

MINI ZOO, ROING

MASTER PLAN

2010-11 - 2029-30



MEHAO WILDLIFE SANCTUARY DIVISION, ROING

ACKNOWLEDGEMENTS

The concept of zoo management has changed enormously in recent years. In present day context main objective of operating any Zoo is aimed at conservation of wildlife by providing in situ habitat as far as possible to the captive animals. The display of animals is to be done in such a manner as to provide meaningful information to visitors about the importance of wildlife, its habitat and role in the eco-system. The zoo should not be merely for recreation of visitors but it should also be a source of educating people and promoting research on animal behaviour, breeding and population dynamics. Therefore, it requires highly intensive and scientific management and hence a well prepared Master Plan with all nitty gritty in detail is quite a handy tool in better management of any zoo.

Preparation of Master plan for a zoo without any documented history, proper record and materials to consult was really a daunting task for us. Many sittings and correspondences were made to invite expert for preparation of Master Plan for the zoo but nothing materialized. Ultimately It was decided that we will prepare our own Master Plan for Mini Zoo, Roing.

The Master Plan has defined the purpose of the zoo in clear and concise terms with intended concepts and has set out the basic guidelines which are to be adopted. It has also looked into the lay out including existing components like animal enclosures, visitor's amenities, veterinary facilities, parking place, education and research, landscaping, conservation breeding, disaster management, contingency plan etc.

I acknowledge the contribution of all staff who under the leadership of Sri Jumto Riba, Divisional Forest Officer have helped me out in bringing the complete shape of this document. I am thankful to Sri Jikom Panor, Veterinary Officer, Biological Park, Itanagar for his guidance and continuous support which helped me to shape this document. I am also thankful to Sri S. Nair, Fr. and Sri M. Gibi, Fr. For preparation of Lay out map and Visitor circulation map and Miss Sagarika Chakraborty for helping me out in printing this document.

Lastly, I thank all of them who had been operational in preparation of this document.

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MASTER PLAN

Mini Zoo, Roing

2010 TO 2030

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O/o Central Zoo Authority

Diary No. 29

Date 11/2/2014

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MASTER PLAN MINI ZOO, ROING 2010-2030 PART - I

1. INTRODUCTION: A small rescue centre was established in Roing during 1985 to deal with the problem of displaced and injured animals of two sanctuaries namely Mehao Wildlife Sanctuary and Dibang Wildlife Sanctuary and other adjoining areas. This small rescue facility gradually became the epicenter for displaced and orphan animals coming from all parts of the district. Having realized the importance of a permanent holding facility particularly those animals unfit to release in the wild due to one other reason the department decided to upgrade the rescue centre to a full-fledged Mini Zoo in 2008 With broader objective of education, recreation and rescue and rehabilitation of Wild animal. Unfortunately the Mini Zoo, Roing continued to be managed without proper planning and vision till 2009. This can be very well realized from the unplanned placement of animal enclosures and haphazard development of the Zoo.

The Mini Zoo, Roing did not have a written master plan for last three decades nor layout plan.

1.1. Objectives of Mini Zoo: - The long term objective of Mini Zoo, Roing are identified as follows:-

1. Complement the national efforts in conservation through planned conservation breeding of endangered species like Hoolock gibbon.
2. Develop amongst the visitors empathy for wild animals and motivate them to support the cause of conservation of wildlife.
3. To act as Rescue Center by receiving and keeping orphaned, seized, rescued, injured wild animals.
4. Educating people about the need for wildlife conservation.
5. Research and captive breeding of rare and endangered animals.
6. Providing recreation to Zoo visitors.

1.2. Site selection:- Main criteria for selection of the site for the Mini Zoo, Roing is the ecological parameters including topography, forest coverage, acoustic, and

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also

pollution free atmosphere which are suitable for different species of animals and birds and are good habitat. It is 2 Km away from the Roing township. The unique configuration represented with the characters of rain fed areas of foot hills of Arunachal Pradesh. The Eastern and Northern boundary of the Zoo is the PWD road, on the Southern side of the zoo is the Wildlife colony and Western boundary is the Deopani River. The office of the Range officer who is also the Curator of the Zoo is approx. 200 mtr from the zoo. The entire area is undulating with gentle slope adjoining to Mehao Wildlife Sanctuary.

1.3. Legal status and area: The Mini Zoo, Roing is established adjacent to the Mehao Wildlife sanctuary with an area of 2.00 hectares.

1.4. Approach: The zoo is well connected by road and is in the northern most outskirts of Roing Township. The nearest railway station is Tinsukia, Assam which is 110 km away from Mini zoo and the nearest air service by chopper is at Roing, which is only 3 km away from zoo. The nearest Airport is at Dibrugarh, Assam.

1.5. Topography: The whole area is gentle slope & undulating. The area lies between 450 mtr. to 500 mtr. elevations from MSL. On survey of India's toposheet, the area is located in 82 P/4 NE. The zoo is located at the height of 470 – 500 meter, latitude $28^{\circ} 09' 23.4''$ North and longitude is $95^{\circ} 51' 29.1''$ East. The soil type of the area is loamy and sandy with scattered granite boulder type of rock. The soil formation is of rocky, sandy and loosely formed.

1.6. Rainfall and Humidity: It is monsoon almost throughout the year with heavy rainfall. The average annual rainfall is about 3500 mm. Maximum rainfall is recorded during the month of July and August. The average rainfall on its peak is 546 mm. The humidity ranges from 60- 90%. The average humidity is 80%.

1.7. Climate and pollution: The area falls under semi temperate zone with four seasons, July-August being the hottest month and the December- January coldest. The spring and autumn are very pleasant. The ambient temperature varies from 08° - 30° degree centigrade in winter and 24° - 34.4° degree centigrade in summer.

The area is free from industry and any other source of pollution. It is in the outskirts of the capital city and is covered with tropical semi-evergreen forest and thus free from any source of pollution. The climate, weather and atmosphere are very healthy, clear and congenial for zoo inmates.

1.8. Flora and fauna: The area of the zoo is very small and contains sufficient amount of greenery with some natural vegetation and some artificially planted trees.

Mini Zoo, Roing is sufficiently green and presents good scenic and aesthetic beauty. Floral species available in the zoo are:

Sl.No.	Local Name	Botanical Name
1.	Hollock	<i>Terminalia myriocarpa</i>
2.	Nahar	<i>Mesua ferrea</i>
3.	Pine	<i>Pinus wallichiana</i>
4.	Amlôki	<i>Emblica officianalis</i>
5.	Pichola	<i>Kydia calycina</i>
6.	Sam	<i>Artocarpus chaplasi</i>
7.	Bogipoma	<i>Chukrasia velutina</i>
8.	Amari	<i>Amora wallichii</i>
9.	Madar	<i>Erthrina indica</i>
10.	Gulmohar	<i>Delonix regia</i>
11.	Guava	<i>Psidium guajava</i>
12.	Jamun	<i>Syzygium cumini</i>
13.	Tita sopa	<i>Michelia champaca</i>
14.	Arjun	<i>Terminalia arjuna</i>
15.	Kadam	<i>Anthocephalus cadamba</i>
16.	Ajar	<i>Lagerströemia speciosa</i>
17.	Ghora Neem	<i>Azadirachta indica</i>
18.	Siris	<i>Albizia lebeck</i>
19.	Tezpat	<i>Cinnamomum obtusifolium</i>

The **faunal species** commonly found within the Zoo (not captive) are only the avifauna Magpies, Golden headed Babbler, Bulbul, Drongo, Laughing thrush, White throated fantail Flycatcher, Warblers, Myna, Dove, Barbet, Owlets etc.

1.9. Achievements: - There has not been much quantitative development over last 24 years, in infrastructure, in area, in staff, in housing as well as in animal collection. However, the Zoo has maintained a very rigid policy in respect of animal collection

where only indigenous endangered species were given thrust. The zoo boundary wall has been constructed all around during 2007-08. Similarly, an Orchid House was constructed during 2004-05, where many local orchid species are displayed. Many signages were placed in the Interpretation cum Information Center during 2009-10. A Hoolock gibbon enclosure was constructed during 2005-06.

1.10. Problems and difficulties: Despite the little progress and achievement made during the last 24 years, there have been lots of difficulties and problems. The existing size of zoo is 2.00 Ha. There is not much neighbouring open space for extension of zoo. Due to shortage of available space it is felt that no enclosure for big carnivore species will be developed.

The Zoo has least of infrastructure and needs total make over. Enclosures are outdated and needs reconstruction of all the enclosures with modern facilities for animals. There is no veterinary facility available at Mini zoo. Visitor's facilities like toilet etc. are also not available and need to be developed. Mini Zoo, Roing is running with least of man power which needs to be increased for proper care and security of animals.

