and these birds can be viewed during mornings and evenings. A sum of Rs.25 lakhs will be required in the first year of the plan. The desilting and deepening of the lake will also help to improve the ground water resources to a great extent. In course of time the birds will become permanent residents of the Zoo.

Tiger and lion rescue center

The center was created to 80 Circus lions and tigers. 50% of th animals have already died. Rests of the animals are unlikely to survive for more than five years. The center would have to be modified to limit large carnivore and bear to about twenty cells. Other cells would have to be demolished to accommodate elephants, ungulates, primates and the quarantine ward for different species

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CHAPTER -IV

4. ANIMAL UPKEEP AND HEALTH CARE

4.1. ANIMAL UPKEEP

4.1.1. General

1 .Every animal shall be provided the opportunity to live in fresh air and sunshine for major part of the day.It shall be kept confined in the feeding cells and night shelter only for such a duration as is absolutely necessary for its security ,feeding and health care.

2 No animal shall be separated from its social group unless doing so is crucial for its health/health of other animals housed in the enclosure.

3. The feeding platform and the drinking water trough shall be so located that the animal can safely reach them and there is no possibility to the feed and water being contaminated by the urine and the faeces of the animals. The feeding platforms and the water troughs would be cleaned and disinfected daily

4. The floor, grills, doors and perches of the feeding cells shall also be cleaned and disinfected daily. The chain-link fence of the paddock and the water troughs shall also be cleaned and disinfected periodically The substrate soil in the paddock shall also be removed and replaced with fresh soil once every year

5. Feeding cells and nigh kraals would have appropriate ventilation and sky lights that allow natural sun light too in the cells.

4.1.2. Nutrition

1. All the animals in the zoo would be provided feed of such composition and in such quantities that their nutritional and physiological requirements are fully met and no animal remains under nourished .I.V.R.I has prepared detailed diet charts for various species. The same shall be adhered to.

2. The quality of the feed being brought by the contractors shall be rigorously monitored and the samples of the same would be sent for screening of fungal, bacterial and toxicological examination.

Feed shall be stored and supplied to animals in such a manner that it does not get contaminated with microbes and other substances injurious to the health of the animals .All safeguards would be put in place that every animal get the feed in full quantity earmarked to them.

3. Highest standards of sanitation and the cleanliness shall be maintained in the feed store, kitchen and the meat house .For this purpose deep freeze and appropriately designed storage facilities will be provided

4.1.3. Sanitation and hygiene

1. There shall be covered drainage from the feeding cell/kraals ,kitchen and meat house to prevent wastes and water draining in the ground surrounding these facilities which may pollute the environment of the zoo.

2 .All the left over feed, feces and other wastes shall be promptly removed and the feeding cells and kraals washed and disinfected .The washings and the liquid waste shall be disposed through the covered drainage into the sever trunk line of the city. The solid waste shall be stored in covered bins, from where it will be taken in a covered vehicle to the composting area.

3. A foot bath shall be provided at the entrance gate of the keepers a gallery

4. Animal keepers during the duty in the keeper's gallery shall wear overall and boots specially provided for the purpose .They shall wear sanitary gloves while handling the animal feed.

4.1.4. Prevention of diseases

The main sources of communication of diseases to the zoo animals are stray dogs, monkeys, rodents, crows and mongooses. Certain diseases like tuberculosis, leptospirosis, brucellosis, herpes, bacilli coli and e. coli can be communicated to the animals through the zoo personnel handling the animals. Infections of some diseases like tripanosomiasis, rabies, HS and foot and mouth diseases and raniket disease can come through the domestic stock kept in the vicinity of the zoo. Besides these disease infection of nematodes and cestodes are also possible. The preventive measures proposed to be taken to safeguard the zoo animals being infected by the diseases mentioned above are briefly summarized below-

1. Every zoo personnel involved in handling of the zoo animals shall be screened, every six months for zoonotic diseases like tuberculosis, leptospirosis, brucellosis, bacilli coli and e.coli etc.Those found positive shall be removed from the animal handling duty and provided appropriate treatment till they are totally free of infection

2. Feces and the blood of the zoo animals shall be screened for pathogenic loads periodically and the prophylactic treatment would be provided as per need.

3. Vaccination of the animals of various species would be done against the disease commonly infecting them.

6. The remnants of the food of carnivores i.e meat and bones removed from the feeding cells shall be put in bins with covered by a lid at the top specially kept for the purpose outside the feeding cells/night shelters. The same would be removed from the bin daily and incinerated. No dogs and crows should get an approach to the meat and bones contained in the remnants of carnivore feed

7. All the ungulates, primates and birds shall be fed in kraals /feeding cells covered on top so that monkeys and crows cannot share it. The remnants of the feed removed from the kraals shall also be kept in closed bins till these are taken in to compost pits for burial.

8. No visitor shall be allowed to take the food items outside the canteen/restaurants. Remnants of the food would be put in closed bins for ultimate burial in the compost post

9. All the feeding /kraals in the zoo shall be made rodent proof so that the rodents don't get access to the food .Similar arrangements would be made in the kitchen and stores.

10. Stay monkeys would be captured, sterilized, treated for tuberculosis and released in the wild.

11. Planned programme would be implemented to eliminate the rodents.

12. The water being supplied to animals for drinking purposes will be tested for microbial and toxicological loads and appropriate measures to make it potable and infection free will be taken.

4.1.5. Diagnosis of diseases

1. Wild animals have immense capacity to conceal their pain and agony and do not show symptoms of the sickness unless it is too late. As such the diagnosis of the disease infection in the zoo animals

needs very close monitoring of the health of the animals. Special arrangements should be made in every enclosure to record the weight of every animal, note the body temperature with infrared thermometer and take blood samples for determining the pathogenic loads.

2. Advantage of the postmortem findings of the animals that have died earlier in the zoo will also be taken to identify the exact cause of the death of the animals and deciding the treatment strategy.

3. Zoo biologists and the veterinarians would spend considerable time every day in observing the behaviour of the animals' particularly feeding and social interaction and record the same to serve as reference point to identify any abnormalities in the behavior at the time of sickness.

4.1.6. Treatment of diseases

1. Treatment of zoo animals needs a lot of patience. Any rough handling of the animal in hurry can at times can cause serious stress to the animal and can result in its death. Physical handling of the animal should be avoided as far as possible and the effort should be made to treat the animal at the animal enclosure itself unless the disease is such that it can affect other animals or round the clock care is necessary for treating the animal.

2. Only one animal would be tranquilized at a time. Second animal would be tranquilized only after the tranquilized animal has fully recovered.

3. Administration of prophylactic vaccine/medicines will be done with due caution and no herding of animals will be done for the purpose

4. Every effort would be made to treat the animals on the basis of systematic diagnosis .Necessary equipment would be provided in the hospital.

5. The veterinarians would be encouraged to upgrade their clinical skills through participation in training and workshops, availability of relevant journals and reference books. Collaborative arrangements would also be made with the eminent institution to infuse scientific skills amongst the veterinarians at the zoo.

6. Zoo hospital swill have adequate stock of the drugs of choice for treatment of various diseases

7. Zoo hospital have adequate stock of feed supplements ,vitamins ,minerals and neo natal feed for the young ones of various species for facilitating the hand rearing of the young ones as and when required.

