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For More Information/Details Please Contact:

National Zoological Park

Mathura Road, New Delhi-110 003 (INDIA)
Phone: +91-11-24358500, 24359825
E-mail: nzpnewdelhi@gmail.com, Website: www.nzpnewdelhi.gov.in

Enrichment Efforts for Captive Animals

National Zoological Park, New Delhi

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Contributing Authors

Mr. Ramesh Kumar Pandey, Director, National Zoological Park, New Delhi

Ms. Natasha S Vashisth, Technical Assistant, Central Zoo Authority, New Delhi

Mr. Saurabh Vashisth, Zoo Ranger, National Zoological Park, New Delhi

Dr. Abhijit Bhawal, Veterinary Officer, National Zoological Park, New Delhi

Dr. Manoj Kumar, Biological Assistant, National Zoological Park, New Delhi

Mr. Suresh Tripathi, Zoo Keeper, National Zoological Park, New Delhi

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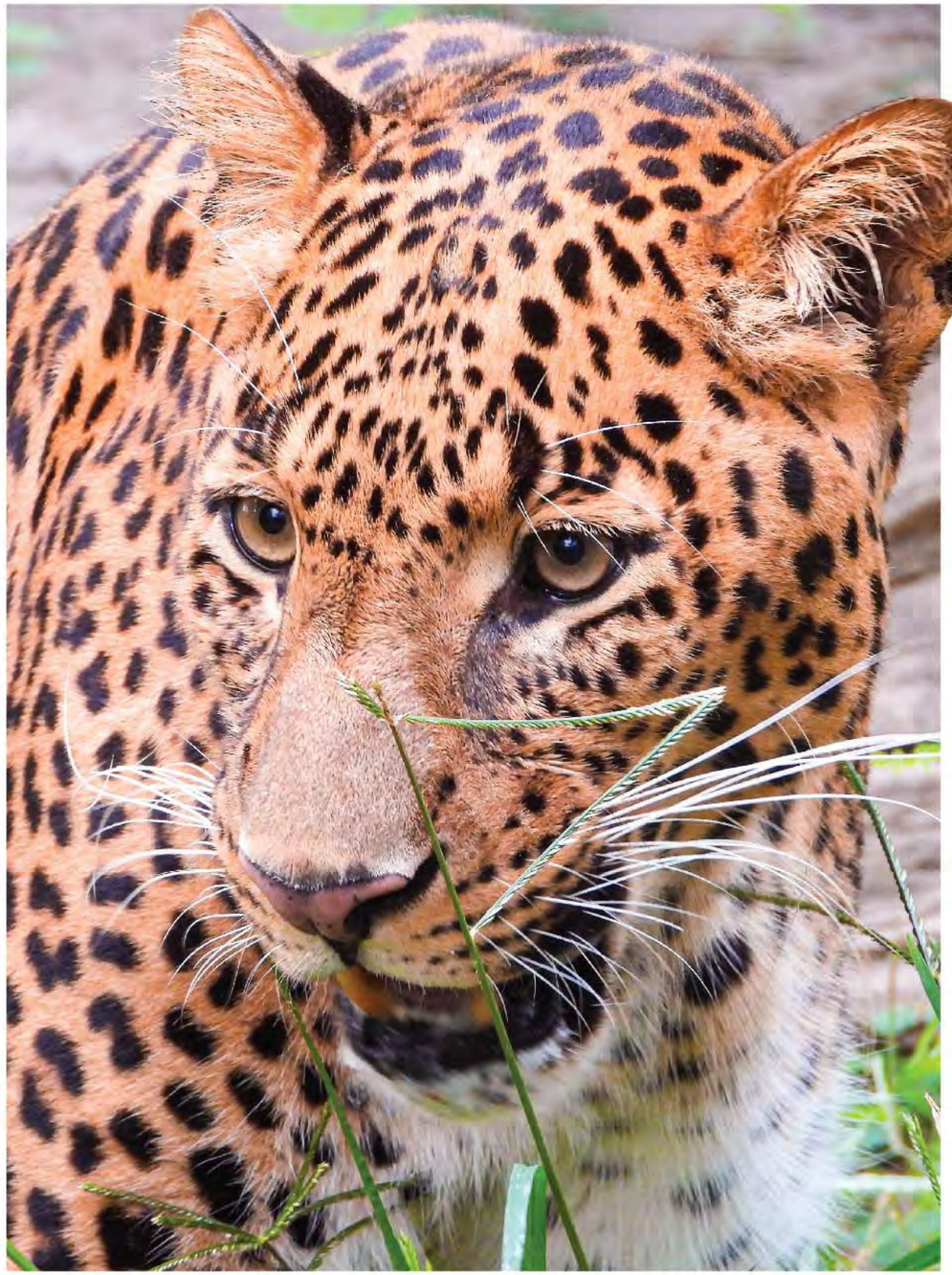

Babul Supriyo
Union Minister of State
Ministry of Environment, Forest & Climate Change
Government of India

Babul Supriyo

बाबुल सुप्रियो
केन्द्रीय राज्य मंत्री
पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय
भारत सरकार

Foreword

The National Zoological Park has completed the 60 glorious years of conservation and management of wildlife in ex-situ conditions. It has a history of taking new initiatives in conservation awareness and captive animal management.

One of the major areas of zoo management is to make animal's life in captivity active and as natural as possible. In order to address this key challenge, the team of National Zoological Park, New Delhi has taken up sincere efforts in providing enrichments to the various species housed at the Zoo in a systemic and phased manner. The primary goal of the efforts in enrichment has been to provide species specific environment, increase their activity, foraging, playing time so that the animals are able to display their natural behaviour and remain healthy and active. During the period of three month time i.e. from June to August, 2020, the team of National Zoological Park, New Delhi worked hard to sensitize and upgrade the knowledge of Zoo Keepers and Animal Attendants working in the zoo by organizing in-house and hands-on training workshops on the "FEED, HEALTHCARE, HYGIENE, AND ENRICHMENT FOR ANIMALS".

This publication is actually an outcome of the efforts made by the National Zoological Park, New Delhi in enriching the lives of the captive animals and to provide enriching experience in terms of better up-keeping of animal to the Zoo Keepers and Animal Attendants.

I appreciate the team National Zoological Park, New Delhi for undertaking these sincere, hardworking and motivating efforts in the area of animal welfare and coming out with this publication, which will form the important reference source on Captive Animal Enrichment for all the other zoos in the country.

Here's Wishing the entire team @ NZP New Delhi, all the very Bestest & a Better future in the Days ahead.