Mini Zoo, Roing is being run with the existing staff of Mehao Wildlife sanctuary. Only devoted and interested trained staff needs to be posted exclusively for the Zoo.

Since the Master Plan was not approved for the zoo no exchange of animals was done to do the pairing.

1.11. Lay out plan: The present development of zoo is in haphazard way. No proper planning was done. There are many roads as a result the visitors get disoriented and move haphazardly in all direction. In fact the zoo should have only one approach road to take visitors to animal display area.

The first ever lay out plan for zoo is being prepared and shall be submitted along with Master Plan. Main stress in plan was given on species wise arrangement of enclosure.

Some of the salient features of layout plan are:-

- I. Lay out of animal enclosures,
- II. Visitor's circulation,
- III. Visitor's amenities,

- IV. Parking area
- V. Orchidarium
- VI. Lay-out for Rescue Centre.
- VII. Veterinary Hospital
- VIII. Open Spaces

The details have been indicated in the **proposed layout plan**.

1.12. Use of the zoo area for different purpose:

The Mini Zoo covers an area of 2.00 ha. Since area is very small, whole of the area is earmarked for intensive development. The present area coverage is as follows:

1.	Road and foot Paths	0.1800 Ha.
2.	Children Park	0.2000 Ha.
3.	Zoo hospital and rescue centre	0.5000 Ha.
4.	Feed store	0.0050 Ha.
5.	Lawn and garden	0.2500 Ha.
6.	Animal enclosure	0.9000 Ha.
7.	Interpretation Center	0.0120 Ha.

2. Appraisal of present arrangement and constrain:

2.1. Animal section:

2.1.1. Most of the enclosure has come up haphazardly without any planning and does not meet the requirement of modern zoo concept. Enclosures require reconstruction as per new concept & designing and approved sizes for different animals..

2.1.2. At present there are total of 7 enclosures. The total animals displayed in the enclosures as on 01/01/10 are as follows:-

Present strength of animals:

1.	Mammals	6 species	12 Nos.
2.	Reptiles	1 species	01 No.

Total: 13 Nos.

2.1.3. There is no specific sanction post for the mini zoo. The staff of Mehao Wildlife Sanctuary are utilized for to look-after the zoo.

1.	Range Forest Officer	1
2.	Forester	1
3.	Forest guard	1
4.	Animal attendant	1
5.	Animal keeper	2
6.	Casual labour including sweeper	Nil

2.1.4. Enclosures which have been constructed in the past do not serve the purpose of modern zoo management and all of them have either become very old or dilapidated. All of them have to be demolished and require reconstruction.

2.1.5. The enclosure for sambar is old fashioned and chain link fencing along with gate are in bad shape and needs to be reconstructed with modification.

2.1.6. The Barking deer enclosure is also old fashioned and chain link fencing along with gate are in bad shape and needs to be reconstructed with modification.

2.1.7. The bear enclosure which was constructed during 2002 is too small to cater the needs of species. It does not meet the biological requirements of the concerned animal. There is a need to construct new enclosure as indicated in the lay out plan. There is no need for two nos. of enclosure. In fact one enclosure will serve the purpose.

2.1.8. The Aviary is also old and needs reconstruction with modification.

2.1.9. The Civet cat enclosure is too small to meet the biological requirements of the species. It needs to be immediately dismantled and constructed as per new concept and design.

2.1.10. The Assamese macaque enclosures are too small to meet the biological requirements of the species. It needs to be immediately dismantled and constructed as per new concept and design.

2.1.11. The present python house has been slightly modified by providing fiber sheet in the roofing so that sun rays can percolate inside the enclosure for this cold-blooded species. More over the structure and the design of the house need to be modified to meet the biological requirement of the species. Existing reptile house as

per new concept needs to be modified in a warmer place indicated in the plan with feeding cubicle.

2.1.12. The present porcupine house do not meet the biological requirements of the species needs to be constructed as per new concepts and design.

2.1.13. The two enclosures of Rhesus macaque are too small to meet the biological requirements of the species. It needs to be immediately dismantled and constructed as per new concept and design.

2.1.14. The enclosure for Hoolock gibbon is small and does not full fill the biological need of the animal. It needs to be properly developed.

2.1.15. Standoff barrier need to be provided at some of the places and wherever it is there it is not safe for the visitors and needs modification.

2.1.16. No furniture is being provided in any enclosure. This should be done very elaborately and be provided in all paddocks and night shelter. Wooden plank as bed on cemented night shelter should be provided in winter to prevent from cold.

2.1.17. To regulate the atmospheric temperature for animal comfort equipment like heater, blower, fan, cooler etc needs to be provided wherever and whenever require:

2.1.18. There is no squeeze cage in the zoo. There is need for installation of squeeze cage in all the enclosure of carnivores including Himalayan black bear.

2.1.19. The doors of almost all the enclosure are very small and create problems while shifting animal for different purpose. It needs to be modified and enlarged. The drainage system in most of the enclosure needs to be provided.

2.1.20. Most of the middle level workers in the animal section are not trained and are not animal oriented. Such staffs need some exposure and training in the field of wild life and zoo management.

2.2 Veterinary section.

2.2.1 The modern concept of zoo management visualizes veterinary medicine as an integral component of all display and breeding programmes of captive animals. The Mini Zoo, Roing does not have veterinary Hospital. Presently it is managing with the District Veterinary Hospital. However, all basic infra structure is required at Mini

Zoo, Roing for proper & timely care of animals at the Zoo premises itself along with a full time trained Veterinarian and other Para veterinarian to look after the animals. The Mini Zoo, Roing has a Postmortem building and a Treatment room without any facility. It needs to be well equipped.

2.2.2. The zoo has the following staff;

1.	Veterinary Officer	Nil
2.	Stock man	Nil
3.	Animal attendant	1
4.	Peon	Nil

2.3. Store and Feed supply section: Store cum kitchen is constructed within the zoo complex. At present it is under the control of range officer and work of store keeper is done by a Forester. This system needs to be changed and one regular store keeper is needed under the control of Range Officer. The present kitchen is too small and requires extension and modification. The other areas of concern are requirement of deep freeze, weighing machine, gas stove, fly proof netting, glazed tiles floor etc.

2.4. Sanitation section: Sanitation is usually looked after by the existing casual animal keepers. This section takes care of the general cleanliness of the park, road, lawns and garden, Reception cum Interpretation center, animal enclosure etc. There is no Veterinary section. Veterinary doctors from District Veterinary hospital, Roing are requisitioned from time to time along with casual animal keepers do the disinfection, fumigation and other sanitation work inside and around the enclosure. Work of sanitation outside the enclosure is carried out by 2 existing casual animal keepers engaged at present. There are no dustbins inside the zoo premises. The garbage are collected and disposed off by burning. Improvement is required in pest control- mosquitoes, rodents etc. Introduction of manure and compost pits for disposal of animal waste.

2.5. Workshop and maintenance section: There is no workshop and maintenance section in the mini zoo. Whenever the need arises the works are get done on contract basis.

2.6. Security section: The zoo extended over a very small area with security wall. Some of the area has to be secured with security wall. There have been instances of crossing over the security wall. Anybody can enter any time inside the zoo by crossing over the wall. There has been incidence of theft of zoo animals and bird inside the zoo area. This has to be stopped by erection of grills over the security wall and beefing up the security measures by increasing the man power.

A Forester of the zoo looks after this section. Following staff are engaged:-

1.	Forester	1
2.	Forest guard	1
3.	Animal attendant	1
4.	Animal Keeper	2
5.	Night guard	Nil

They function round the clock in the park in two shifts. Besides, during the night hours, other foresters, forest guard along with forest range officer also keep vigil.

2.7. Water supply section: Large quantity of water is required for cleaning of enclosure, staff quarters, gardening, drinking and toilets. The zoo is provided water from pipeline which is exclusively laid out for staff colony located adjoining to zoo. Water supply is very insufficient and cannot meet up even the daily requirement of the Mini Zoo. A separate pipe line with tanks dedicated to zoo should be laid out to meet water requirement in sufficient. Presently, there is no facility of drinking water for visitors. It has to be provided on urgency basis.

2.8. Power supply section: The Zoo has no electric connection. Authorities from Electrical deptt. are being approached to provide electric connection to the Mini Zoo, Roing. The power supply is very good and regular with very little power cut in the Roing Township. As a back up support 5 KVA D.G. Set is required in the Zoo.