The guidelines issued by the Central Zoo Authority on the basis of the report of I.V.R.I on diagnosis of animal diseases and health care would strictly be followed in this regard

4.1.7. Upgrading the support infrastructure

. **1. Hospital**

(a) The zoo would be provided with self- sufficient reference library

(b) Following equipment would be acquired for the zoo hospital to upgrade diagnostic and treatment facilities.

1. Infrared thermometers
2. Portable ultrasound scan
3. Thermocautery unit for effective homeostasis' and to reduce blood loss.
4. Ophthalmoscope for examination of eyes.
5. Otoscope for the diagnosis of disorders of the ears
6. Portable x-ray machine- To be useful such X-ray machine should be of minimum 500MA capacity
7. Animal transport-cum-recovery trolley

(c) Modifications required in the hospital building-

1. Library cum record room and store room for x ray films will be provided
2. Provision of in- patient wards for ungulates, primates and birds
3. Up-gradation of carnivore inpatient wards- provision of appropriately designed kraals

2. Necropsy Room

The necropsy room to be modified, upgraded and properly equipped

3. Quarantine facilities

Quarantine facilities for carnivores ,ungulates ,primates and birds would be constructed in some isolated area away from the animal upkeep facilities of the zoo where all the new animals can be taken directly ,with- out entering the main zoo campus and can be kept in isolation and screened for pathogenic loads and treated appropriately. Necessary support infrastructure and upkeep facilities will also be provided

4. Store and Kitchen-

(a) The stores would be upgraded, extended and made rodent proof to facilitate storing the feed hygienically and safely

(b) The kitchen would be upgraded and provided with adequate ventilation and cooking facilities including biogas stove and requisite furniture

(c) The rodent breeding facilities shall be moved out of the kitchen campus and the building used for storing nonfood items like pipe ,chain-link and timber etc .

5. Storage and distribution of Water

There are six ground level water tanks at the following places

1. Quarters site
2. Lion and Tiger enclosures (Main tank - Circular tank)
3. - Do - (Rectangular Tank)
4. Bear enclosure
5. Elephant Enclosure
6. Fodder Bank

There are six OHT with 20000 Lit capacities each

1. Near Office Building
2. Near Bear Enclosure
3. Near No. 1 pump house
4. Near Prehistoric Centre

5. Near Rest Area 83

6. Near Rescue centre.

The network of distribution is from the ground level water tanks at elevated place above Tiger enclosure. The main line runs all-round the circular road. Due to ground level variation of main line water flows to the lower level along one side (Southern Part) of the Circular roads and other side (Northern part) with less pressure. Therefore there is problem of uneven distribution to the enclosures on Northern side circular road and also to loop roads.

For future requirement also there is need for one more water tank. Hence, it is suggested to construct one more ground level tank at an elevated place above Tiger enclosure for distribution to the Northern Part of the Circular road by joining the main line with suitable closing valve arrangement, stopping water flowing to lower side (i.e. Southern Side) at a suitable place. This arrangement will have even distribution all-round including loop roads.

6. Electricity-

To prevent frequent power failures due to cable faults, the old cables would be replaced with new underground cable systems. Few important animal houses particularly the carnivore feeding cells, which do not have power at present will be provided power by fitting solar panels

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CHAPTER –V

5. VISITOR MANAGEMENT AND EDUCATION

5.1. GENERAL

The zoo has taken significant efforts to make the visitors to the zoo feel secure and comfortable as well as to communicate to them a loud and clear conservation message. However to meet the expectations of ever increasing number of visitors continues to be a serious challenge. Further it is too much to expect the visitors in a recreation mood to read large sign boards and pick up the conservation message. Lot of innovation have to go towards education and interpretation to motivate the visitors for supporting the cause of conservation of natural resources.

5.2. UP GRADATION OF VISITOR AMENITIES

1. The present parking area is spread over 6400 m^2. This has to be extended to meet the future requirements. Another 3600 m^2 of land may be required adjacent to this present parking bay along Vandalur- Kelambakkam Road.

2. Railway should be persuades to introduce a shuttle services from Chennai Central Railway Station to Tambaram in coordination with the transport authorities. They should also be persuaded to install a mono-rail service between Tambram Railway station and the Zoo.

3. In the interim period shuttle bus services should be available between Chennai Railway Station and the zoo at a periodicity of 15 minutes in the peak hours and every 30 minutes in the wee hours of the day.

4..For the facility of the visitors, coming to the zoo by car 4-5 boards notifying the distance of the zoo and indicating the exact location of the zoo should be fixed.

5. Just before the ticket counter at the entrance, an Electronic Display Board should be fixed following information-.

Zoo timings, rate for entrance ticket, details regarding Battery operated vehicle and fees, safari park details, availability of wheel chair, First Aid facility and Zoo guide book, the various symbols used in the signage boards, activities prohibited inside the zoo, availability of rest areas with available facilities and the persons to be contacted in case of a emergency along with their telephone numbers

6. Direction sign boards should be provided on every road crossings in the zoo showing the direction of various enclosures, visitor facilities, main gate and office

7 .Visitors will be provide hop down and hop in facilities in the battery operated vehicles to give them the option of spending as much time at various enclosure as they wish

8. To safeguard against uncontrollable rush and disturbance at the enclosures of the charismatic animas the zoo roads would be divided in 3 sub loops and the visitors will be given freedom to ride in the trolley going to their preferred loops i.e. primate-birds –ungulate loop,. carnivore-crocodile loop and africana-.reptile-nocurnal animal house loop

9. On line ticket booking facilities and multiple facility ticket system would introduced to facilitate visitors in approaching the zoo and its facilities.

10. Security system in the zoo will be upgraded by deployment of adequate number of security personnel through outsourcing of the security services, deployment of forest supervisors and the police personnel. C.CTV will also be installed at the main gate and important animal enclosures

11. Range officers in charge of the section would be provided office accommodation on the visitors route and would be available for redressing the difficulties of the visitors. They would also be equipped with a public address system.

12. Adequate number of sign boards would be provided at each enclosure to keep away from the stand- off barriers of the enclosures.

13. Ramps may be provided to enable the physically handicapped persons to move in the wheel chairs and visit the enclosures. Similarly, toilet facilities specially designed for physically handicapped may be provided.

14. Number of battery operated trolleys and CNG operated buses need to be augmented to meet the demand of increasing number of visitors.

15. Reception Center at the gate needs to be made more effective by posting qualified and competent personnel.

16. First aid kits and anti-snake venom would always be available at the reception office and the zoo hospital. A stand by vehicle will also be kept at the hospital to evacuate any sick /injured visitor and rush him to the hospital.

5.3 .ZOO EDUCATION

5.3.1. Zoo Interpretation center

1. The emphasis of the zoo at present is on apprising the zoo visitors with the biology and behaviour of various species of wild animals. To convince the visitors for supporting the cause of conservation of these species, the present status of their population in the wild, the ecological impact of the continued decline of the population and the measures required to reverse this negative trend has also to be highlighted. The font of words used is so small that it cannot be read without focused attention and the likely hood of missing it by most of the visitors going through the interpretation center cannot be ruled out .The panels need to be increased in size and the information to be provided should be written in telegraphic language and unnecessary details omitted. The pictures of the animals can be made little smaller and the desired information should be painted in bolder font both in Tamil and English.