(Babul Supriyo)
Date : 30.10.2020

Office: 5th Floor, Aakash Wing, Indira Paryavaran Bhawan, Jor Bagh Road, New Delhi-110 003
☎ (+91) 11- 24621921/22 • Fax : (+91) 11- 24695313
Cell : (+91) 9811777143 • 9810711980
E-mail : mos4ef.cc@gmail.com

GOVERNMENT OF INDIA
भारत सरकार
MINISTRY OF ENVIRONMENT, FOREST & CLIMATE CHANGE
पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय
Central Zoo Authority
केन्द्रीय चिड़ियाघर प्राधिकरण

Foreword

All the zoos in the country are regulated according to the norms, standards and guidelines issued by the Central Zoo Authority. On the concept of Modern Zoos, the animals are provided with spacious enclosures, naturalistic environment, healthcare facilities, adequate feed etc. in captivity. However, the animals in captivity often show stereotypic behaviour due to the lack of species specific needs and facilities, which should be addressed by the zoos by means of providing different types of Enrichment.

The present book published by the National Zoological Park, New Delhi, is an overview of an efforts made by the team of National Zoological Park, New Delhi to enrich the lives of the animals housed in the zoo in terms of providing them the enriching environment using different types of enrichment artefacts, providing social enrichment, feeding enrichment and sensory enrichment. During the short span of three month time (from June, 2020 to August, 2020), the team of National Zoological Park, New Delhi also worked hard in sensitizing the Zoo personnel particularly the Zoo Keepers and Animal Attendants by means of organizing the In-house hands-on training/workshops on "FEED, HEALTHCARE, HYGIENE AND ENRICHMENT FOR ANIMALS".

I congratulate, the team National Zoological Park, New Delhi for conceptualizing and executing these sincere and hardworking efforts on developing the enrichment plan and its execution in the Zoo in a short span of time. I hope this publication will prove to be the foundation stone for implementation of more innovative means of species-specific enrichment for the captive animals in other zoos of the country as well.

(Dr. S.P. Yadav)
Member Secretary
Central Zoo Authority

Date: 30.10.2020

B-1 Wing, 6th Floor, Pt. Deendayal Antyodaya Bhawan, CGO Complex, Lodhi Road, New Delhi-110003
बी–1 विंग, छठा तल, पंडित दीनदयाल अन्तोदय भवन, सीजीओ परिसर, लोधी रोड़, नई दिल्ली–110003
Tel.: 011-24367846, 24367851, 24367852, Fax: 011-24367849
E-mail: cza@nic.in, Website: http://www.cza.nic.in

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All praise and Thanks to the 'Almighty' for all His blessings.

The authors would like to owe a deep sense of gratitude to all those who have contributed for the successful completion of this enrichment efforts.

Efforts in implementing the Enclosure Enrichment for the selected species of animals housed at National Zoological Park, New Delhi and successful organization of the In-house workshops for the Zoo Keepers and Animal Attendants has been possible with the aid, support, guidance and assistance of number of persons. We would like to express our gratitude to everyone.

We are grateful to Dr. S.P. Yadav, Member Secretary, Central Zoo Authority and Dr. Sonali Ghosh, Deputy Inspector General of Forests (HQ), Central Zoo Authority for their valuable guidance and support on every stage of the work. We would also like to thank the officers/staff of the Central Zoo Authority for providing necessary assistance during the work in all possible ways.

We are extremely thankful to the officers/staff of the National Zoological Park, New Delhi for their support and help during the collection of enrichment work material and organising of the workshops in a smooth and effective manner.

The field work of the enrichment including the collection of enrichment material, preparation of enrichment artefacts and its installation in the respective animal enclosure would has been possible with the hard work of Shri Harwadin and Shri Shahazad, Animal Attendants (DPL), who worked with full dedication during the enrichment work.

We would like to extend our gratefulness to all the Zoo Keepers and Animal Attendants working in the National Zoological Park, New Delhi for their valuable suggestions and inputs during the implementation of enrichment in animal enclosures and for helping us in various ways during the work.

Last but not the least, we would like to mention a special thanks to our family members and friends, without their support and encouragements, the successful completion of the work would have not been possible.

Contributing Authors

Executive Summary

National Zoological Park, New Delhi is a Large Category Zoo recognised by the Central Zoo Authority. The Zoo has a long history of housing several species of animals, at present there are 83 numbers of species of animal with around 1169 number of individual animals housed in 67 number of enclosures.

One of the main objectives of the Zoo is to provide the naturalistic environment to the animals with adequate space, quality feed, veterinary care etc. Further, the vision of the National Zoological Park, New Delhi is to have more enriched environment for the animals, quality of animal exhibits, conservation education and sustainable management practices.

There are several challenges faced by the Zoo Management while trying to provide all the facilities to the captive animals. Similarly, at the National Zoological Park, New Delhi some of the challenges and constraints has been identified and the team has been constituted to address those challenges. The key issue addressed during the last three months i.e. June to August, 2020 alongwith other challenges areas was the lack of enrichment for the captive animals. Therefore, efforts in enriching the lives of the captive animals housed at National Zoological Park, New Delhi was carried out.

Firstly, the review and assessment of the present condition of the animal enclosure was carried out with regard to the enrichment. The enrichment was planned and implemented accordingly in some of the animals comprising of Reptiles (Snakes, Monitor Lizard, Turtle), Aves (Pheasants, Raptors, Parakeets), Primates (Lion tailed macaque, Himadryas Baboon, Bonnet macaque), Felids (Tiger and Leopard), Ursids and Elephants. Both physical/environmental as well as food/feeding enrichment was carried out as immediate interventions (Phase-I).

It has been observed that the enrichment provided to the animals has positively affected the behaviour of animals and the animals has been shown interest in the enrichment artefacts and used the enrichment provided to them. In other words, the animals interact with even small enrichment given to them and it makes animal physically active and overcome their boredom due to captive conditions.

On the other hand, the National Zoological Park, New Delhi has organised an In-house Orientation and Refresher Programmes/Workshop on "FEED, HEALTHCARE, HYGIENE AND ENRICHMENT FOR ANIMALS" for the Zoo Keepers and Animal Attendants. A total of 4 workshops was organised wherein the participants were also given hands-on training on different kinds of enrichment and group activities on enrichment.

The feedback submitted by the participants of the workshop revealed that workshop was informative for the participants (86%), half of the participants (50%) started planning the enrichment activities in the animal beats where they are working and around 53% of the total participants actually implemented the enrichment in the animal enclosures after the workshop. The participants (64%) even agreed that such kind of in-house workshops should be organised from time to time on monthly (18%) and quarterly (71%) basis by the Zoo. It also showed that majority of the participants got motivated in planning and implementing enrichment in the animal enclosures which is one of the purposes of the workshop and a positive change in the way of performing their day to day duties in the animal beats has also been observed. In the enclosures of animals including birds, lion, blackbuck, snake, bear etc. the respective Zoo Keepers and animal attendants has carried out enrichment on their own which also showed fruitful results.