2.9. Disposal of solid and liquid waste: Solid waste of the zoo is disposed off by burning, by burying inside pit as there is no firewood incinerator. Disposal of carcass and bones are done by burying. The dung is collected and dumped inside pits away from each enclosure which are later burnt and covered. The disposal of liquid waste is not a problem in the zoo due to its topography. There is no stagnation of water or

sewage. Drains and culvert are needed to be provided where ever required to channelize the excess rain water since zoo falls in the high rainfall area.

2.10. Visitors amenities: There is no infrastructure available for visitor's amenities. It needs to be immediately placed in the zoo premises at strategic locations to secure the lawns and to provide basic facility to visitors. Visitors amenities required are viz. Signage, Resting shed, benches and toilets, drinking water, wheel chair for disabled etc...

2.11. Lawns and garden: To give aesthetic look to the zoo premises floriculture and lawns have been created in the zoo. Children Park can be created with minimum facilities like merry go round, sea saw and swings. Proposal for orchidarium and nursery for plant and flower has been put up in proposal. At present it is looked after by animal keepers. There is need of appointment of Mali to look after all these.

2.12. Fodder cultivation and organic farming: At present fodder are collected from outside the park for feeding of ungulates. But in dry season it is scanty and therefore it needs to start our own farm and fodder cultivation. An area outside Zoo premises can be earmarked for cultivation of fodder.

3. Collection plan

3.1 Since inception of the zoo main thrust in animal collection were given to indigenous and native animals, birds and reptiles of the state. List of the animals and birds under collection plan which are displayed in the zoo are:-

Sl.No.	Common Name	Zoological Name
MAMMALS		
1.	Common Palm Civet	<i>Paradoxurus hermaphroditus</i>
2.	Porcupine	<i>Hystrix indica</i>
3.	Rhesus Macaque	<i>Macaca mulata</i>
4.	Barking Deer	<i>Muntiacus muntjac</i>

- | | | |
|----|-------------|--------------------------|
| 5. | Hog deer | <i>Axis porcinus</i> |
| 6. | Leopard Cat | <i>Felis bengalensis</i> |

REPTILES

- | | | |
|----|--------|-----------------------|
| 1. | Python | <i>Python molurus</i> |
|----|--------|-----------------------|

In addition to the above all the native animals, birds and reptiles of the state are included in the collection plan.

4. General zoo administration section.

4.1. Divisional Forest Officer, Mehao Wildlife Sanctuary Division, Roing looks after the management of Mini Zoo, Roing as additional responsibilities apart from regular duty of protection and conservation work of the two wildlife sanctuaries i.e. Mehao Wildlife sanctuary and Dibang Wildlife sanctuary. There is urgent need to increase the staff strength in the veterinary section, animal attendant and security section of the zoo.

The works of Mini Zoo, Roing is carried out by the existing staff of Mehao Wildlife Sanctuary, Roing., An abstract of total number of staff, both regular, and casual working under the establishment of Divisional Forest Officer, Mehao Wildlife Sanctuary, Roing.

It is felt to get separate sanction for the posts for curator, forest guards, compounder, field guide, ticket booking clerk etc as utilizing the services of regular staff of Sanctuary is badly hampering the protection aspect.

Present Staff strength of Mehao Wildlife Sanctuary Division, Roing:

01.	Divisional Forest Officer	01 No.
02.	Curator / RFO	01 No.
04.	Forester	06 Nos.
05.	Forest Guard	08 Nos.
06.	Head Assistant	01 No.
07.	L.D.C.	02 Nos.

08.	Stenographer	Nil
09.	Forest Watcher	1 No.
10.	Game watcher	1 No.
11.	Typist	Nil
12.	Mahout	Nil
13.	Medical Attendant	Nil
14.	Chowkidar	Nil
15.	Animal attendant	01 No.
16.	Animal Keeper	02 Nos.
17.	Security Guard	Nil.
18.	Daily Wages	13 Nos.

5. Research.

- 5.1** No research work has been done by Zoo staff or any research scholar from outside in the past.

6. Conservation Breeding.

- 6.1** Main emphasis will be given on conservation breeding in the zoo rather than displaying of animals. In extension to the programme of Translocation of Eastern Hoolock gibbon from Dello to Mehao Wildlife Sanctuary, Roing the sick/injured gibbons will be rescued and kept in the zoo for further treatment. Thereafter, the conservation breeding programme of Eastern Hoolock gibbon will start.
- 6.2** Presently, Zoo has been successful in breeding rhesus.
- 6.3** In due course of time the zoo will also start breeding programme of endangered native species of the state.

7. Education and awareness.

- 7.1** In a modern Zoo, education is very important and Mini Zoo, Roing has also contributed its bit in this respect. Visitors are being continuously made aware of the efforts for conservation and their role.
- 7.2** Celebration of Wildlife Week, conducting tours and different types of competition for student are also organized under the banner Mehao Wildlife

Sanctuary, Roing. Students from schools make use of the zoo and its facilities.

7.3 The Zoo also provide training programme for the trainees of APFTI, Roing and students of other schools of Roing on Zoo management.

7.4 There is building for interpretation centre without much infrastructure and needs to be upgraded for visitors.

7.5 Publication of brochures, signage, leveling of floral species etc. is yet to happen so that zoo can be better equipped for educational purposes.

8. Rescue and Rehabilitation.

8.1 Though with limited facilities the zoo has been involved in many rescue and rehabilitation of wild animals. Many animals injured or orphanage keeps on coming for treatment and hand rearing.

8.2 However lots of improvement needs in respect of infrastructure. There is no enclosure and intensive care unit for critically injured and also for infant animals. There are also shortage of equipment and medicine. There is also requirement of emergency fund in the hand for the purpose. Creation of quarantine facilities, treatment cell, life support equipment like oxygen mask with accessories etc.

PART II

PART- II

1. Objective of the Mini Zoo.

1.1 Initially, it was started as a rescue centre during 1985 which subsequently took the shape of Mini zoo. Like any other zoo around the world it was established for the purpose of recreation and entertainment. But with the advancement of time and expertise in the field, the concept of modern zoo has undergone drastic changes. More stress has been laid on conservation, education and research. Keeping these in view, the objectives of Mini Zoo, Roing have been framed as follows:-

- (a) Conservation breeding of different endangered species belonging to the region for preservation of biodiversity and re-introduction.
- (b) To promote Research and Education in respect of both flora and fauna.
- (c) In extension of programme of Translocation of Eastern Hoolock gibbon from wild to wild (from Dello to Mehao Wildlife Sanctuary) sick/injured gibbons will be rescued and thereafter, conservation breeding programme of Eastern Hoolock gibbon will start.
- (d) Providing recreation for Zoo visitors
- (e) Rescue and rehabilitation of wild animals.

1.2. Mission statement:

The above objective are proposed to be achieved by housing and displaying of broad representative of diverse and endangered animals and birds, with emphasis on Indian fauna belonging to the region considering the climatic condition suited to them.

- (a) Complement the national interest of wildlife through planned coordinated conservation breeding of endangered wild animal species of the region.
- (b) By sharing of endangered species for the purpose of pairing with other zoos for conservation breeding and also exchange of excess animals with other zoos.
- (c) Develop amongst the visitors an understanding about the ecological linkages with the life supporting processes of nature and the need for keeping them intact by adopting

sustainable life styles and living in harmony with nature. Also motivate them to support the cause of conservation of wildlife.

- (d) Enhancing the role of zoo in conservation of wild life through collaborative research aiming at attaining management skills for in-situ population and carrying out advocacy for protecting the wild life and their habitat.
- (e) Study of feeding, management, biology, veterinary aspect, enclosure design, enrichment etc. in respect of Hoolock Gibbon to develop nodal training centre for the species.
- (f) Act as rescue centre by receiving and keeping orphaned, seized, rescued, injured wild animals and creation of rescue facilities.
- (g) Ensure high standard of animal health and hygiene, veterinary care and providing pleasant aesthetic near natural enclosure with large space for each species.
- (h) Training of zoo staff inside and outside the country shall be encouraged for creating trained man power for better management.

2. Future action plan:

The Master Plan is not a blue print and is likely to be changed as per the advancement of time and requirement. However to prevent haphazard development of zoo due to frequent changes of manager and staff, future action plan is required. It is aimed to provide direction for development of the zoo in coming 20 years i.e. 2010 – 2030. The proposal is based on the topography of the site, water availability, vegetation climate, rainfall, visitors profile, education and research, needs and convenience. For convenience the proposal has been prepared section wise. The recommendation of CZA during evaluation of zoo from time to time has been kept in view in formulating the proposal of new structure and or modification of existing structures.