2. Computer based interactive panels that provide the visitors answers of their inquisitive queries should also be provided

3. Talks by experts should also be organized at pre-notified times to pass on the conservation message to the visitors. Pre- recorded talks and documentary films could also be shown

5.3.2. Recreation Park

The children park has swings and chutes which can be seen in any public park and are total distraction from the conservation theme of the zoo. Innovative devices which allow the children to carry on the physical activities and as well learn about the physical attributes of various species of wild animals particularly tiger ,elephant ,black buck ,crocodile and primates should fixed/provided in the park in place of ordinary devices.

5.3.3. Management of visitors at the animal enclosures

The visitors should be provided to get an opportunity to see active and healthy animals in naturalistic background, created by planting of appropriate species and understand the linkages between the animals and the habitat around it. To facilitate the process appropriately designed bilingual signboards which are clearly visible and legible should be fixed at appropriate places. Interactive interpretation facilities should also be provided. To avoid unnecessary rush more than one viewing points will be provided. The animal keepers would be encouraged to give talks on the ecological significance of the species and the strategy to protect the species. Special training programs should be conducted to impart these skills to the keepers. They should be provided with public address systems to give the talk.

5.3.4 .Interpretation facilities at important enclosures

Reptile enclosures, nocturnal animal house, carnivore section and primate section have great potential to educate the visitors about the importance of conservation of wild animals. Small interpretation centers could be created within the enclosures/small shed specially created for the purpose. Education assistants /trained volunteers could be deputed to give educative talks to the visitors in these interpretation centers.

5.3.5. Using the travel time for educative purposes

The trolleys/buses carrying the visitors round the zoo should either have pre-recorded commentary that could be played by the driver as he approaches different sections or live commentary could be made by the education assistants/volunteers. For school and college groups, the later approach should be adopted.

5.3.6 .Other innovative approaches

Zoo distributes quite a lot of literature to the visitors which is invariably not used constructively. It will be worthwhile to make the zoo tickets in the form of cards having at the back of it information about the ecological significance and the need for conserving species along with an attractive photograph. Visitors can be made to swipe this card in swiping machines fixed at the entrance point of the gate. This would help in regulating rush at the entrance as well as serve as educative materials for the visitors.

CHAPTER-VI

6. ENVIRONMENTAL MANAGEMENT

6.1. LANDSCAPE MANAGEMENT

1 .Every effort will be made by the zoo to maintain the forest character of the zoo premises. To achieve this goal the exotic species particularly eucalyptus, prosopis and non- indigenous flowering plants/trees would be phased out in a phased manner and replaced with species endemic to the region. The trees in animal enclosures will be replaced with the species forming part of the animal habitat. Clearance of extensive areas for creating visitor facilities Large number of small sized lawns shall be preferred than having very large lawns

2.All the buildings and masonry structures would be painted in light green colour and camouflaged with green vegetation and it will be ensured that the natural ambience of the area is not affected

6.2 .MINIMIZING THE POWER CONSUMPTION

1. The animal feeding cells/night shelters and keeper's galleries will be so designed that they get adequate sunlight and natural ventilation and do not require any electricity for lighting/air circulation purposes where use of power is unavoidable solar panels would be used
2. Use of air conditioners and coolers in the enclosures would be avoided. Instead the enclosures would have mud floors, dwarf plans and frequent sprinkling of water..

6.3. WATER CONSERVATION

1. The water from the moats and water bodies would be made to flow through small channels and frequently recycled to make it fit for horticulture purposes and washing the enclosures This goal would be achieved by planting appropriate species of plants and shrubs

2. For maintaining effective cleanliness in the zoo and irrigating the lawns 5-6 new bore wells have to be provided. To mitigate the adverse impact of this action on ground water extensive water harvesting measures would be taken.

6.4. WATER HARVESTING

To improve the ground water sources, rain water harvesting is imperative. Around these ground sources percolation ponds may be developed to impound rain water by improving the hydraulic stratum. Percolation ponds to be developed at various places and necessary arrangements for collection of rain water by forming drains have to be done. In addition, the capacity of Otteri lake may be improved by desilting and deepening works..

The Aruvan Eri, Periya Eri and Kolapakkam Eri are under the control of Public Works Department. They would be persuaded to deepen the water bodies to impound more water.

6.5. DISPOSAL OF SOLID AND LIQUID WASTES

The zoo would provide at various points near the visitor facilities and the animal enclosures specially designed top covered bins with provision of putting metallic, plastic and biodegradable wastes separately. The half- eaten animal feed, meat and bones would be put in a separate bins covered at the top provided in the keepers gallery to be incinerated daily. The biodegradable wastes would be dumped by a garbage collection vehicle in the garbage disposal yard where it is decomposed. The metallic waste would be sent for recycling and the other non – bio degradable waste would be sent for dumping to the site earmarked by the Municipal Corporation for the purpose

The zoo already has well laid out sewerage line **(Appendix.10)**. Part one of the line contemplates collection, treatment and disposal of sewage from the wet moat such as otter, crocodiles, hippopotamus, public toilets, veterinary hospital and quarantine. The sewage from the above moats are collected in screen well and screened sewage is collected in a collection well and pumped to the grit well by 3 x 10 Hp non clog centrifugal pump sets. From the grit well it is distributed in the distribution chamber and then let into the oxidation pond of size 30 m x 90 m - 2 Nos.

Part II Contemplates the disposal of monkey islands waste only. The liquid wastes from the monkey moats is collected and let into the nearby Otteri lake under gravity without treatment since the liquid waste do not contain much pollutants.

PART III contemplates the collection, treatment and disposal of sewage from the staff quarters. The sewage from staff quarters is collected in screen well and the screened sewage is let

into collection well and pumped to the oxidation pond of size 45 m x 15 m from 1 HP - 2 No on non clog centrifugal pump sets.

There is a need for extension of underground drainage extended to new animal areas such as mountain lion, tiger, otter, leopard, Black Panther, white tiger and jaguar and also repairs to the existing sewerage scheme.

The TWAD Board who has executed the scheme earlier had been asked to investigate. The investigation has been completed and TWAD Board has given its report. The TWAD Board has given proposals for Rs. 14.00 lakhs for improvement to the existing sewerage system and extension of sewerage lines including investigation charges. There is a need to revamp the entire drainage system in the Zoo.

CHAPTER-VII

7. PERSONNEL PLANNING

7.1. STAFF FUNCTIONS

The workers engaged in the formative years of the zoo were casual labourers without any specific skill, knowledge and education and acquired experience over years in carrying out specific task for the management of the zoo and their service were regularized in due course. The workers were given in house training in the zoo and developed adequate skill and knowledge for the performance of the tasks. Some of these workers were found to be lacking adequate knowledge for performance of specific specialized task and they have to be re-assigned work which they are capable of undertaking based on their skill.

The task required from the workers for zoo management comprises of the following discipline:

1. Animal care and management
2. Animal nutrition
3. Zoo Sanitation
4. Animal health care
5. Transport
6. Zoo landscaping and horticulture
7. Zoo education and interpretation
8. Visitor hospitality
9. Zoo research and monitoring
10. Security

7.2. STAFF TRAINING

As the staff gets older, they may not be in a position to carry out their assigned function. They are to be assessed and evaluated regularly and jobs based on their mental and physical capacity may be assigned to them for optimum efficiency in work. The staff has to be protected from exposure to risks in the course of their duty.