This shows that the small but sincere attempt and efforts made by the National Zoological Park, New Delhi team during the three months actually enriched the lives of the captive animals in many ways as the animals responded to the enrichment provided to them. These efforts was also proves to be encouraging and motivating for the Zoo Keepers and Animal Attendants as they feel a sense of responsibility towards their day to day duties related to the animals under their care and are able to understand the need/importance of providing species-specific environment/requirements i.e. Enrichment.

These enrichment efforts highlights that the behaviour study of some of the selected animal species housed at the Zoo with regard to the enrichment is an need of an hour along with the regular skill development/capacity building of the Zoo Keepers and the staff/officials of the Zoo in overall management of the animals in captive conditions.

Chapter 1 Background

The Zoos all over the world have visited by a large number of visitors every year and continued to become most popular place of visit for different sections of the society. All over the time, zoos have evolved themselves from the menagerie concept to scientifically managed institutions having all the facilities for the wild animals ranging from naturalistic enclosures to healthcare facilities. Thus, the Zoos are considered as an important conservation tool, and a means of educating people about wild animals and inspiring the general public to take a greater interest in their protection and conservation. The Zoos has therefore becomes a 'Centre for Conservation and Education'.

The National Zoo Policy, 1998, states that *"the main objective of the zoos shall be to complement and strengthen the national efforts in conservation of the rich biodiversity of the country, particularly the fauna".*

1.1 History and Evolution of Zoos in India

In India, the zoos were originated during the time of kings of the princely states where animals were maintained by them as a private collection for the purpose of entertainment. During the 19th century in India, the zoos were set up in different parts of the country by princely states and individuals. In 1808 at Barrackpore, the first zoos for public viewing was established and similarly with time many zoos were set up in different states of the country like Kolkata, Madras, Bikaner, Lucknow, Jodhpur, Baroda, Jaipur, Udaipur etc.

Evolution of Zoos in India takes place mainly in three phases- Early 1990s, Mid 1990s and late 1900s. During the early 1990s, the zoos were like parks where animals were displayed mainly for the purpose of entertainment and recreation, there was no emphasis on animal housing i.e. animals were displayed in small cage like enclosures, no animal welfare, safety etc. Further, during the Mid-1990s i.e. the post-Independence era, the Government of India recognize the importance of zoos as a storehouse of wildlife and centres for Conservation awareness i.e. the concept of modern zoos. This leads to the establishment of a model zoo in the Capital of India- The National Zoological Park, New Delhi in 1957 wherein the modern concepts of displaying animals in naturalistic enclosures instead of cage like enclosures and a concept of moated enclosures, enclosure barriers and water ways were introduced. Besides, other zoos were also flourished during that time. In late 1990s, the zoos got more support in terms of rules, regulations, guidelines and more innovative concepts flourished with the establishment of Central Zoo Authority in the year 1992. The Central Zoo Authority is a statutory body of the Ministry of Environment, Forest and Climate Change, Government of India which regulates the functioning of zoos in India and also provides financial, technical and guidance support to the zoos.

1.2 History of National Zoological Park, New Delhi

The establishment of the National Zoological Park, New Delhi was initiated by Pt. Jawaharlal Nehru, the then Prime Minister of India. The vision was to have a Zoological-cum-Botanical Park for the capital in the backdrop of historic Purana Quila. Therefore, on the recommendation of the Indian Board for Wildlife in 1952, the Government of India set up a Zoological Park in the capital region of the country with the objective to have a zoo for the conservation and breeding of rare fauna, to educate people about conservation and to provide recreation for the people.

The area between the Old Fort (16th Century) and Tomb of Humayun (second Mughal Emperor) was selected for this purpose. Plans were prepared in consultation with Major Weinman, the then Director of the Zoological Garden, Colombo, Sri Lanka and Mr. Carl Hagenbeck of West Germany. The Park was inaugurated on 1st November 1959.

The Delhi Zoo today owes its existence in the present form to Mr. Carl Hagenbeck, who designed the zoo on the lines of the modern concept of moated enclosures. The 188.62 acres area of the zoo provides visitors an opportunity to see & learn about animals in the naturalistic environment. The zoo presents green lawns, groves of trees, colourful shrubbery which blends with the informal look of a natural woodland which provides a sense of attachment to the nature. Inside the zoo there present the sites of archeological importance like Azimganj Sarai which was built during Mughal period and the first Koshminar (mile stone) which was the first mile for Delhi-Agra Highway in Mughal times.

1.3 About National Zoological Park, New Delhi

The National Zoological Park, New Delhi popularly known as Delhi Zoo is one of the 'Large Category Zoo' of the country recognized by the Central Zoo Authority having an area of about 188.62 acres. The Zoo has a wide collection of animals which live in an environment that in many ways resemble their natural habitat. The National Zoological Park not only provides a home for endangered species, but also helps them to breed in captivity. The vision of the Delhi Zoo is to have more enriched environment for the animals, quality of animal exhibits, conservation education and sustainable management practices. The Delhi Zoo is visited by a large number of visitors from various folks of the society. The Zoo aims to house its animals in a nature emerging enclosures with appropriate enrichment so that the animals feel a sense of connectedness with nature and display their natural behaviour in captivity.

The management of Zoo is carried out by the collaborative efforts of the different sections of the Zoo which consists of Animal Section, Veterinary Section, Education Section, Research Section, Commissary Section, Horticulture Section, Sanitary Section, Security Section, Maintenance Section and Administration Section.

1.4 Challenges and Constraints

There are various challenges and constraints faced by the Zoo Management while managing animals in captivity. Following gives an overview of the some of the challenges faced by the Delhi Zoo:

- → Lack of Consistent Enrichment
- → Large number of Single Sexed animals
- → Surplus number of animals (mainly herbivores)
- → Animal compatibility issues
- → Inbreeding and senility issues
- → Mortality issues
- → Lack of advanced health care facilities
- → Lack of suitable Manpower
- → Lack of Skilled and experienced staff
- → Lack of Conservation Education and Research activities
- → Lack of long term strategy for Captive Breeding Programme etc.

In view of the key problem areas, the National Zoological Park, New Delhi has started working on the challenges and carried out efforts in providing enrichment to the various species housed at the Zoo in the phased manner. This publication gives an overview of the Enrichment Efforts carried out at National Zoological Park, New Delhi during the period of three month time i.e. from June to August, 2020.

1.5 Objectives and Significance of The Enrichment Efforts

The objectives is to implement (Phase-I) enrichment in the enclosures of captive animals housed at National Zoological Park, New Delhi so that the animals were able to get greater choices and have some control over the environment they are living in i.e. the enclosure area and may feel like living in natural wild conditions.