2.1. Proposed animal collection plan.

Animal collection plan of the zoo since inception is based on the native animal, birds and reptiles of the state. The lists of animals included are:

Sl.No.	Common Name	Zoological Name	Population size
MAMMALS			
1.	Leopard Cat	<i>Felis bengalensis</i>	1:1
2.	Jungle Cat	<i>Felis chaus</i>	1:1
3.	Common Palm Civet	<i>Paradoxurus hermaphroditus</i>	1:1
4.	Porcupine	<i>Hystrix indica</i>	1:1
5.	Himalayan Black Bear	<i>Ursus thibetanus</i>	1:1
6.	Eastern Hoolock gibbon	<i>Hoolock leuconedys</i>	2:2
7.	Rhesus Macaque	<i>Macaca mulata</i>	2:2
8.	Sambar	<i>Cervus unicolor</i>	1:1
9.	Barking Deer	<i>Muntiacus muntjac</i>	1:2
10.	Hog deer	<i>Axis porcinus</i>	1:1
REPTILES			
1.	Python	<i>Python molurus</i>	1:1
AVI FAUNA			
1.	Blyth's Tragopan	<i>Tragopan blythii</i>	1:1
2.	Kaleej Pheasant	<i>Lophura leucomelana</i>	1:1
3.	Jungle fowl	<i>Gallus gallus</i>	1:1
4.	Oriental pied hornbill	<i>Anthracoceros coronatus</i>	1:1
5.	Rose ringed parakeet	<i>Psittacula krameri</i>	1:1
6.	Common Myna	<i>Acridotheres tristis</i>	1:1
7.	Emerald dove	<i>Chalcophaps indica</i>	1:1
8.	Dove	<i>Streptopelia spp.</i>	1:1
9.	Barbet	<i>Megalaima spp.</i>	1:1
10.	Drongo	<i>Dicrurus adsimilis</i>	1:1

(D) In addition to the above, few endangered native animals, birds and reptiles of the state are also considered in the collection plan.

2.2. Justification of the collection plan.

2.2.1. The species considered in the collection plan are mostly of native to the state and therefore suited to the climatic condition of the zoo. Moreover most of the species have been already displayed in the zoo for long time. The zoo has a past experience in handling these animals' species of the region and some of them have been even successfully bred in the zoo. They also plays significant role in the education as these animals being more secretive endangered species and are rarely seen in the wild. Recognizing the importance of zoo in providing nature of education as well as their role in scientific research on different aspects of wild animals, emphasis has to be given to display Indian fauna with special reference to those belonging to the region. Some little smaller animal species like Indian pangolin, giant squirrel, linsang etc. also needs to be exhibited.

2.2.2. Top priority has to be given to pair the single animals or animals of the one sex available in the zoo either by arranging mates for them or by transferring to other zoos on breeding loan or transfer in the interest of conservation of the species.

2.2.3. For long term commitment to conservation and captive breeding, the Mini Zoo, Roing has identified mission species like Hoolock Gibbon. Among the avian the species considered are Blyth's Tragopan and kaleej pheasant.

2.2.4. Less important species like barking deer, sambar, Assamese macaque, rhesus macaque etc. shall form the limited breeding species. Such species as per requirement will have control breeding programme by means of vasectomy or spaying without disturbing their sexual behaviour and biological need.

2.3. Description of lay out plan of the Zoo:

The master plan layout of zoo gives the detailed landscape map of the zoo with existing facilities and infrastructure. It also indicate the locations of the proposed developmental activities in animal display area, conservation breeding area, rescue centre area, visitors circulation routes, animal upkeep and healthcare facilities including animals quarantine facilities and isolation wards, visitors education facilities and civic amenities, service road, administrative blocks, entry plaza, car parking. Since the area is flat the layout of roads and enclosure cannot be shown on contour map. Earlier enclosures were either rectangular or square in shape. However, there is provision of curvilinear moats and fencing. The shape of new enclosures are

designed irregular in shape. The Layout Plan has been drawn on a scale of 1:1000 with contour interval of 1.00 mtr. In the layout plan of the zoo the existing animal enclosures (Black colour) enclosures to be modified (green colour) and that need to be redone after demolishing the old structure in blue colour. Besides the animal enclosures other physical features have also been shown like Ticket counter, Parking place, veterinary unit, Interpretation center etc.

Details are given in serial No. 2.4. of proposal to address inadequacies and shortcoming. Lay out map enclosed in Annexure - I.

2.4. Proposal to address the inadequacies and shortcoming identified in the appraisal report:

Proposal for improvement of the shortcoming in the appraisal are listed section wise in details.

2.4.1. Animal Section:

2.4.1.1 The animal section is the most important section of any zoo and various aspects of topography and vegetation has to be kept in mind to locate enclosure for different species depending upon their habits. The display will also depend on management convenience.

2.4.1.2 The maximum numbers of any species to be displayed depending on their social behaviour has to be taken into account to provide adequate space for the individual or special group. The enclosure should be designed to take care of the biological need of the species, its safety and ease of viewing by the visiting public.

2.4.1.3 An attempts shall be made to provide open air enclosure for most of the species with dry moat barrier or brick or boulder wall with RCC pillars and beam, other types of barriers like chain link mesh fence or glass shall be used whenever felt necessary depending upon the species.

2.4.1.4. By considering the heavy rainfall in the area, the chain link, mesh wire use for aviary or enclosure shall be restricted to galvanized quality only.

2.4.1.5. All enclosure shall be provided with adequate protection to the animals against climatic variation, commensurate with the individual need of the species such as boulders, cages, trees, platform, shrubs, logs etc. which will meet their biological needs. Adequate attention has to be paid for provision of crate or isolation arrangements for protecting individuals or groups from aggression behaviour of individuals in the group, protection of expectant mothers, injured animals and young ones. Such separation will help in elimination of any problem of infighting, cannibalisms or rejection.

2.4.1.6. All Feline and canine enclosure including bear enclosure shall have in-built squeeze cages attached for restraining of the animals for providing treatment and when necessary without putting the animal to undue stress for capture or transport to the zoo hospital.

2.4.1.7. Each animal house shall be provided with adequate drainage facilities so that the liquid wastes are drained out of the enclosures and disposed off without contaminating the surrounding enclosures. Solid waste of the zoo shall be disposed off by burning, by burying inside pit and there is also fire wood incinerator which is used for disposal of carcass and bones. The dung's collected shall be dump inside pits away from each enclosure which are later burnt and covered.

2.4.1.8. Potable water supply shall be ensured to all animal enclosures and feeding cubicles preferably from dedicated water supply pipeline to Mini Zoo with storage tanks.

2.4.1.9. In addition to enrichment of enclosure, plantation of fruit bearing trees, shrubs etc. which are natural food of the respective species shall be carried out where ever possible.

2.4.2. Arrangement of display:

2.4.2.1. The placement of enclosures in the zoo have come up haphazardly in past without considering geographical location and habitat of the species. Animals enclosures should be located on either side of the meandering road to make viewing of animals easier. Similarly repetition of animal enclosure like Rhesus and Hoолоck gibbon as in the old plan will be discontinued and in fact only one enclosure for

Rhesus and one enclosure for Hoolock gibbon will be retained. The shapes of enclosures will also be curvilinear and irregular. It is

proposed to adopt broad taxonomic display for convenience of management, research and education. The broad classification will be as follows:

- a. Bears.
- b. Small carnivores
- c. Nocturnal animals
- d. Ungulate
- e. Primates
- f. Aviary
- g. Reptiles are proposed to be displayed in three locations depending upon physiological requirement of animals like python in warm area.

2.4.3. Demolition, modification, or re-arrangement of existing enclosure:

2.4.3.1. There are some numbers of enclosures which exist in the zoo at present, but most of them are very old, rusted and are not fit to hold animals any more. More over such enclosures do not fit into modern concept of zoo design or do not meet the biological needs of the species housed in them. Some of them shall have to be completely demolished, some shall be modified for other species, or few others shall be modified to meet the minimum size for feeding or retiring cubicles recommended in the Recognition of Zoo Rules and Guidelines prescribed by CZA. The changes proposed are as follows:

- (i) The enclosure for sambar is old fashioned and chain link fencing along with gate are in bad shape and needs to be reconstructed with modification.
- (ii) The Barking deer enclosure is also old fashioned and chain link fencing along with gate are in bad shape and needs to be reconstructed with modification.
- (iii) The bear enclosure which was constructed during 2002 is too small to cater the needs of animals. It does not meet the biological requirements of the concerned animal. There is a need to construct new enclosure as indicated in the lay out plan.
- (iv) The Aviary is also old and needs reconstruction with modification.
- (v) The Civet cat enclosure is too small to meet the biological requirements of the species. It needs to be immediately dismantled and constructed as per new concept and design.