The updating of the knowledge and skill of the staff is a continuous process. They must get opportunity to know and understand the new methods, technologies and findings regarding the management of animals. The Central Zoo Authority is funding training of the Animal keepers of the zoo. Similar in house training must be organized regularly in the zoo.

The training needs of the different category of staff should be assessed and Education and skill development module for each category should be designed and agency/organization should be identified for updating of their skill and knowledge.

The exchange programme between zoos should be encouraged to give them exposure about the new techniques and management skills in vogue in various zoos of the country.

7.3. PROMOTION OPPORTUNITY

Since the promotion opportunity and career advancement for the last grade workers and biologists of the zoo does not exist in zoo, there is frustration amongst zoo workers and antagonism between staff and management. There should be mechanism to overcome this anomaly in the system. Sufficient motivation should be available to the staff to encourage them to work with sincerity and devotion.

7.4. STAFF RECRUITMENT

S. No	Name of the post	Post sanctioned	Post filled	proposed
1	Director	1	1	
3	Deputy Director	1	1	

4	Assistant Director	2	1	
5	Superintendent	3	2	
6	Assistant Executive Engineer	1	1	
7	Junior Engineer	2	1	
8	Draughting Officer	2	2	
9	Veterinary Officer	1	1	
10	Veterinary Assistant Surgeon	2	2	
11	Biologist	3	3	
12	Ranger	8	4	
13	Forester	9	6	
14	Forest Guard	9	7	
15	Driver	16	13	
16	Assistant	6	1	
17	Junior Assistant	5	2	
18	Assistant Draughtsman	2	2	
19	Steno typist	2	0	
20	Typist	2	1	
21	Junior Accountant	1	1	
22	Office Assistant	8	3	
23	Electrician II	1	1	
24	Electrician	1	1	
25	Assistant Electrician	1	1	
26	Plumber	4	3	
27	Office watchman	1	1	
28	Night watchman	11	11	
29	Animal keeper	54	53	

30	Gardener	6	5	
31	Gate watchman	9	9	
32	Sweeper cum scavenger	32	21	
33	Pump operator	10	6	
34	Feed distribution helper	6	6	
35	Mahout & cavady	3	0	
36	Mali	34	28	
37	Bungalow watcher	1	0	
38	Security watchman	4	4	
39	Forest watcher	2	1	
40	Sweeper	1	1	
41	Live stock inspector	1	0	
42	Lab technician	1	0	
43	Scientist (CF cadre)	0	0	1
44	Scientist (DCF cadre)	0	0	2
45	Research Associate	0	0	2
46	Junior research fellow	0	0	2
47	Lab technician	0	0	1
48	Lab assistant	0	0	1
49	Driver	0	0	2
50	Junior assistant	0	0	2
51	Office assistant	0	0	2
51	Animal care taker	0	0	2

The nature of work in the zoo should be categorized as Essential services and all vacancies should be filled promptly as Animal husbandry, nutrition and sanitation in the zoo cannot be neglected. This inadequacy will affect the zoo management and result in eventual

deterioration of the care of the animals. The Government should grant exemption to the zoo and allow filling up of vacant posts.

7.5 .WORK OUTSOURCING

The execution of some of the works in the zoo can be undertaken by outsourcing it to NGO/Private agencies/service provider who have sufficient expertise, skill and trained manpower for executing the works. The following works have been identified for outsourcing

(1) Sanitation in public utility area of the zoo

(2) Zoo security

(3) Maintenance of lawn, gardens, hedges, rest sheds and toilets

(4) Refreshment stalls

(5) Maintenance of water supply and electrical system

7.6. REDISTRIBUTION

Redistribution of work amongst various Ranges is given in **APPENDIX -14.**

7.7. DUTIES AND LINE OF COMMAND OF THE STAFF

1. Director

Being the administrative head of the organization, the director is responsible for ensuring that all the operations of the zoo are carried out efficiently and in a time bound manner .He has been delegated necessary financial and administrative power to discharge this responsibility. He is assisted, Deputy Director, Assistant Director and other staff in ensuring that all the zoo operations are carried out efficiently

2. Deputy Director

Apart from attending to office work and assisting the Director in supervising various works, the Deputy Director will pay special attention to

1. Various works proposed, and under execution
2. Breeding of endangered species
3. Exchange of animals including transport
4. Training programme
5. Theme parks
6. Scientific work carried out by Biologist

7. Interpretation, digital display and Interactive System at the entrance.

3. Assistant Director

The ACF will pay attention to

1. Horticultural works including planting of dry ever green species in Vandalur hills and Biological Park.
2. Electricity
3. Water supply
4. Watch and ward
5. Maintenance of enclosures water moat, and rest areas
6. Visitor amenities, including ticketing
7. Zoo opening and closing including animal enclosures

The duties and responsibilities of the Rangers, Biologist and Animal Keepers and the proposed changes are discussed below:

4. Rangers

Rangers are the field level executives. There are at present 5 rangers who report immediately to the next higher officer viz. ACF, then to DD & Director. Of these 5 Rangers, Ranger I & II are exclusively in charge of Animal and Birds Enclosures. Ranger III is in charge of Transit and quarantine area, apart from looking after feed transport, Horticulture, Fodder, Fruit orchard, Plantation and Rescue Centre. Ranger IV is in-charge of Visitor reception, Entrance and amenities, Zoo school programme. Ranger V is in-charge of Sanitation, Electricity, Water supply and Stores.

The workload involved in animal care is enormous and therefore the 3 Rangers utilized exclusively for looking after the animals and birds and are assisted by two Foresters in this regard. They report directly to the Dy.Director

Rangers IV and V are responsible for all the works other than animal keeping namely, transport, visitor facilities, entrance complex, maintenance of building and roads, electricity,

water supply, parking, plantation, sanitation, etc. The ACF is responsible for supervising their work and keeping the Deputy Director and Director informed of the same.

5. Biologists

The 3 biologists now deal with matter relating to Animal Exchange, Education, Research, Interpretation and Training, Outreach Programme, Zoo club, Record keeping - stud book etc. They report direct to the DD & then to Director.

The main work of the Biologists is to contribute to the scientific management of animals held in the stock of the zoo by way of keeping a close watch on upkeep, feeding, behaviour and breeding of the animals and meticulously recording and analyzing the observations and make suitable suggestions for improving the health and breeding potential of the animals, prevention of diseases and behavioral management. .For this purpose they maintain regular interaction with the Veterinary Doctor, Rangers in-charge of animal enclosures and animal keepers . The Animal Keepers, though unqualified academically, can make invaluable suggestions on animal management issues

6. Animal Keepers

There are 85 animal enclosures. The strength of Animal Keepers now is 52. Some more labourers are also engaged on daily wages for animal keeping.

CHAPTER-VIII

8. DISASTER MANAGEMENT PLAN

8.1. INTRODUCTION

There are many threatening conditions that may require a rapid and organized response to minimize injury to people and animals or damage to facilities. Severe weather such as flooding, earthquakes, drought, severe cold and fires not only can severely damage the zoo, but also will do serious damage to the local community. Resources and equipment to clean up after catastrophic incidences will be directed to the community as a whole, and the zoo will be a low priority unless it presence the threat to the community. Portable generators, chain saws, gasoline, fresh water and an adequate supply of food stuffs should be maintained by zoo at all times. Staff may be needed around the clock to deal with problems occurring during severe weather. Normal access to the zoo may be limited or cut off due to flooding, downed trees or damaged roadways.