The significance of the efforts is to reduce the stress related to captivity in the animals, to reduce abnormal behaviour in animals, provide them an opportunity to display their species-specific behaviour, increase their activity, foraging, playing time and provides the near naturalistic environment. All these will help in maintaining the overall behaviour and health of the animals in captivity which may results in decrease in health issues and increase longevity etc.

1.6 Enrichment for Captive Animals

In captivity, the enrichment helps in keeping the animal active and hence prevents stereotypic behaviour. Various studies showed that using different kinds of enrichment could not only benefit the animals directly but it can also benefit the zoo visitors indirectly by means of improving their experience of zoo visit. The Recognition of Zoo Rules, 2009- Rule 10 norm 4 (6) also made emphasis on the enrichment *"Every Zoo shall make special efforts to enrich the environment of the enclosure to meet the species specific behavioural requirements of the animals in accordance with the standards specified by the Central Zoo Authority".*

Keeping these implications in mind, the National Zoological Park, New Delhi planned to review the present enrichment practices used for different species of animals housed at Delhi Zoo and to form an enrichment plan for their various species of animals. The work was carried out for a period of 3 months duration i.e. from June to August, 2020. During the work, an attempt was made to implement different forms of enrichment (as Phase- I) with some random observations on how and when the animals were using the enrichment artifacts provided to them. The results of the efforts made indicate the enhanced engagement of animals with enrichment objects which fosters the positive behavioural change in these captive species.

Besides, during these three months duration of work, the Zoo keepers and Animal Attendants were also targeted by means of organizing an In-house Orientation and Refresher Programmes/Workshop on "FEED, HEALTHCARE, HYGIENE AND ENRICHMENT FOR ANIMALS" where they were also been involved in group activities on Enrichment. Moreover, the feedback given by the Zoo keepers and Aniamal Attendants on the workshop were taken into account.

Accordingly, the present publication has in total Eleven Chapters: **CHAPTER-1, Background**, which is the present chapter that provides a brief background about the Zoos, National Zoological Park, New Delhi, its history; Objectives and Significance of Enrichment Efforts etc. **CHAPTER-2, Enrichment and Work Strategy**, deals with the basic understanding of the Enrichment, its different forms, strategy of work and the enrichment material used during the work. **CHAPTER- 3 to 8, Enrichment efforts for Elephants, Primates, Ursids, Felids, Aves and Reptiles** which gives an overview about the efforts made by the National Zoological Park, New Delhi in providing various types of enrichment to the captive animals. **CHAPTER- 9, Enrichment efforts- Capacity Building Workshop** which includes the In-house Orientation and Refresher Programmes/Workshop carried out for the Zoo Keepers and Animal Attendants and the enrichment carried out by the participants of the workshop. **CHAPTER- 10 Impact of Enrichment efforts**, is on the analysis of the feedback of participants of the Workshops and Enrichment done during and after the workshop and their Experience Sharing i.e. the changes brought through enrichment work with emphasis on the animal welfare. **CHAPTER-11- Conclusion and Recommendations** concludes the work (Conclusion part) and discussed about recommendations/suggestions with future prospective i.e. way forward.

Note: Enrichment efforts carried out was purely a team work which mainly focused on providing the animals housed at Delhi Zoo a sense of feeling in wild environment and a freedom to live happily with good health even in captive conditions so that the main moto of zoos i.e. ANIMAL WELFARE is addressed at large.

Plate 01 NZP Naturalistic Entrance Point

Chapter 2 Enrichment & Work Strategy

2.1 Enrichment, Its Types & Importance

What is Enrichment?

Enrichment (En+ rich) in simple word is an act of providing something better or richer conditions in the already existing conditions.

Environmental Enrichment is defined as the *"provision of stimuli that promote the expression of species-appropriate behavioural and mental activities in an under stimulating environment"*

What are the reasons for providing Enrichment to captive animals?

In the captive environment, the animals are often confined in limited space, provided with no opportunity for hunting, no provision for activities etc. Due to this, the animals in captivity come under stress, develop certain ailments and start displaying abnormal or stereotypic behaviour.

The enrichment efforts are an attempt to provide the near naturalistic environment to the captive animals where they are able to perform their instinct behaviour. In other words, Enclosure enrichments are the management interventions that are made to help captive animals display natural behaviour patterns. Animal housed in natural enclosures that allow species-typical behaviour live longer and are less susceptible to diseases. Therefore, Zoos need to implement enrichment plans for each animal species housed in the Zoo.

What are the probable factors of stress for captive animals?

Restricted space, improper diet, disturbance due to visitors, un-naturalistic environment, barren enclosure, solitary animal, improper grouping of animal etc.

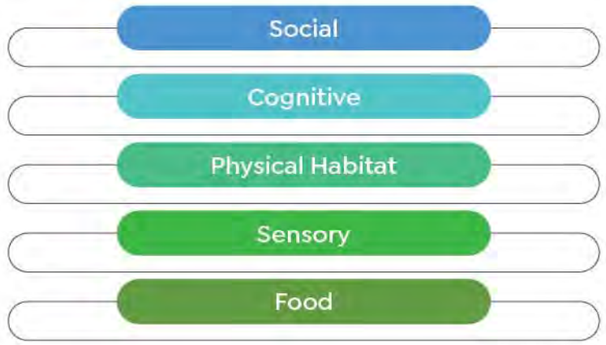
Aim of Enrichment

The main aim is to provide social, psychological and physiological needs to all the animals in captivity and allow them to make choice. Further, the main motive behind enrichment is to address the commonly practiced "FIVE FREEDOMS OF ANIMAL WELFARE" which mainly focused on physical and mental well-being of the animal. The Five Freedoms are:

- → Freedom from hunger and thirst- by ready access to water and a diet to maintain health and vigour.
- → Freedom from discomfort- by providing an appropriate environment.
- → Freedom from pain, injury and disease-by prevention or rapid diagnosis and treatment.
- → Freedom to express normal behaviour- by providing sufficient space, proper facilities and appropriate company of the animal's own kind.
- → Freedom from fear and distress- by ensuring conditions and treatment, which avoid mental suffering.

Types of Enrichment

The enrichment is categorized as follows depending on the natural behavioral traits of the species:



Social Enrichment: Housing of animals in social groupings, pairing of animals, mixed species exhibit etc.

Cognitive Enrichment: involves mental stimulations and novel exercise. Providing puzzle feeder, scattered feeding or concealed feeding methods.

Physical Enrichment: This involves enclosure design and furniture aspects i.e. the enrichment

wherein the addition of some permanent or semi-permanent structures in the animal enclosure are carried out. Change in existing enclosure environment by planting trees, providing wooden logs, wooden structures, perches, visual barriers. which increase the physical activity of the animal (like scratching, rubbing) by engaging the animal in various activities.