(vi) The Assamese macaque enclosure is too small to meet the biological requirements of the species. It needs to be immediately dismantled and constructed as per new concept and design.

(vii) The present python house has been slightly modified by providing fiber sheet in the roofing so that sun rays can percolate inside the enclosure for this cold-blooded species. More over the structure and the design of the house need to be modified to meet the biological requirement of the species. Existing reptile house as per new concept needs to be modified in a warmer place indicated in the plan with feeding cubicle.

(viii) The present porcupine house do not meet the biological requirements of the species needs to be constructed as per new concepts and design.

(ix) The two enclosures of Rhesus macaque are too small to meet the biological requirements of the species. It is again repetition of display. It needs to be immediately dismantled and constructed as per new concept and design as per the lay out plan.

(x) The planting of trees in the neighbourhood area of Gibbon enclosure will be taken up during 2010-11 for more shade.

2.4.4. Construction of new enclosure:

Almost all the old enclosure are to be dismantle and re-arranged to provide new look to the zoo and to provide appropriate arrangement of animal display as per their habitat requirement and also for the education importance to the zoo visitors. Some new enclosures are needed to be added in order to make the zoo more much interesting and attractive.

The enclosures proposed are:-

2.4.4.1. Primate enclosures: The enclosure for Hoolock gibbon is in good condition and after modification it can be put in use. The existing Assamese Macaque and Rhesus macaque enclosure will be dismantled and constructed as per new design at the properly laid place.

2.4.4.2. Enclosures for ungulates: All the ungulates will be displayed side by side for education purpose and the enclosure shall be constructed with brick or boulder wall shall be design to give natural look. The proposed enclosures for ungulates as per lay out plan are:-

- a. Sambar enclosure
- b. Barking deer enclosure
- c. Hog deer enclosure.

2.4.4.3. Enclosure for Small Cat like Leopard cat & Civet cat is proposed as the old one is misfit and not at proper location.

2.4.4.4. Bear enclosure: One bear enclosure is proposed for display of Himalayan black bear. The existing structure will be modified.

2.4.4.5. Aviary: In addition to the present aviary and pheasant enclosure another aviary is proposed near the present aviary for display of different species of birds listed in the collection plan. Galvanized chain link wire mesh, iron angle post and thrust shall be used for construction of the aviary. Back portion will have covered area preferably of RCC for protection from rain and for nesting.

2.4.4.6. Enclosure for Porcupine is proposed at the identified location.

2.4.5. Veterinary section: The Mini Zoo, Roing does not have veterinary Hospital. Presently it is managing with the District Veterinary Hospital, Roing. However, all basic infra structure like dispensary with basic diagnostic facilities, operation theatre room and firewood incinerator are required at Mini Zoo, Roing for proper & timely care of animals at the Zoo premises itself along with a full time trained Veterinarian and other Para veterinarian to look after the animals. It has No dedicated staff for veterinary section. The Mini Zoo, Roing has a Postmortem building and a Treatment room without any facility. It needs to be well equipped.

The requirements are:-

- a. Veterinary hospital building.
- b. Basic diagnostic facilities.
- c. Tranquilizing equipments like pistols, blowpipes and jab sticks with medicines.
- d. Intensive care unit: Large numbers of infant and grievously injured animals are rescued from different part of the state and send to the zoo for treatment and rehabilitation. Due to lack of intensive care unit mortality rate or growth abnormality rate is high. Facilities for birds, mammals and reptiles needed to

be constructed with facilities like air-condition, brooder, heating system, baby incubator etc.

- e. Quarantine ward: There is no quarantine ward at present in the zoo and it needs to be constructed with suitable restraining facilities.
- f. Disease investigation: - A laboratory fully equipped is required to carry out various tests like Blood smear, urine, rapid test tuberculosis, faecal examination etc. are routinely carried out in the proposed zoo hospital.
- g. Formation of disease and health advisory committee: A committee involving veterinary expert including District Vety. Officer, Roing, Veterinary Surgeon, Roing, Divisional Forest Officer, Mehao Wildlife Sanctuary Division, Roing, Range Forest Officer, Mehao Wildlife Range, Deopani Shall be formed which will meet time to time and advice pertaining to health and management of zoo inmates.
- h. Training and education: In service trainees of Deptt. of Environment & Forest undergoing training at APFTI, Roing are given exposure to various aspects of zoo. This should be encouraged because it gives fair idea about handling of tranquilizing equipment and zoo animal medicine to the trainee.
- i. Veterinarian, Para veterinary staff, laboratory technician should be subjected to appropriate exposure for up gradation of their skills.
- j. Organizational set up:

The Zoo has the following staff;

1.	Veterinary Officer	Nil
2.	Stock man	Nil
3.	Animal attendant	1
4.	Peon	Nil

The additional man power required in the zoo for Veterinary section are:

1.	Veterinary Officer (Part time)	1
2.	Compounder	1
3.	Attendant (daily wages).	1

- k. Reference Library: A small library for reference needs to be developed with collections of few required books and journals.

2.4.6. Store and Feed supply section:

Store cum kitchen is constructed within the hospital complex. The present kitchen is too small and requires extension and modification. It should be provided with washing basin, gas stove, fly proof netting, glazed tiles floor etc. Items needed to be procured are deep freeze, weighing machine, Kitchen knives, utensils and other equipments required for preparation of animal food.

2.4.7. Sanitation section:

2.4.7.1. Sanitation is one of the most important section in a zoo as lot of solid and liquid wastes are generated every day from animal enclosure as well as from visitors. Unless suitable arrangement is made for their day to day disposal, it will be difficult to keep the zoo clean and pleasant. Hence, necessary infrastructure needed to be developed. It is essential to provide complete sewage disposal system, series of dustbins, and construction of pit for dumping and burning and sweeping on daily basis. The public toilet needs proper and regular cleaning. To achieve this, besides man power, proper equipment should be made available from time to time. Improvement is required in pest control- mosquitoes, rodents, feral dogs etc. Introduction of manure and compost pits for disposal of animal waste. However due to its topography – undulating and slope the sanitation especially the liquid wastage has not been a problem in the zoo. Specific area should be ear marked for the visitors for eating food brought with them.

2.4.7.2. Polythene and tetra packs should be completely prohibited in the park. Composting of bio-degradable wastes should be done in the compost pits and manure so generated may be used in organic and fodder farm, lawns and garden.

2.4.8. Workshop and maintenance section :

Since it is a Mini zoo, no separate workshop and Maintenance Section is proposed. The maintenance of animal enclosures as and when required will be done

by hiring job or contract basis. Similarly other carpentary and mason work will be done as and when need arises.

2.4.9. Security section:

It very important to keep the zoo animals, visitors, zoo staff and their families,, zoo properties both movable and immovable secure and safe to make the zoo function properly. The zoo extended over a very small area with security wall. Some of the open area has to be secured with security wall. There have been instances of crossing over the security wall. Anybody can enter any time inside the zoo by crossing over the wall. There has been incidence of theft of zoo animals and bird inside the zoo area. This has to be stopped by erection of grills over the security wall and beefing up the security measures by increasing the man power and Completion of Security wall. The measures need to be taken in years to come are:-

- a. Early completion of security wall around the Zoo and erection of Iron grills over the security walls all along. The soil formation at the zoo area is loose, therefore the security wall to be constructed should have RCC horizontal beam at the base of the wall and another at the top of the wall to sustain the tensile force during rainy season and earthquake.
- b. Out sourcing the Security Personnel from Private Security Agencies engaged in this Sector. This will reduce the Creation of posts.
- c. Creating awareness among the public about importance of wild life conservation in general and particular in zoo inmates and about legal implication of wildlife protection act' 1972.
- d. Overall Security will be looked by the Zoo Curator.

2.4.10. Water supply section: Large quantity of water is required for cleaning of enclosure, staff quarters, gardening, drinking and toilets. The zoo is provided water from pipeline which is exclusively laid out for staff colony. Water supply is very insufficient and cannot meet up even the daily requirement of the Mini Zoo. A separate pipe line with tanks dedicated to zoo should be laid out to meet water requirement in sufficient. Presently, there is no facility of drinking water for visitors. It has to be provided on urgency basis.

2.4.11. Power supply section: The Zoo has no electric connection. Authorities from Electrical deptt. are being approached to provide electric connection to the Mini Zoo, Roing. The power supply is very good and regular with very little power cut in the Roing Township. As a back up support 5 KVA D.G Set is required in the Zoo. Provision for Underground cable power connection with erection of light pole at different location for purpose of security and electrification of all the enclosure may be considered.