8.2. FIRE

Fire in an animal facility requires quick thinking and discretionary judgment on the part of the employee discovering the problem. The fire department should be called immediately and directed to zoo entrance nearest to the fire that allows the passage of its vehicle. The electrician should also notify appropriate zoo personnel to assist at the scene. The public should be evacuated from the area, if the fire is within an animal facility, attempts should be made to remove the animals threatened by the fire. If possible employees should attempt to extinguish the fire with a fire extinguisher. Circuit breakers to affected area should be turned off.

8.3. BOMB THREAT

Bomb threats should be immediately referred to the law enforcement agency having jurisdiction. Generally, in a bomb threat emergency, zoo staff should follow the same evacuation procedure as for a fire, except all radio communications in the area should cease immediately. Visitors overhearing conversation concerning a bomb threat could panic, creating yet another problem.

8.4. CIVIL DISTURBANCES

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

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

8.4.1. Equipment required for dealing with civil disturbances

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

8.4.2. For warning people about the emergencies

To address the visiting public during emergencies, AAZP has its own alarm system at the entrance; public address system and enough walkie talkies for effective communications.

8.4.3. Local Response Capabilities

AAZP has the contact numbers of the nearest police station, fire and rescue service station and the nearest Government hospital to deal with any emergencies.

8.5. FLOODS

The zoo will have contingency plan for dealing with exigency associated with flooding. The contingency plan will envisage the cleaning and sanitizing the food items to eliminate the pathogens. Furthermore, the food items will be stored above ground and the storage will have sufficient ventilation and sunlight. Similarly, preventive measures will be taken to cope up with large scale contamination of the drinking water supply by identifying alternative sources of water and mobilizing water tankers.

CHAPTER-IX

9. CONTINGENCY PLAN

It is very much needed by the zoos that they should have a well-documented technical contingency plans for specific and high priority animal diseases. Apart from it every zoo should prepare a resource and financial plans too for dealing with emergency situations as it is being practiced in Australia.

9.1. ESCAPE OF ANIMALS FROM ENCLOSURE

Arignar Anna Zoological Park has 1371 animals mostly in enclosures and in the safari (Lion and deer). As the enclosures and the entire zoo have been protected by a compound wall of about 8-10 feet, there may be a little chance of animals escaping from them. Past incidences of escapes provide the strategy for dealing if escapes happen in future. AAZP conducts detailed checking of the zoo parapet walls and the enclosures therein to avoid any such mishaps. The keepers of each and every enclosure thoroughly check the public exhibit areas, fences, night shelter rooms and service areas before releasing the animals in the day exhibit and after bringing them back to the night shelter. Public safety is the priority; otherwise the damage caused by the escaped animals will be immense, in terms of the injuries/fatalities done to the zoo guests/staff of the zoo by the escaped animals and in terms of possible loss of the wild animal.

All the animal keepers were sensitized about the issue of animal escapes during their animal keepers training programmes and often during interactions with the technical staffs of the zoo.

The trees around the enclosures are trimmed to keep them in shape and to avoid falling of branches in to the exhibit which may serve as a escape route for the animals like primates, carnivores and reptiles.

Water in the wet moated enclosures is maintained to a level so that the animals housed in these wet moats can’t cross the barrier.

The gates and windows are painted once in a year to avoid rusting of the same. Barriers are designed, constructed and maintained to contain animals within enclosures.

Gates and doors to enclosures are strong and effective in containing the animals, as the rest of the enclosure barriers.

Gates and doors to animal enclosures where the public are admitted (as in case of Nocturnal Houses), and any enclosure or standoff barrier are designed, constructed and maintained so as not to trap or otherwise injure visitors, particularly children or those with disabilities.

For dealing with animal escapes

The equipments required pertaining to deal the escape of different captive animals are given in the table.

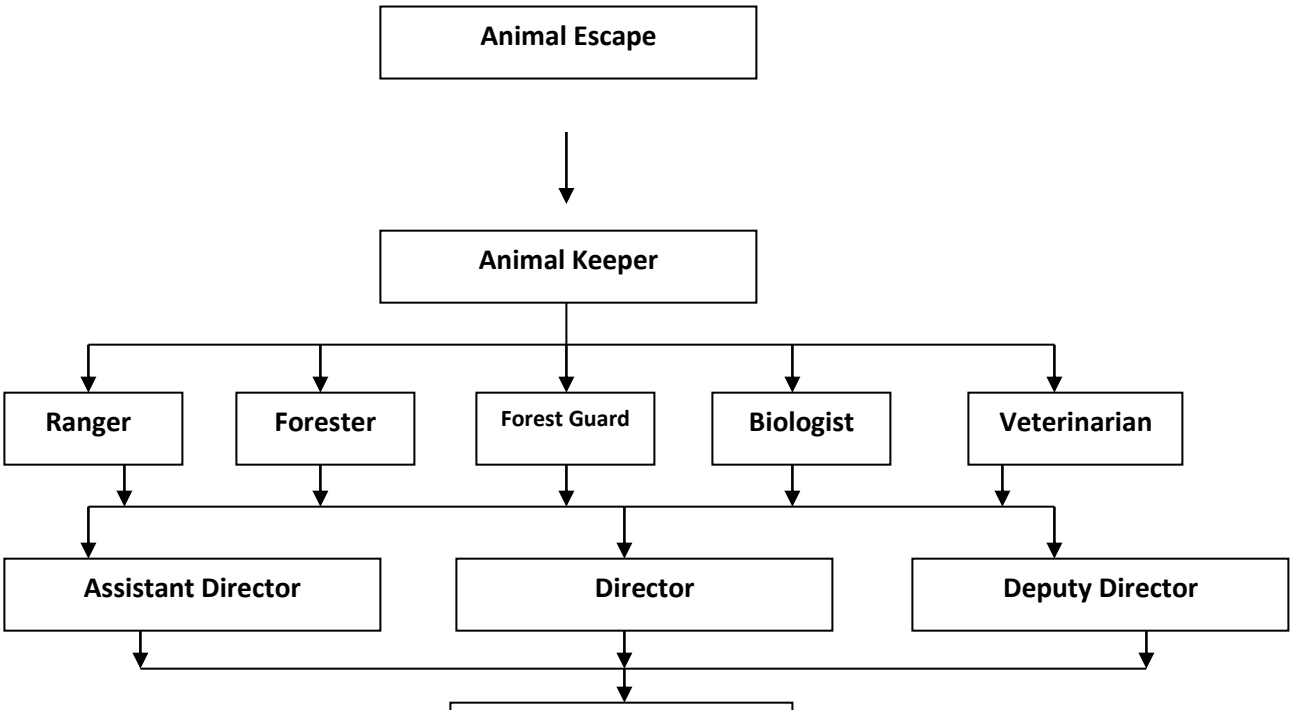
Captive animals	**Minimal requirement**	**Highly recommended but not required**	**What AAZP has**
Large carnivores	Nets, pole syringes, snare, Projectile guns and darts, blow dart equipment, crates, squeeze cages etc		Nets, snare, Projectile guns and darts, blow dart equipment, crates, squeeze cages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