Sensory Enrichment: involves stimulating the animal senses. Tactile (Touch), Olfactory (Smell & Taste), Auditory and Visual. Use of fragrances at different places in an enclosure (Olfactory) for encouraging exploratory behaviour, use of different sounds of same and different species (for attraction, attention).

Food or Feeding Enrichment: involves Novel food items and Food presentation. Food manipulation, change in the frequency of the food provided, change in the mode of food provided and providing varieties of food type. All are feeding enrichment. Other examples includes the use of puzzle feeders, hiding of food various places, hanging of food which develop the foraging activity in the animal for the search of food and became more active.

Importance of Enrichment

→ Helps in reducing abnormal behaviour (Stereotypic behaviour)

→ Species -specific behaviour is displayed.

→ Stress related to captivity is reduced.

→ Reduces health related issues.

→ It enhances the visitor experience as the animals show more natural behaviours and can be seen much more active.

2.2 Strategy of The Work

The present work in the Delhi Zoo was conducted in a planned manner with the implementation of following steps:

STEP 1: Constitution of a Team consisting of Officials from Delhi Zoo and CZA for the Formulation and Execution of Enrichment Plan.

STEP 2: Preliminary review of the existing enrichment in the animal enclosures.

STEP 3: Meeting of the team members for finalization of Enrichment Plan (Phase I plan)

STEP 4: Execution of Enrichment (Phase-I) in the respective animal enclosures.

STEP 5: Recording of random observations on the use of Enrichment provided to the respective animal species.

STEP 6: Organization of the In-house Orientation and Refresher Workshop/Programme for the Zoo Keepers and Animal Attendants from time to time with a focus on Enrichment for captive animals.

STEP 7: Recording and Analysis of the Feedback provided by Zoo Keepers and Animal Attendants on the Enrichment workshops.

STEP 8: Recording of Enrichment Efforts carried out by the Zoo Keepers and Animal Attendants after the Workshops and Enrichment work.

Note: STEP 2 to STEP 5 has been followed in case of all the animal enclosures where enrichment work was carried out during the period of three months.

2.3 Material Collected and Prepared for Enrichment Work

During the implementation of enrichment various locally available materials were collected from inside the premises of the Zoo only. Further, some of the materials collected were also used for preparing the enrichment artefacts.

Following gives the glimpses of different Enrichment materials used during enrichment efforts:

Plate 02 Logs of fallen trees

Plate 03 Cutting of tree logs of desired height by the Keepers

Plate 04 Prepared tree log with hole (for birds)

Plate 05 Bamboo feeder prepared for Primates & Ursids

Plate 06 Tree logs and Hessian bags filled with paddy straw

Plate 07 Earthen pots and bowls

Plate 08

Feeding Baskets prepared for primates

Plate 09

Prepared tree trunk with hole (for Owls)

Plate 10

Baskets used for nesting in birds

Plate 11

Preparing of hut like structures with Paddy straw for Pheasants

Plate 12

Locally available plants were planted inside the enclosures

Plate 13

Sowing of wheat as a feed for Pheasants

Plate 14

Bamboo swing

Plate 15

Perches made for Pheasants

Plate 16
Dried leaves and dead tree barks

Plate 17
Filling up of feed in feeding baskets for Primates

Plate 18
Resting platform in Tiger enclosure made with tree logs and tied with ropes

Plate 19
Hanging of Hessain bag by tree in Tiger enclosure

Plate 20
Resting platform in Common Leopard enclosure made with tree logs and tied with ropes

Plate 21
Placing of inclined tree logs in Common Leopard enclosure

Plate 22
Hanging of Hessain bag in Common Leopard enclosure

Plate 23
Swings made with bamboo for birds

2.4 Enrichment Efforts

At the National Zoological Park efforts have been made to enrich the environment of the captive animals by means of providing various means of enrichment like feeding basket, bamboo swings, bamboo feeders, tree trunks with holes, resting platform, hanging fruits, nesting material, early release of animals in the enclosure (early morning at around 7:00 am), social enrichment, morning walk for Elephants etc. During the period of work following animals/ species has been focused for enrichment and the details for each are mentioned in the subsequent chapters.

A. Elephants

B. Primates

C. Ursids/Bears

D. Felids

E. Aves

F. Reptiles

Indian Rock Python

Plate 24

Chapter 3

Enrichment Efforts For Elephants

Elephants belong to the family Elephantidae and are social animals which lives in matriarchal group consists of females and sub-adult males.

Asiatic Elephant *(Elephas maximus)* is commonly known as 'Hathi'. In India, Asiatic Elephants are found in isolated populations in the Northeast, West Bengal, Orrisa, Jharkhand, North Indian Terrai region and South India. They are the largest mammals of India. They mostly prefer the habitat having bamboos. They are protected under Schedule I of the Wild Life (Protection) Act, 1972.

Plate 25 Asiatic Elephant

SCIENTIFIC CLASSIFICATION

Kingdom	Animalia
Phylum	Chordata
Class	Mammalia
Order	Proboscidea
Family	Elephantidae
Genus	*Elephas*
Species	*maximus*

SOME OF THE IMPORTANT TRAITS OF INDIAN ELEPHANT

Height	245 to 275 cm
Weight	4000 kg (males), 2500 to 3500 kg (females)
Body Length	550 to 640 cm
Life Span	Around 60 years (in wild) and 50-60 years (in captivity)
Breeding Season	No seasonality, based on food availability
Sexual maturity	15 years (males) and 11-24 years (females)
Gestation Period	20 to 22 months
Litter size	One

Asiatic Elephant also known as Indian Elephant needs an average of 150 Kgs of food intake which comprises of vegetation, grasses, barks, stems, roots, fruits, leaves of trees, shrubs.

INDIAN ELEPHANT AT NATIONAL ZOOLOGICAL PARK, NEW DELHI

In captivity, the basic requirement related to the housing, upkeep, healthcare, feed and nutrition is of utmost important for the physical and mental health of the captive elephants. Therefore, enrichment through various means becomes essential part of the zoo management. The National Zoological Park, New Delhi housed a pair of Indian Elephant. The zoo provides the environmental conditions to the elephant which are similar to naturalistic environment having proper space, source of water, shade, trees, grazing and browsing opportunities.

The diet of Elephants at National Zoological Park, New Delhi consists of Green fodder/Sugar cane, Tree fodder, Dry fodder, Banana, Gur, Rice, Bajra, Roti, Turmeric, Common salt, Mustard oil, Moong etc. Seasonal arrangements with regard to feed, housing facilities and veterinary care were also carried out for the animals from time to time.