2.4.12. Garbage Disposal: Solid waste of the zoo is disposed off by burning, by burying inside pit as there is no firewood incinerator. The dung is collected and dumped inside pits away from each enclosure which are later burnt and covered. The disposal of liquid waste is not a problem in the zoo due to its topography. There is no stagnation of water or sewage. Drains and culvert are needed to be provided where ever required to channelize the excess rain water since zoo falls in the high rainfall area. The area has been marked on the lay out plan.

2.4.13. Carcass Disposal: Disposal of carcass will be done by way of burying. The place has been marked on the lay out map.

2.4.14. Visitors amenities: There is no infrastructure available for visitor's amenities in the zoo. It needs to be immediately placed in the zoo premises at strategic locations to secure the lawns and to provide basic facility to visitors. Visitors amenities required are viz. Signage, Resting shed, benches and toilets, drinking water, wheel chair for disabled etc.

2.4.14.1. A ticket counter has to be constructed near the gate.

2.4.14.2. Artistic gate: The gate in the park, one the main gate which is common entry for both zoo staff and visitors needs to be improved with proper design with a cattle proof culvert and duly provided List of Does and Don't and also guide map on it.

2.4.14.3. Parking place: Parking place need to be constructed near the gate with facilities like visitor's shed etc.

2.4.14.4. Resting shed, benches, toilets, and points provided shall be provided in every strategic point.

2.4.14.5. Drinking water facilities: Installation of aqua guard or any other facilities for clean drinking water should be provided at suitable places.

2.4.14.6. Wheel chairs should also be provided for disable at nominal charges. The clean toilet for such visitors should be kept fully operational.

2.4.14.7. Proper signage for every species of animals displayed and also for important species of flora should be done for education purpose.

2.4.14.8. In order to make the visit enjoyable, children park with minimum facilities like see-saw and swings can be created which is proposed in the plan.

2.4.15. Landscaping and gardening: To give aesthetic look to the zoo premises floriculture and lawns have been created in the zoo needs to be developed. Children Park can be created with minimum facilities like merry go round, sea saw and swings. Proposal for orchidarium and nursery for plant and flower has been put up in proposal. At present it is looked after by animal keepers. There is need of appointment of Mali to look after all these.

2.4.15.1. Plantation in vacant patches & in the enclosures.

Plantation of rare and endangered species of native origin mostly of medicinal, timber, ornamental, latex, fruit and seed bearing trees which are natural feed for different species displayed in the zoo, will be carried out in the vacant patches & in the enclosures of the zoo. Plantation of bamboo shall also be encouraged in the clear patches of zoo area.

2.4.15.2. Lawns and garden: To give aesthetic look and pleasant atmosphere to the visitors, creation of flower garden and lawn is considered at different location.

2.4.15.3. Nursery: Nursery for plant and flower should be taken up in the park at the place earmarked in the zoo.

2.4.15.4. There is need for creation of post of Mali to look after the work of lawn and garden.

2.4.15.5. An area has also been identified for creation of orchidarium in the zoo for education, research and to give aesthetic look for the visitors. The Orchidarium needs regular maintenance.

2.4.16. Fodder cultivation and organic farming. At present fodder are collected from outside the park for feeding of ungulates. But in dry season it is scanty and therefore it needs to start our own farm and fodder cultivation. An area of 2 hectare will be earmarked for the purpose outside the zoo premises.

Bio-degradable wastes like leaf, litter, animal dung, vegetable wastes etc. should be composted or subjected to vermiculture for organic manure for the farm and flower garden.

2.4.17. Road and visitors' circulation:

2.4.17.1. There is only a single footpath starting from entry gate and traverses in the entire zoo premises. Presently the footpath is gravel filled which create lots of problem & discomfort to the visitors. It needs to be upgraded to CC footpath. The layout of the foot paths have been shown in the Proposed Map.

2.4.18. Administrative building and staff quarter: Since Divisional Forest Officer, Mehao Wildlife Sanctuary Division, Roing looks after the affairs of Zoo therefore, infrastructure is not required for office building etc. But accommodation for staff and labourers are required. Renovation of existing office building and staff quarter will be taken up from time to time.

2.4.19. Mobility:

2.4.19.1. The existing vehicles with Divisional Forest Officer Mehao WLS Division are sufficient for the purpose. Proposal for a LMV(Mahindra Utility) is prescribed for specially for the zoo purposes for carrying feed, fodder etc. Therefore requirements are:-

a. Mini truck(Mahindra Utility Van).

2.4.19.2. Replacement of vehicle in every 10 years intervals or as prescribed should be taken up.

2.4.20. Education and awareness: This is a very important component of zoo management. The visitors, after their visit should go back with empathy for wild animals in captivity and also in the wild, besides getting educated about different

aspects of biology and ecology of the wild animals. Hence the following steps need to be taken in the years to come in a phased manner.

2.4.20.1. Creating of interpretation centre in modern lines with the advice and involvement of experts in the field. Some of the existing interpretation materials like photographs, models etc needs to be improved. This should not only educate visitors on the zoo animals, but provide information on different protected areas of the state and ecology.

2.4.20.2. Signages are the best educative materials for the visitors. They should be properly designed, made more interesting with pictures and ecological information and put in different enclosures and in groups of enclosures. Guide maps and direction boards should be displayed at different point of the park.

2.4.20.3. Introduction of keepers talk will be much more meaningful and practical for the zoo visitors. Proposal for the post of a field Guide has been made in the proposal.

2.4.20.4. A gift shop for selling souvenirs of the park, photos, slides, guide books, stickers and other nature related artifacts like mugs, paper weight, caps, ties, T-shirt, etc. should be established in the zoo near the interpretation centre. This will not only help people take back certain durable wild animal related materials back home for long time to remember but also help the park to get some revenue like many foreign zoos.

2.4.20.5. An arrangement may be made for zoo visit of students from nearby schools from time to time. They can be exposed to various aspects of bio-science taking advantage of live animals, documents, and proposed library facility of the park.

2.4.20.6. Celebration of wild life week, quiz competition, radio broad casting, and publicity about wildlife should be carried out from time to time in collaboration with other Department, organization and NGOs.

2.4.20.7. Creation of own web site, facilities for film shows, digital camera etc needs to be made available.

2.4.20.8. All the plant, bamboo and medicinal shrubs naturally available in zoo should be properly labeled with common and scientific names.

2.4.21. Research: Although there is abundant scope of research in endangered animals of zoo, no work has really been taken up till date. Some effort needs to be put into this direction.

2.4.21.1. The zoo should collaborate with different colleges and universities on animal research and provide facilities for management oriented research without involving any disturbance or discomfort to animals.

2.4.21.2. Research on veterinary, nutritional and physiological aspect may also be carried out for the benefit of the animals. Any other research work which is beneficial for zoo animals will be encouraged provided it does not cause any discomfort or disturbance to zoo animals.

2.4.22. Off display Conservation breeding:

Taking into consideration of available space, infrastructure conservation breeding of Hoolock gibbon is proposed in the existing enclosures. Since there is shortage of space, conservation breeding of other species is not proposed.

2.4.23. Rescue centre.

2.4.23.1. Though with limited facilities the zoo has involved in many rescue and rehabilitation of wild animals. Many animals injured or orphanage keeps on coming for treatment and hand rearing. Therefore a rescue centre is proposed. This area will remain separated from the zoo with a gate and no display of animals will be allowed.

2.4.23.2 Proposal for veterinary hospital with equipments has been stressed on for fulfilling the requirement needed for rescue & treatment. A treatment and Postmortem room exists in the zoo.

2.4.23.3. There are always shortage of equipment, medicine and fund for transportation expenses. Therefore provision for such emergency fund may be kept in hand from time to time.

3. Human Resource:

Mini Zoo, Roing initially started as a rescue centre, slowly developed into Mini zoo. Therefore, the personnel requirement varies and were reviewed and asses from time to time. At present Divisional Forest Officer, Mehao Wildlife Sanctuary Division, Roing looks after the overall administration of the zoo apart from conservation and protection works of Mehao Wildlife Sanctuary and Dibang Wildlife Sanctuary. Since, Zoo is very small it can be managed. Since not much office works are desired in the

mini zoo therefore ministerial posts are not proposed. Some field staff on regular basis needs to be engaged for the zoo for which separate posts needs to be sanctioned as existing system of engaging staff from Division is hampering the protection works of the Sanctuary. The present strength and staff pattern is given in appendix.