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

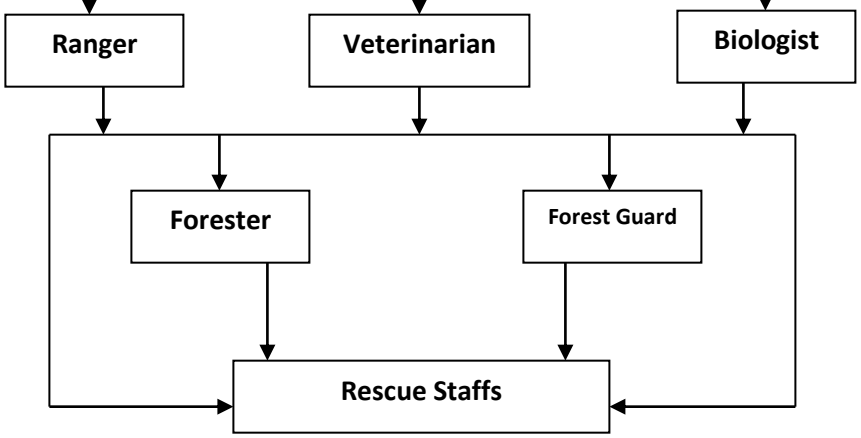
Storage of Equipment

The above equipments are stored in the respective range office of the Ranger I & II who solely deal the animal section of the entire zoo. Apart from this all the field staffs like Forest Guards, Foresters, Rangers, and Assistant Director have been given adequate training on handling tranquilizing equipment and chemicals for controlling big mammals like Lion, Tiger, Leopard, Bears and Bison. The tranquilizing kits are stored in the Director's office and the location of the equipment and the phone numbers have been informed to all trained field staffs in order to take immediate action for capturing escaped animals.

Flow of information



Chain of command



Telephone numbers of the officers

Sl. NO	NAME OF THE OFFICERS	DESIGNATION	CELL NO
1	K.S.S.V.P. Reddy, I.F.S.,	CCF & Director	9444164411
2	Dr.B.C.Archana Kalyani,I.F.S.,	Deputy Director	9380240170
3	K.Sudhagar	Assistant Director	9942991511
4	M. Baskaran	Ranger – I	9976685023
5	C. Elango	Ranger – II	9444644606
6	K. Siva Kumar	Ranger – III	9444933212
7	D. Manivannan	Ranger- IV	9444217591
8	A.R.Suban Shariff	Ranger – V	9841377281
9	N.Ashok Kumar	Forester, Range I	9786713569
10	S.Mathiyan	Forester, Range I	9585627993
11	S.Ravichandran	Forester, Range II	7598864224
12	N. Jothilingam	Forester, Range III	9487319948
13	C. Ganesan	Forester, Range IV	9444712614
14	S. Kumar	Forester, Range IV	9445378328
15	K.Raju	Forest Guard Range I	9941583683
16	K.Jothi	Forest Guard II	9445437974
17	S. Ganesan	Forest Guard II	9710354734
18	T. Durai	Forest Guard III	9790564013
19	R. Venkatarajan	Forest Guard Range III	9677555445
20	M.Kanniyappan	Forest Guard Range IV	9445372664
21	Rani	Forest Guard Range IV	9710390998

22	P. Govindaraj	Forest Guard V	9498021701
23	Dr. A. Manimozhi	Biologist	9445427043
24	Dr. M. Sekar	Biologist	9445228332
25	Dr. Ranjit Sam Stanley	Vet. Officer	9486585103
26	Dr.R.Thirumurugan	Vet. Asst. Surgeon	9445307200
27	Dr.Pradeep	Vet.Asst. Suregon	9840850247

9.2. ARRANGEMENT OF FOOD IN CASE OF STRIKE (NON-SUPPLY OF CONTRACTOR)

The supply of food and feed for the animals may be affected by public strikes, vehicle breakdown, non-supply of the contractor, natural calamities…etc. In these circumstances, it is essential to get the required feed items to be fed.

- At present, Non-perishable feed items are supplied once in a week. The store of AAZP has the capacity to store non-perishable feed for a period of three months. The factor to be considered here is that, if the feed is stored for more than a month, insect pests and rodents may destroy the quality of feed.
- For perishable feed items, AAZP has a cold storage unit having two tones capacity and can accommodate feed required for a period of one week.

9.3. SNAKE BITE

- Enough anti-snake venom is stocked in the zoo veterinary hospital and will be used in case of any eventuality.
- Vehicles are readily available to transport the victim to the nearest hospital for proper treatment and care.

9.4. VISITOR GETTING INJURED/ VISITOR FALLING INSIDE THE ENCLOSURE

Visitors getting injured:

- First aid boxes are kept ready in important points of the zoo like entrance complex; Battery operated vehicle counter, Zoo Veterinary Hospital and office of the Forest Range Officers inside the zoo.

- First aid boxes are also available in the lion safari vehicles.
- Walkie talkies are also provided to the drivers of the vehicles and zoo staffs for easy and quick communication.
- Vehicles are readily available to transport the victim to the nearest hospital for proper treatment and care.

Visitor falling inside the enclosure

- Ropes, ladders, nets are kept ready in the respective offices of the Range officers.
- Once the information is passed to the Range officer, he will depute a team of skilled animal keepers to rescue the victim.
- The animals in the enclosures will be brought back to the night shelter to facilitate the operation.
- Sometimes the animals may have to be chemically immobilized to avoid any injury to the fallen victim or to the animal.

9.5. FIGHTING AMONG ANIMALS

Every effort will be made to separate the fighting animals without causing serious injuries. The fighting animals will be driven back to the night shelter (primates and carnivores) and kraals (herbivores) to avoid further fighting. Many a times fight occurs during breeding season and the animals are watched carefully to avoid fight and if any fight happens, they will be separated. In Felids only those animals that are compatible will be released in the public exhibit. If needed, the animals will be chemically immobilized to bring them back to the night shelter.

9.6. BREAKDOWN OF POWER SUPPLY.

AAZP has two 80 kW power generators and fuel for the same to run a minimum of 24 hours is kept in stock. The generator will be used to supply power for the entrance complex, stores, hospital, office and exhibits that require continuous power supply like Aquarium, Nocturnal animal house and King cobra exhibit. The RA 42 area generator is under repair.

9.7 .VISITOR GETTING INJURED/SICK-

Zoo shall ensure that all such cases are attended on priority basis .To facilitate this the zoo will have

- An adequate number of staff trained in first-aid is available during the zoo's normal operating hours
- Written instructions for staff is provided in the provision of health care and the procedures to be followed in the event of an incident involving any venomous animal and a visitor or staff member. These instructions include immediate action to be taken and required information on a pre-prepared form for forwarding to the local hospital which would include:
- The nature of the bite or sting and the species inflicting it (if the species is known);
- The specification, for cross-reference purposes, of the anti-venom which accompanies the patient;
- The telephone number of the zoo and of an appropriate senior staff member;
- Details of the vet or any staff involved in handling venomous species

9.8. FOR WARNING PEOPLE ABOUT THE EMERGENCIES

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

CHAPTER-X

10. CAPACITY BUILDING

As the staff gets older, they may not be in a position to carry out their assigned function. They are to be assessed and evaluated regularly and jobs based on their mental and physical capacity may be assigned to them for optimum efficiency in work. The staff has to be protected from exposure to risks in the course of their duty.