The enclosure has a 2121 square meter of the area with an L-shaped dry moat system, 4 number of night cubicles/ retiring cells and a keeper room.

REVIEW OF EXISTING ENRICHMENT FOR INDIAN ELEPHANTS

A review of the existing enrichment and facilities provided to the Elephants housed at National Zoological Park, New Delhi was carried out and following observations has been made:

- → A water pool is present which is used only occasionally by the Elephants and the pool needs some cleaning and repairing work.
- → Trees, Shrubs and Vegetation present which is not as per the species.
- → An umbrella shape like shade on the visitor viewing side is present which is used by the Elephant.
- → A retiring area/night shelters at one corner of the enclosure is present where Elephants spend most of their time swaying or bobbing their head.
- → As a practice usually one Elephant at a time is released in the enclosure.
- → Lack of appropriate species specific enrichment.
- → Feed provided at the same time daily and at the same place in the enclosure.
- → Few tree logs were present in the enclosure area.
- → Interaction between the animal and Mahouts/Keepers has been observed.

ENRICHMENT EFFORTS CARRIED OUT FOR INDIAN ELEPHANTS

Social Enrichment

Both the Elephants were released at the same time in the enclosure and they were observed enjoying together and reduced showing stereotypic behaviour (swaying or bobbing their head).

Plate 26 Social enrichment

A walk around the zoo premises was started for the Elephants in the early hours of the morning with their mahouts when visitors are not present. The Elephants observed browsing on the trees inside the zoo premises.

Elephants enjoying Walk In The Zoo Plate 27

Environment Enrichment

A water pool was cleaned, repaired and fresh water was filled in the pool. The Elephants started using the water pool on the daily basis.

Plate 28
Elephants enjoying water pool

Environment Enrichment

Placing of dead tree logs and log piles in the enclosure, Elephants observed using the same.

Logs Placed In enclosure
Plate 29

Sensory Enrichment

The mud present in the enclosure area was mixed up and upturned and the Elephants enjoyed the mud bath/dust bath.

Plate 30
Mud Bath

Sensory Enrichment

A shower was provided in the shade area and the Elephants started using the shower.

Elephants enjoying shower provided under the shade
Plate 31

Special Treats on Various Occasions a kind of Feeding Enrichment

A special treat/ Feast were arranged for the Elephants on two occasions – World Environment Day, 5th June, 2020 and World Elephant Day, 12th August, 2020.

Plate 32
Feast for the Elephants comprising of Roti with Gurd (Jaggery) and Khichadi

Plate 33
Feast for Elephants with bamboo, watermelon, cucumber and banana

Plate 34
Fruits, bamboo and jaggery provided on the occasion of World Environment Day

FEW SUGGESTED ENRICHMENT FOR ELEPHANTS

- → **Feeding Enrichment:** Hiding of food (fruits, green fodder) at various locations in the enclosure, using pot feeder, basket feeder etc.
- → **Physical Enrichment:** Use of Grass balls (making ball of grasses tied with a net or ropes), providing tree logs with barks, planting species specific trees/plants etc.
- → **Sensory Enrichment:** Using sprinklers in the enclosure, wallowing areas, sand piles etc.

SOME SUGGESTED POINTS

- → Safe Enrichment material should be used.
- → Regular Evaluation of Enrichment provided may be carried out.
- → Efforts may be made to provide earthen floor to the Elephants in the retiring cells/kraal.
- → Change in the enrichment should be carried out from time to time to avoid boredom among the animals.
- → Strict maintenance of hygiene and sanitation in and around enclosure.
- → Seasonal changes in Enrichment should be carried out.

Plate 35
Feast provided to the Elephants on the occasion of World Elephant Day

Plate 36
Feast for the Elephants comprising of Roti with Gurd (Jaggery) and Khichadi

Chapter 4 Enrichment Efforts for Primates

Primates are group of animals having five fingers, generalized dental pattern, fingernails etc. They are normally consists of three groups- prosimians, monkeys of the New World, and apes of the Old World.

Enrichment for primates needs lots of planning to meet their psychological and behavioural enrichment. Developing and providing enrichment to primates in captivity is a big challenge for the zoo management and zoo keepers as primates are much more active, clever and intelligent animals and explores a lot.

The National Zoological Park, New Delhi housed five species of primates- Lion tailed macaque, Bonnet macaque, Hamadryas baboon, Common langur and Rhesus macaque.

The Enrichment Efforts was carried out for three species of primates namely Lion tailed macaque, Bonnet macaque and Hamadryas baboon. The details about enrichment efforts for each of the species are listed below.

1. Lion-Tailed Macaque *(Macaca silenus)*

Lion tailed macaque is commonly known as 'Sher poonch bandar'. They are found in Western Ghats of India and inhabit evergreen moist deciduous forest. They live in hierarchical groups which consist of few males and many females. They have a tuft of hair at the tail, just like lion's tail therefore known as Lion tailed macaque. They are good climbers and spend most of the time exploring and feeding. They are protected under schedule I of the Wild Life (Protection) Act, 1972

Plate 37
Lion-tailed Macaque

SCIENTIFIC CLASSIFICATION

Kingdom	Animalia
Phylum	Chordata
Class	Mammalia
Order	Primates
Family	Cercopithecidae
Genus	*Macaca*
Species	*silenus*

SOME OF THE IMPORTANT TRAITS OF LION TAILED MACAQUE

Height	60-95 cm
Weight	5-10 kg (males), 2-6 kg (females)
Body Length	51-61 cm (males), 42-46 (females); excluding 25-40 cm tail
Life Span	20-25 years
Breeding Season	Throughout the years
Sexual maturity	2- 4 years
Gestation Period	162-186 days
Litter size	One

Lion tailed macaque in wild eats primarily on fruits, leaves, insects, small invertebrates etc.

LION TAILED MACAQUE AT NATIONAL ZOOLOGICAL PARK, NEW DELHI

Lion tailed macaque are the very agile and clever and needs to be engaged in various activities in captivity. Therefore, an effective enrichment plan has to be prepared and implemented for the Lion tailed Macaque in zoos and they may be engaged in various activities/exercises to make them healthy and active. The National Zoological Park, New Delhi housed 4 males and 1 female Lion tailed macaque. The zoo provides the naturalistic enclosure to the Lion tailed macaque having proper space, source of water, shade, trees etc.

The diet of Lion tailed macaque at National Zoological Park, New Delhi consists of fruits, vegetables, ground nut, kheer etc. Seasonal arrangements with regard to feed, housing facilities and veterinary care were also carried out for the animals from time to time.

The enclosure has an 808 square meter of the arena area with adequate space for movement, kraal facility, moat, night cubicles/ retiring cells and a keeper room.