3.1. Proposed cadre strength:

A. Establishment(Office):

- | | | |
|----|---|---|
| 1. | Divisional Forest Officer, Mehao Wildlife Sanctuary(Over all in charge) | 1 |
| 2. | Ticket Booking Clerk | 1 |

B. Security:

- | | | |
|----|--------------|---|
| 2. | Forest Guard | 2 |
| 3. | Night Guard | 1 |

C. Animal Management:

- | | | |
|----|--|---|
| 1. | Curator (Range Forest Officer or Dy F.R) | 1 |
| 2. | Forest guard | 1 |
| 3. | Animal Keeper | 1 |

D. Sanitation:

- | | | |
|----|---------|---|
| 1. | Sweeper | 3 |
|----|---------|---|

E. Veterinary Section:

- | | | |
|----|---|---|
| 1. | Veterinary Officer(Part time on need based from Govt.Vet , Hospital) | 1 |
| 1. | Compounder | 1 |

F. Lawn & Garden:

- | | | |
|----|------|---|
| 1. | Mali | 2 |
|----|------|---|

G. Machines

- | | | |
|----|------------------------|---|
| 1. | Driver (Light Vehicle) | 1 |
|----|------------------------|---|

H. Feed and Distribution:

- | | | |
|----|---------------------------|---|
| 1. | Cook cum feed distributor | 1 |
|----|---------------------------|---|

I. Education & Research

- | | | |
|----|---------------------------------------|---|
| 1. | Field Guide i/c Interpretation centre | 1 |
|----|---------------------------------------|---|

3.2. Duties and Responsibilities:

3.2.1. Divisional Forest Officer is the overall in-charge of the zoo. He/she is responsible for smooth functioning of the zoo, proper housing upkeep and health care of the animals, proper visitor management and ensuring their safety. He is also responsible for overall administration, finance, interacting with media and any other important issues relating to zoo. For discharge of these functions smoothly the responsibilities and duties are assigned to all the zoo personnel as per guidelines issued by CZA. The directions issued by the Divisional Forest Officer are binding on all zoo personnel. The duties and responsibilities for the post are as follows:-

3.2.2. Veterinarian: Upkeep, health care and management of zoo animal is the primary duty of the veterinarian. Frequent visits to animal enclosures and assessing general health condition of the animals and timely screening of animal for parasitic load. Preparation of disinfection schedules, prophylactic treatment schedules and ensuring the implementation of the same. Taking steps for timely restraining and treatment of sick animals, maintenance of treatment report card and conducting post mortem. He is also responsible for tranquilization, crafting, shifting and transportation of zoo animals. He will control the feed store and maintain record and stock ledger with the help of store keeper. He will also ensure the quantity and quality of feed supplied to the zoo animals. Since, it is a mini zoo no proposal for veterinarian is proposed. The veterinarian from Department of animal husbandry Roing will be requested to do health check up.

3.2.3. Curator/Range Forest Officer: Upkeep and maintenance of animal collection and animal housing, including timely cleaning and disinfection of animals enclosure, timely feeding of animals in the prescribed manner, keeping a close watch on general health conditions of the animals and taking steps for getting sick animal treated on priority basis including crafting, shifting of animals and transportation of animals within the zoo. He is also responsible for construction and maintenance of animal enclosure, building, roads and other infrastructure. He will also personally supervise the progress of Orchidarium, lawns and garden.

3.2.4. Veterinarian Assistant: He will assist the Veterinarian in his every visit. He will also watch on the general health of the animals and take action as per his observation.

3.2.5 Security Personnel: It is proposed to out-source the security matter to private agencies. However overall security responsibility will lie on the Curator.

3.2.6 Field Guide cum Interpreter : The field guide will be a trained person, He will guide the person visiting the zoo. He will also be in charge of Interpretation Centre.

3.2.7. Formation of health advisory and expert committee: A committee involving veterinary expert including Veterinarian Roing, Divisional Forest Officer, Mehao Wildlife Sanctuary Division, Roing, Range Forest Officer, Mehao Wildlife Range, Deopani shall be formed which will meet time to time and advice pertaining to health and management of zoo inmates.

4. Disaster management: There is no full proof management system that will prevent destruction and causality in natural calamity; however emergency preparedness shall aid successful control and mitigation. Though the occurrence of such natural and manmade disasters are certain, they are infrequent, and the zoo has to cope with it. To deal with it an Emergency Preparedness Hand Book shall be prepared which will specify the following points:

- a. Formation of emergency team with chain of command in the team.
- b. Each member and employ should know exactly what his/her role is during a disaster, whom to report and work with.
- c. List of the possibilities of disasters and its emergency preparedness in operational and orderly planed manner.
- d. List of personal needs like water, food, first aid, lantern, battery, torches stoves, rain/winter cloth etc. will also be provided in the hand book.

4.1. Possibilities of disasters in the Mini Zoo are:

a. Fire control: There are no incidences of fire in the zoo premises. The preparedness in these regard is must which will include storage of water, storing fire extinguishers and immediate contact to the fire brigade. Leaf litters and other wasteful materials are cleared regularly to prevent any fire accident.

b. Flood: Due to heavy rainfall in the state the incidence of flood are common in the state, but there is no problem as such with regard to flood. Although heavy and incessant rain do create some problem in the day to day activity and care of animals.

Proper drainage system needs to be developed in and around Mini Zoo premises so that excess flow of rain water can be channelized.

c. Cyclone situation: Such natural calamities are usually not common in the area but have faced the menace of cyclone in the year 2005. Preparedness for such situation will be formulated with possibility for immediate evacuation of animal or repairing of enclosure etc.

d. Breakdown of law and order: The management of Zoo may be put under the Essential Service Maintenance Act which will immensely help the zoo in smooth functioning at the time of such law and order breakdown. However preparedness is required in case of law and order breakdown due to external aggression or any other major situation. The preparedness will mostly concerned with stocking of food item, medicine, and other daily required materials for animal as well as for staff.

5. Contingency Plan:

Contingency plan for emergencies like snake bite, breakdown of power supply; escape of animals from enclosure, visitors falling into enclosure etc. along with preparedness needs to be formulated for the zoo. Most of the animals in case of escape can cause severe problems and danger to the people. Escape of zoo animals, aberrant human behavior etc. can create unforeseen situations. Meticulous prior planning with adequate finance is needed for preparedness to face such exigencies in the interest of the zoo animals as well as public safety. Points that are considered in the plan are:-

(A) Animal rescue from wild :

- a. Rescue team comprising of animal attendant, Range Officer, and forest guard will be kept ready any time whenever required.
- b. The proposed Vehicle for the zoo along with tranquilizing equipment and drug, movable laboratory facilities transport cages etc. will be utilized for the purpose.
- c. Quarantine ward and treatment cell will be created in the Zoo Veterinary Hospital.
- d. Provision for emergency fund shall be kept for procurement of medicine, feed and other miscellaneous items during rescue operation.

e. Intensive care unit has also been proposed in the plan in the veterinary section.

(B) Escape of animals from enclosures :

- a. Rapid action force shall be formed to deal with such emergency situation. The team shall have pre-arranged tranquilizing drugs and equipment, rope, cages, rescue van with stretcher for immediate recapturing of escaped animal.
- b. Pre-arrange facilities for immediate evacuation of person getting injured during such operation to nearest hospital shall be made available.
- c. Guns and bullets in case of unavoidable circumstances.

(C) Arrangement of food during strike:

Moreover movement of vehicle on "zoo duty" is normally exempted from the purview of any strike and therefore, it has never been a problem for the zoo. Deep freeze need to be installed in the feed store for preservation of perishable feed item for longer period of time.

(D) Snake Bite:

No provision is there in the Mini Zoo, Roing for snake bite. Anti-venom drugs be kept in veterinary wing of the Zoo.

(E) Visitors getting injured/ fall inside enclosure:

First aid box, vehicle, ladder, ropes etc. are made available for minor treatment and evacuation of injured person. Rapid action team to deal with such type of emergencies shall be formed.

(F) Fighting among Animals: Preventive measures are usually taken to prevent infighting among animals, however infighting do occurred in the zoo. Manual separations with bamboo pole or tranquilizing equipment are usually used.

(G) Epidemic: There has been no incidence of epidemic. Vaccination of ungulates in the zoo is practically very difficult and therefore, main stress is given on prevention by vaccination of livestock around the zoo in a year. However, in case of any such eventualities the diseases infected animals will be kept in isolation shed and expert

from Department of AH & Vety. And also from nearest Veterinary College will be outsourced.

(H) Break down of Power supply: D.G. Set with 5 KVA capacity need to be installed in the zoo to meet the emergency power supply during break down of power supply.

6. Capacity building: Officers and staff posted in the zoo shall be deputed for short term training conducted by CZA or any other organization within or outside of the country. Forester, forest guard and animal keepers posted in the zoo shall be made mandatory to undergo keepers training programme conducted by CZA.