The up gradation of the knowledge and skill of the staff is a continuous process. They must get opportunity to know and understand the new methods, technologies and findings regarding the management of animals. The Central Zoo Authority is funding training of the Animal keepers of the zoo. Similarly in house training must be organized regularly in the zoo.

The training needs of the different category of staff should be assessed and Education and skill development module for each category should be designed and agency/organization should be identified for up gradation of their skill and knowledge.

The exchange programme between zoos should be encouraged to give them exposure about the new techniques and management skills in vogue in various zoos of the country.

The existing keepers have been provided with frequent training programme to upgrade the technical skill in management of captive animals. Appropriate promotional avenue will be created for animal keepers as an incentive for them. The casual labourers working in the zoo over the years will be utilized for the recruitment of the animal keepers in future.

CHAPTER -XI

11. E-GOVERNANCE

The concept of e-governance is now a reality. In this, the core strategy is to move ahead in a systematic manner, and the approach is to achieve success step by step ensuring convenience, efficiency, transparency & reliability.

All the computers in the zoo will be networked to form LAN and internet connection will be given so that the documents can be accessed from any computer.

The website of AAZP will be updated frequently and important events will be published for the public to create awareness.

Visitors can book their entry tickets and BOV tickets from their home using AAZP website (e-ticketing).

The staffs of the zoo will be given smart identity card in which his personal details will be stored and the same card will be used to monitor his time of entry and exit. The profiles of the staff will be kept and the database will be used for future management plans.

Closed circuit television sets will be installed in strategic locations like entrance, parking, stores, hospital and few animal enclosures to monitor the visiting public and the activity of animals.

The ticket vending machines will be linked to the LAN and the details of the visitation will be monitored by the Director/ Deputy Director.

CHAPTER - XII

12. FINANCE- BUDGET

The source of funding for the management of AAZP flows through the following broad financial/ budget heads:-

1. Zoo Authority of Tamil Nadu
2. Non-Plan
    a) Works
    b) Establishment
3. State Plan Part I
    a) Works
    b) Establishment
3. State Plan Part II

    New Works
5. Schemes funded by Central Zoo Authority on 50:50 basis
6. Schemes funded by Central Zoo Authority on 100% financial assistance

The works carried out under the above heads are narrated below:

12.1. ZOO AUTHORITY OF TAMIL NADU

The funds under this category are accrued to the accounts of the zoo, mainly through ticket collection at the gate, Battery operated vehicles, Lease rents, Guest house collection etc., In the last financial year, the funds received in the ZAT accounts was nearly Rs.2.5 Crores. Also, this revenue is seen to be increasing at nearly 20% annual growth.

12.2. NON-PLAN -(A) WORKS

The financial allotment under this head is of the order of about Rs. 100 to 140 lakhs. The works normally carried are need based and most essential for the management of the zoo, which include maintenance and upkeep of the animals including feeding charges, maintenance of infrastructure like cages, animal houses, enclosures, visitors facilities, transport, drainage etc.,

12.3. NON PLAN - B) ESTABLISHMENT

This represents the pay and allowance being paid towards "Direction and Administration" amounting to about Rs. 5 to 6 lakhs per annum.

12.4. STATE PLAN - PART I

a) Works

The allocation under this head over the past years has been very meager ranging from Rs. 12-20 lakhs per annum. Zoo is an ever developing dynamic resource which should keep pace with the development at National and International level. The proposals under this head are all need based and essential for the welfare of zoo animals. Works such as renovation and improvement of enclosures, purchase of equipments, animal exchange programmes, publicity, laying roads, zoo education programmes are included in this scheme, which are approved in the Five year plan for Forestry Section of Tamil Nadu.

b) Establishment

This head represents the cost on employment of the staff engaged for the management of the zoo. Annually about Rs. 160 lakhs is spent under this head towards salaries and allowances.

12.5. STATE PLAN - PART II - NEW AND INNOVATIVE WORKS

This head includes new works to be executed in the zoo which needs to be sanctioned on priority basis are included. The quantum of allotment depends on availability of funds in the State budget.

Important works such as improvement of Entrance to zoo, water harvesting and soil conservation works, installation of animal models with educational value, construction of additional parking space are some of the new works proposed/sanctioned in recent years.

12.6. SCHEMES FUNDED BY CZA ON 100% BASIS

The Central Zoo Authority, Ministry of Environment and Forests, Government of India has the mandate to improve the conditions of the zoos for their proper management and development on scientific lines and provides a financial assistance for capital works giving priority to improve animal housing, upkeep and veterinary care facilities. As per the funding policy of CZA, the activities relating to animal housing, upkeep and veterinary care facilities are considered on 100% funding basis. Based on these guiding policy proposals are formulated and sent to the CZA for approval.

12.6.1. Schemes funded by CZA on 50:50 bases

The Central Zoo Authority grants funds for the development of zoo on 50:50 basis i.e. equal matching share is to be provided by State Government for activities like Zoo education and awareness, construction of boundary wall and drainage… etc.

12.7 FINANCIAL IMPLICATIONS

12.7.1 Schedule for the years from 2013-2014 to 2022-2023

The major works to be carried out each year for the above period have been indicated. Some of the important works to be taken up early has been given priority. The other major works have been given in the second five year period since considerable planning and resource mobilization is required. However according to urgency and considering the factors like pattern of assistance, the works proposed for a particular year can be taken up early/ later.

12.7.2. 2013-2014

S. No	Work Schedule	Rs. in lakhs
1.	Up gradation and repair of electrical installations	50.00
2.	Construction of breeding enclosure for Parakeets	50.00
3.	Construction of rear wall etc., in enclosures No. 25,26,27	3.00
4.	Serpentarium roof and enclosures repair with improved ventilation, lighting and electric supply	10.00
5.	Modification of Black swan enclosure.	15.00
6.	Study to be made regarding LPG or CNG vehicle for replacing the present battery operated vehicle	2.00
7.	Strengthening of Zoo compound wall	100.00
8.	Improvements in Digital display and interactive system	20.00
9.	Publicity materials such as stickers, pamphlets, brochures etc.,	10.00
10.	Investigation and re-designing the drainage system	50.00
11.	Construction of percolation ponds and water harvesting works	20.00
12	Purchase of Zoo round and Lion safari vehicles	40.00
13	Miscellaneous expenditures	20.00
	Total	**390.00**

12.7.3. 2014 – 2015

Sl. No	Work Schedule	Rs. In lakhs
1.	Electricity, cable, and generator spill over work	50.00
2.	Construction of new bird enclosures No. 17, 18, 20, 22, 23	40.00
3.	Improvement of Otteri lake birds sanctuary	25.00
4.	Modification of primate enclosure No. 13	30.00
5.	Modification to enclosure no. 39 to house Four horned antelope	2.00
6.	Landscaping and Horticulture – All preliminary work	25.00
7.	Sign boards to be erected	15.00
8.	Security system to be installed	100.00
9.	Strengthening compound wall and fixing **Y** angle in peripheral length of compound	50.00
10.	Purchase of Zoo round and Lion safari vehicles	45.00
11.	Creation of Biological Park - Phase 1	20.00
12.	Construction of new Lion enclosure	100.00
12.	Miscellaneous Expenditures	23.00
	Total	**525.00**