REVIEW OF EXISTING ENRICHMENT FOR LION TAILED MACAQUE

A review of the existing enrichment and facilities provided to the Lion tailed macaque housed at National Zoological Park, New Delhi was carried out and following observations has been made:

- → There is one enclosure for Lion tailed macaque at Delhi Zoo where good vegetation, trees and plants are present.
- → Hut like structures for resting and sitting are present which are often used by the animals.
- → Ropes tied at poles/rods were present and are used by animals for hanging and playing.
- → A moat filled with water.
- → Feed is provided in the night shelters at the same time daily and at the same place.
- → All the 5 Lion tailed macaques released in the enclosure together in the morning till evening.

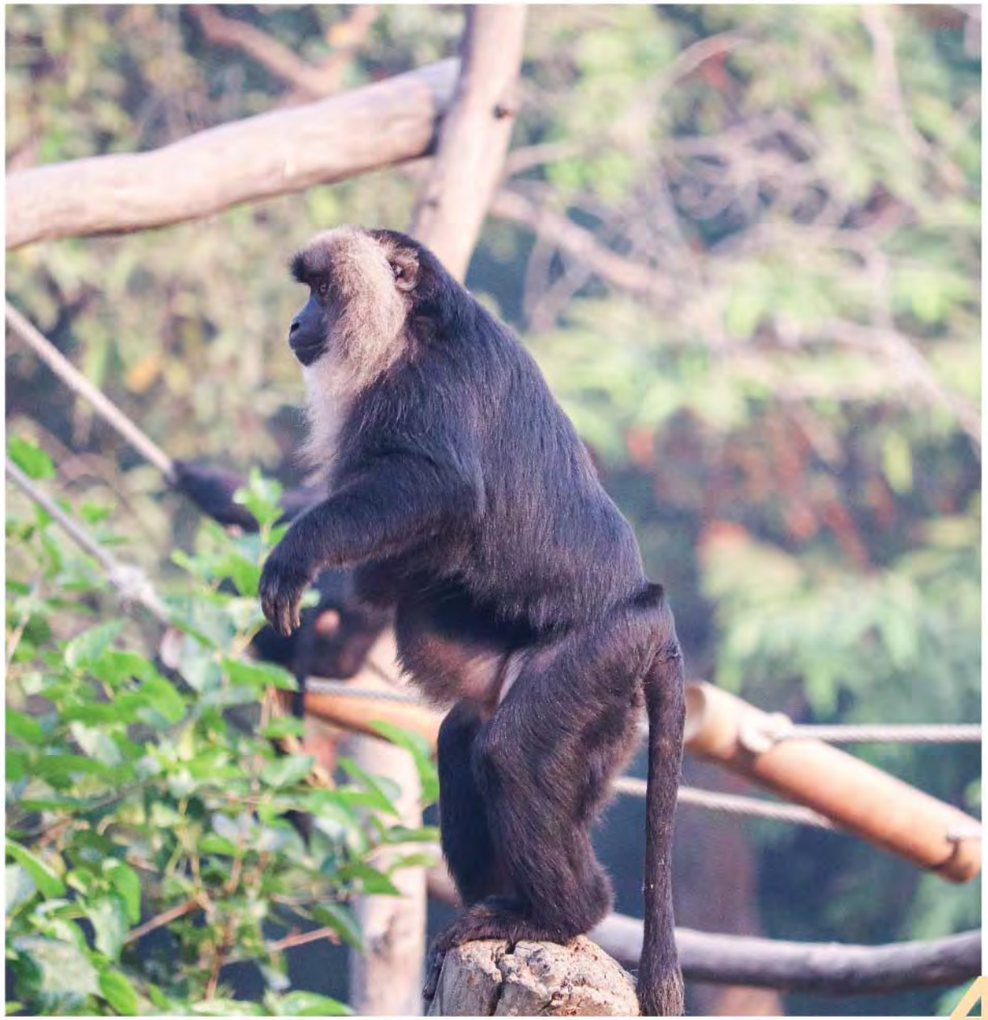
ENRICHMENT EFFORTS CARRIED OUT FOR LION TAILED MACAQUE

Environment Enrichment

- → A long ladder made up of bamboo and ropes introduced in the enclosure- for climbing, playing etc.
- → The huts already present were modified and made more natural with the help of paddy straw.
- → Ropes already present were replaced with the new one and tied tightly.

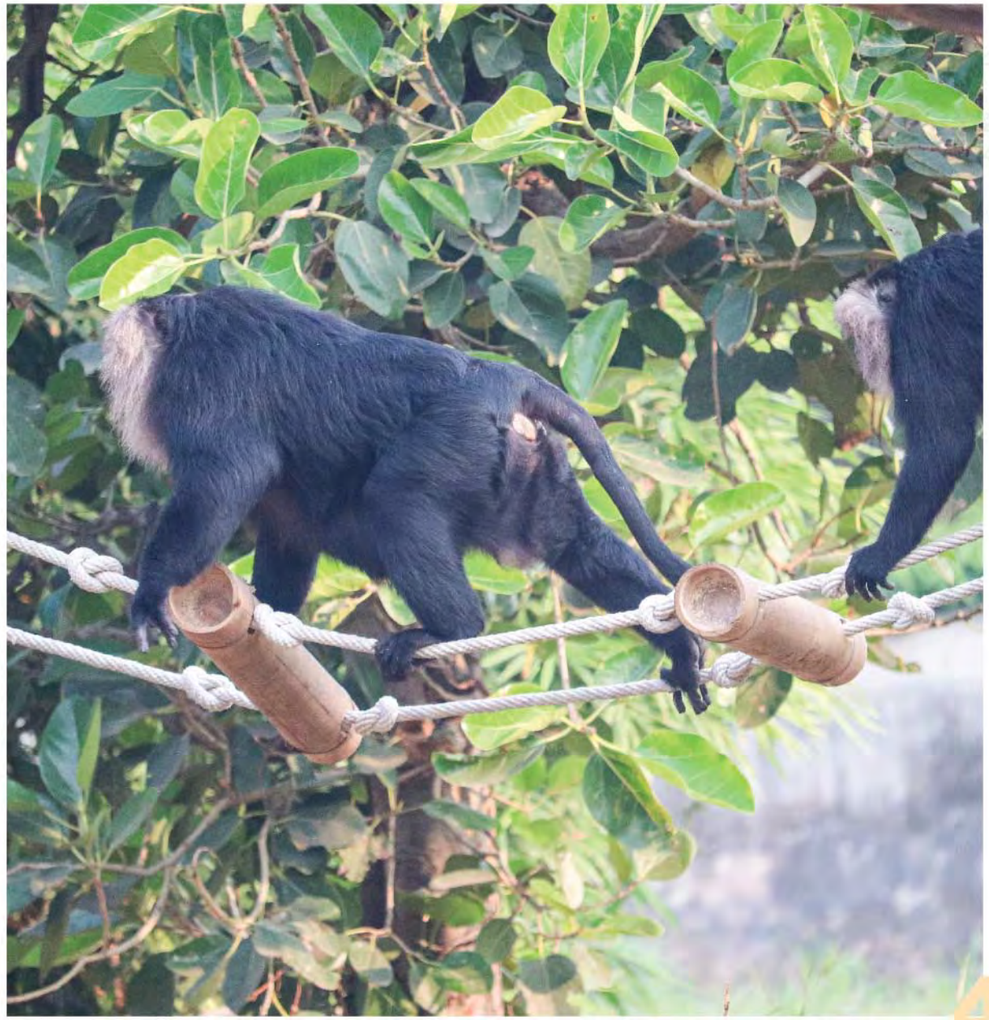
Plate 38 Pre-enrichment Lion tailed Macaque enclosure