7. E- governance: a comprehensive information system for database management covering all aspects of Mini Zoo, online reporting and suitable training of zoo staff needs to be developed.

8. The broad budget analysis for the development of Mini Zoo, Roing.

The broad budget analysis is based on the present schedule rate from state public work department and will vary as per the cost index of materials and labour charges at the time of implementation of the work: Some of the items not included in the list may also be taken into consideration as per future requirement

Year wise requirement of fund showing Physical & Financial Targets for construction & modification works of Mini Zoo, Roing NON-RECURRING ITEM OF WORKS

Sl. No	Details of work	Physical Target	Year wise Financial Target (in Rs. Lakhs)									
			2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20
1.	Replacement of chainlink fencing around Barking deer enclosure	200 rmt.	--	5.00								
	Construction of feeding cubicle & roosting shade				4.00							
2.	Replacement of chain link fencing around Hog deer enclosure	160 rmt.	--	4.00								
	Construction of feeding cubicle & roosting shade				4.00							
3.	Replacement of chain link fencing around Sambar enclosure	180 rmt.	--	--	--	4.50						
	Construction of feeding cubicle & roosting shade		--	--	--	--	5.00					
4.	Construction of Black Bear moat	1 No.	--	--	--	30.00						
5.	Construction of enclosure for Python	1 No.	--	--	--	5.00						
	Construction of feeding cubicle & roosting shade						3.00					
6.	Construction of Aviary enclosure	1 No.					12.00					
7.	Construction of Porcupine enclosure	1 No.						5.00				

8.	Modification of Hoolock gibbon endlo.	1 No.								20.00									
9.	Construction of Rhesus macaque enclosure	1 No.			15.00														
10.	Construction of Assamese macaque enclosure	1 No.								15.00									
11.	Construction of Leopard cat enclosure	1 No.			4.00														
12.	Construction of Civet cat enclosure	1 No.			4.00														
13.	Construction of Visitors Toilet	1 No.	2.00																
14.	Construction of rescue center											8.00		4.00					
15.	Construction of Zoo Hospital															8.00		7.00	

Sl. No	Details of work	Physical Target	Year wise Financial Target (in Rs. Lakhs)									
			2020-21	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30
16.	Construction of Aquarium	1 No.	6.00	3.00								
17.	Construction of main footpath	1200 rmt.			15.00							
18.	Construction of narrow footpath	700 rmt.				5.00						
19.	Development of Visitors Shade	2 Nos.					2.00	2.00				
20.	Purchase of LMV	1 No.							8.00			
21.	Development of water supply with overhead tank	300 rmt.								12.00		
22.	Laying of Underground power cable i/c cost of DG set	300 rmt.									10.00	
23.	Construction of drainage system	800 rmt.										6.00
24.	Construction of Stand off barrier	300 rmt.		3.00								3.00
25.	Development of Parking Place						2.00					
26.	Construction of Ticket counter & railing	1 no.						1.00				

Year wise requirement of fund showing Physical & Financial Targets for construction & modification works of Mini Zoo, Roing

RECURRING ITEM OF WORKS

Sl. No	Details of work	Physical Target	Year wise Financial Target (in Rs. Lakhs)									
			2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20
1.	Wages of 10 nos. of contingency workers	5 skilled. 5 unskilled	1.80	1.80	2.00	2.00	2.20	2.20	2.50	2.50	2.75	2.75
2.	Procurement of feed items		1.50	1.50	1.65	1.65	1.80	1.80	2.00	2.00	2.20	2.20
3.	Cost of medicines/disinfectant		2.00	2.00	2.20	2.20	2.45	2.45	2.70	2.70	3.00	3.00
4.	Publicity/Pamphlets/		0.50	0.50	0.55	0.55	0.60	0.60	0.65	0.65	0.70	0.70
5.	Cost of POL for LMV		0.50	0.50	0.55	0.55	0.60	0.60	0.65	0.65	0.70	0.70
6.	Rescue, Treatment & Release of animals in wild		0.10	0.10	0.11	0.11	0.13	0.13	0.15	0.15	0.17	0.17
7.	sign posts & post maintenance every two year		0.10	--	0.11	--	0.13	--	0.15	--	0.17	--
8.	Maintenance of enclosure every 2 year		2.00	--	2.20	--	2.45	--	2.70	--	3.00	--
9.	Maintenance of staff building		0.50	0.50	0.55	0.55	0.60	0.60	0.65	0.65	0.70	0.70

Sl. No	Details of work	Physical Target	Year wise Financial Target (in Rs. Lakhs)									
			2020-21	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30
1.	Wages of 10 nos. of contingency workers	5 skilled.	2.75	2.75	3.00	3.00	3.30	3.30	3.60	3.60	3.95	3.95
		5 unskilled	2.20	2.20	2.45	2.45	2.70	2.70	3.00	3.00	3.30	3.30
2.	Procurement of feed items		3.00	3.00	3.30	3.30	3.65	3.65	4.00	4.00	4.40	4.40
3.	Cost of medicines/disinfectant		0.70	0.77	0.85	0.94	1.03	1.16	1.28	1.40	1.55	1.70
4	Publicity/Pamphlets/		0.70	0.77	0.85	0.94	1.03	1.16	1.28	1.40	1.55	1.70
5.	Cost of POL for LMV		0.70	0.77	0.85	0.94	1.03	1.16	1.28	1.40	1.55	1.70
6.	Rescue, Treatment & Release of animals in wild		0.17	0.20	0.23	0.27	0.30	0.34	0.37	0.40	0.44	0.48
7.	sign posts & post maintenance every two year		0.17	--	0.20	--	0.23	--	0.26	--	0.30	--
8.	Maintenance of enclosure every 2 year		3.00	--	3.30	--	3.65	--	4.00	--	4.40	--
9.	Maintenance of staff building		0.70	0.77	0.85	0.94	1.03	1.16	1.28	1.40	1.55	1.70

Appendix- I

Existing animal collection plan:

Sl.No.	Common Name	Zoological Name
MAMMALS		
1.	Leopard Cat	<i>Felis bengalensis</i>
2.	Jungle Cat	<i>Felis chaus</i>
3.	Common Palm Civet	<i>Paradoxurus hermaphrodites</i>
4.	Porcupine	<i>Hystrix indica</i>
5.	Himalayan Black Bear	<i>Selenarctos thibetanus</i>
6.	Eastern Hoolock gibbon	<i>Hoolock leuconedys</i>
7.	Rhesus Macaque	<i>Macaca mulata</i>
8.	Sambar	<i>Cervus unicolor</i>
9.	Barking Deer	<i>Muntiacus muntjac</i>
10.	Hog deer	<i>Axis porcinus</i>
REPTILES		
1.	Python	<i>Python molurus</i>
AVI FAUNA		
1.	Blyth's Tragopan	<i>Tragopan blythii</i>
2.	Kaleej Pheasant	<i>Lophura leucomelanos</i>
3.	Jungle fowl	<i>Gallus gallus</i>
4.	Oriental pied hornbill	<i>Anthracoceros albirostris</i>
5.	Rose ringed parakeet	<i>Psittacula krameri</i>
6.	Common Myna	<i>Acridotheres tristis</i>
7.	Emerald dove	<i>Chalcophaps indica</i>
8.	Laughing dove	<i>Streptopelia senegalensis</i>
9.	Barbet	<i>Megalaima virens</i>
10.	Drongo	<i>Dicrurus adsimilis</i>

Appendix- II

Enclosure wise display of animals of Mini Zoo, Roing.

Sl.No.	Name of the enclosure	Species Displayed	No. of animals			Total
			M	F	U	
1.	Civet Cat enclosure	Civet cat	1	-	-	1 No.
2.	Porcupine enclosure	Porcupine	1	-	-	1 No.
3.	Monkey enclosure	Rhesus macaque	3	3	-	6 Nos.
		Assamese macaque	1	-	-	1 No.
4.	Barking deer enclosure	Barking deer	-	1	-	1 No.
5.	Hog deer enclosure	Hog deer	-	1	-	1 No.
6.	Python enclosure	Python	-	1	-	1 No.
7.	Leopard Cat enclosure	Leopard Cat	1	-	-	1 No.
			7	6	-	13 Nos.

Appendix- V

List of Building other than animal enclosure;

Residential Building

- 1) SP Type III -- -- -- -- 1 No.

Non-Residential Building

- 1) SP Type Range Office -- -- -- -- 1 No.
- 2) Post Mortem House -- -- -- -- 1 No. (Needs extension & Improvement)
- 3) Treatment Room --- -- -- -- 1 No.