12.7.4. 2015 – 2016

Sl. No	Work Schedule	Rs. In lakhs
1.	Construction of additional rooms for chimpanzee	30.00
2.	Construction of additional water tank and new lines	40.00
3.	Construction of new panther enclosure	100.00

4.	Modification in Nocturnal animal house, lighting and air circulation work in enclosure No.85	25.00
5.	Children's Park - Redesigning with lawn, hedge plants and flowering plants	10.00
6.	Purchase of Zoo round and Lion safari Vehicles	45.00
7.	Creation of Biological Park phase – II	15.00
8.	Modification and construction of new animal house for White tiger	100.00
9.	Creation of pond within Hippo enclosure	10.00
10.	Conversion of existing Rescue Centre	10.00
11.	Construction New Tiger enclosure	100.00
12.	Providing uniform sized sign boards	5.00
13	Providing appropriately designed dust bins	2.00
Total		**492.00**

12.7.5. 2016 – 2017

Sl. No	**Work Schedule**	**Rs. In lakhs**
1.	Construction of new Animal house in Nilgiri langur enclosure.	15.00
2.	Water circulation system for all enclosures with water moat	60.00
3.	Reconstruction of Kodiakarai Birds sanctuary – Enclosure No. (59 & 60)	25.00
4.	The Rest Area No.30 (near the B.O.V ticketing counter) to be redesigned and planting to be undertaken	25.00
5.	Interpretation centre to be developed	30.00
6.	Miscellaneous	10.00

7.	Construction of Research centre	200.00
8.	Construction of conservation breeding enclosure for 11 species	550.00
9.	Conversion of existing Rescue Centre	10.00
Total		**925.00**

12.7.6. 2017 – 2018

Sl. No	**Work Schedule**	**Rs. In lakhs**
1.	Construction of new Animal house in the new enclosure No.94-97(spare)	80.00
2.	Modification of crocodile enclosures including water circulation system	75.00
3.	Link road formation in outer circular road & road to winch point	20.00
4.	The Rest Area No. 23, with concrete umbrella (Near the otter Enclosure) to be redesigned and planting	20.00
5.	Miscellaneous	20.00
6.	Recruiting Scientists CF level one No	8.00
7.	Recruiting Scientists DCF level two No	12.00
8.	Recruiting Research Associate two No	7.20
9.	Recruiting Junior Research Fellows two No	4.80
10.	Recruiting support staffs(Lab technician (1), Lab Assistant(1), Driver(2), Clerk(2), Office Assistant(2),Animal keepers (2)	40.00
11.	Creation of Research facilities(Procurement of instruments	200.00

	and chemicals)	
12.	Purchase of vehicles 2No	15.00
13.	Purchase of fuels and vehicles maintenance	1.00
14.	Maintenance of Research centre (Feeding animals, Water, Electricity, etc	200.00
15.	Conversion of existing Rescue Centre	10.00
Total		**713.00**

12.7.7. 2018 – 2019

Sl. No	**Work Schedule**	**Rs. In lakhs**
1.	Deer Safari improvement.	20.00
2.	Winch to Vandalur hill top, Phase – I	50.00
3.	Rest Area No. 42 at the junction of circular road and inner loop road to be redesigned	20.00
4.	Salary of Scientists CF level one No	8.00
5.	Salary of Scientists DCF level two No	12.00
6.	Salary of Research Associate two No	7.20
7.	Salary of Junior Research Fellows two No	4.80
8.	Salary of Support staffs(Lab technician (1), Lab Assistant(1), Driver(2), Clerk(2), Office Assistant(2),Animal keepers (2)	40.00
9.	Purchase of fuels and vehicles maintenance	1.00
10.	Conversion of existing Rescue Centre	10.00
	Total	**173.00**

12.7.8. 2019 – 2020

Sl. No	Work Schedule	Rs. In lakhs
1.	Modification in Pygmy hippopotamus and Hippopotamus enclosure	50.00
2.	Insectariums to be remodeled	10.00
3.	Rest Area No.58 (near Safari Park) to be redesigned and planting	20.00
4.	Winch to Vandalur Hills Top Phase II	90.00
5.	Salary of Scientists CF level one No	8.00
6.	Salary of Scientists DCF level two No	12.00
7.	Salary of Research Associate two No	7.20
8.	Salary of Junior Research Fellows two No	4.80
9.	Salary of Support staffs(Lab technician (1), Lab Assistant(1), Driver(2), Clerk(2), Office Assistant(2),Animal keepers (2)	40.00
10.	Purchase of fuels and vehicles maintenance	1.00
11.	Conversion of existing Rescue Centre	10.00
	Total	**253.00**

12.7.9. 2020 – 2021

Sl. No	Work Schedule	Rs. In lakhs
1.	Bifurcation of Nilgai enclosure and construction of animal house for Wild ass and Nilgai.	50.00
2.	Amphibian enclosure – remodeling	15.00

3.	Improvement in Rest Area No. 51 (Near Vedanthangal bird sanctuary)	25.00
4.	Improvements to veterinary centre and incinerator	60.00
5.	Salary of Scientists CF level one No	8.00
6.	Salary of Scientists DCF level two No	12.00
7.	Salary of Research Associate two No	7.20
8.	Salary of Junior Research Fellows two No	4.80
9.	Salary of Support staffs(Lab technician (1), Lab Assistant(1), Driver(2), Clerk(2), Office Assistant(2),Animal keepers (2)	40.00
10.	Purchase of fuels and vehicles maintenance	1.00
11.	Conversion of existing Rescue Centre	10.00
Total		**233.00**

12.7.10. 2021 – 2022

Sl. No	**Work Schedule**	**Rs. In lakhs**
1.	Improvement of Sambar enclosure	50.00
2.	Rest area No. 83, (Pygmy Hippopotamus) – Remodeling.	25.00
3.	Creation of Quarantine facilities for mammals,Birds,reptiles	150.00
4.	Salary of Scientists CF level one No	8.00
5.	Salary of Scientists DCF level two No	12.00
6.	Salary of Research Associate two No	7.20
7.	Salary of Junior Research Fellows two No	4.80

8.	Salary of Support staffs(Lab technician (1), Lab Assistant(1), Driver(2), Clerk(2), Office Assistant(2),Animal keepers (2)	40.00
9.	Purchase of fuels and vehicles maintenance	1.00
10.	Conversion of existing Rescue Centre	10.00
	Total	**308.00**

12.7.11. 2022– 2023

Sl. No	**Work Schedule**	**Rs. in lakhs**
1.	Formation of Bear safari and Bison Safari – Enclosures.	75.00
2.	Development of dry evergreen forest in Vandalur hill slope	25.00
	Total	**100.00**
	Grand Total	**4112.00**

(Rupees Forty Thousand one hundred and twelve lakhs only)

12.8. REVENUE GENERATION

The annual revenue realized in the Zoological Park during 2011-2012 was about Rs.515.20 lakhs and 70% of this is realized from entrance fee collection. Various sources of revenue collection are given in percentage.

Source	Percentage
Entrance fee collection	70.00
B.O.V. fees	13.50
Interest received from bank	10.21
Animal adoption	2..98
Vehicle parking fee	1.52
Others (Rent, toilet lease, TI cycle .,etc)	1.79