Post enrichment Lion Tailed Macaque enclosure Plate 39



Lion tailed Macaque using enrichment

Plate 40



Lion tailed Macaque using bamboo ladder

Plate 41

Lion tailed Macaque using naturalistic hiding & resting place

Plate 42

2. Bonnet Macaque *(Macaca radiata)*

Bonnet macaque is commonly known as 'Bandar'. They are endemic to Indian peninsula and inhabit all types of forests and even human habitation. They live in troops which consist of one to several males and many females and also a number of sub-adults, juveniles, infants. They have a whorl of hairs on the crown of its head therefore known as Bonnet macaque. They are protected under Schedule II of the Wild Life (Protection) Act, 1972.

Plate 43 Bonnet Macaque

SCIENTIFIC CLASSIFICATION

Kingdom	Animalia
Phylum	Chordata
Class	Mammalia
Order	Primates
Family	Cercopithecidae
Genus	*Macaca*
Species	*radiata*

SOME OF THE IMPORTANT TRAITS OF BONNET MACAQUE

Weight	5.5-9 kg (males), 3.5-4.5 kg (females)
Body Length	35-60 cm and 35-68 cm long tail
Life Span	15-20 years
Breeding Season	Through out the year
Sexual maturity	3 to 4 years
Gestation Period	150 to 180 days
Litter size	One

In the wild, the Bonnet macaque feeds on leaves, fruits, nuts, seeds, cereals, flowers etc.

BONNET MACAQUE AT NATIONAL ZOOLOGICAL PARK, NEW DELHI

The National Zoological Park, New Delhi has two enclosures for Bonnet Macaque and there are 10 numbers of Bonnet Macaques. The zoo provides the naturalistic enclosure to the Bonnet macaque having proper space, source of water, shade, trees etc.

The diet of Bonnet macaque at National Zoological Park, New Delhi consists of fruits, vegetables, ground nut, kheer etc. Seasonal arrangements with regard to feed, housing facilities and veterinary care were also carried out for the animals from time to time.

The enclosure has moat system, night cubicles/ retiring cells, a kraal and a keeper room.

REVIEW OF EXISTING ENRICHMENT FOR BONNET MACAQUE

A review of the existing enrichment and facilities provided to the Bonnet macaque housed at National Zoological Park, New Delhi was carried out and following observations has been made:

→ Trees, naturalistic rocky structure for resting are present

→ Few ropes tied at poles/rods are present and are used by animals for hanging and playing.

→ Feed is provided in the night shelters at the same time daily and at the same place.

→ All the Bonnet macaques released in the enclosure together in the morning till evening.

ENRICHMENT EFFORTS CARRIED OUT FOR BONNET MACAQUE

Environment Enrichment

→ A ladder made up of bamboo and ropes introduced in the enclosure- for climbing and playing.

→ The huts already present were modified and made more natural with the help of paddy straw.

→ Ropes already present were replaced with the new one and tied tightly.

→ A swing made of tyre is introduced.

→ Ropes were hanged and tied at appropriate places.

Feeding Enrichment

→ Feeding enrichment by hanging fruits at ropes and ladder.

Plate 44
Pre enrichment Bonnet Macaque enclosure (Beat no. 1)

Plate 45
Post enrichment Bonnet Macaque enclosure (Beat no. 1)

Plate 46 Pre enrichment Bonnet Macaque enclosure (Beat no. 15)

Plate 47 Post enrichment Bonnet Macaque enclosure (Beat no. 15)

Plate 48 **Some Random observations:** Post-enrichment Bonnet Macaque using tied ropes

Plate 49 Bonnet Macaque using feeding enrichment

Plate 50 Bonnet Macaque using poles

3. Hamadryas Baboon *(Papio hamadryas)*

Hamadryas baboon are called sacred baboon. They inhabit semi-desert, alpine, savanna and steepe. They live in hierarchical troops which consist of several thousand members. They spend most of the time in walking and foraging for food.

Plate 51 Hamadrayas Baboon

SCIENTIFIC CLASSIFICATION

Kingdom	Animalia
Phylum	Chordata
Class	Mammalia
Order	Primates
Family	Cercopithecidae
Genus	*Papio*
Species	*hamadryas*

SOME OF THE IMPORTANT TRAITS OF HAMADRYAS BABOON

Height	40-60 cm. Males are longer than females
Weight	20-30 kg (males), 10-15 kg (females)
Body Length	70-80 cm (males), 60-70 cm (females)
Life Span	20-30 years
Breeding Season	Throughout the year
Sexual maturity	7 years (males), 5 years (females)
Gestation Period	170 to 180 days
Litter size	One

In wild, Hamadryas baboon feeds on leaves, grasses, seeds, termites, insects, small mammals etc. It means that they are omnivores in nature.

HAMADRYAS BABOON AT NATIONAL ZOOLOGICAL PARK, NEW DELHI

The National Zoological Park, New Delhi house 5 numbers of Hamadryas baboon. The zoo provides the naturalistic enclosure to them having proper space, source of water, shade, trees etc.

The diet of Hamadryas baboon at National Zoological Park, New Delhi consists of fruits, vegetables, ground nut, kheer etc. Seasonal arrangements with regard to feed, housing facilities and veterinary care were also carried out for the animals from time to time.

The enclosure has a 157 square meter of the arena area with a moat system and 4 numbers of night cubicles/ retiring cells.

REVIEW OF EXISTING ENRICHMENT FOR HAMADRYAS BABOON

A review of the existing enrichment and facilities provided to the Hamadryas baboon housed at National Zoological Park, New Delhi was carried out and following observations has been made:

→ Few Plants are present.

→ Hut like structure present.

→ Feed is provided in the night shelters at the same time daily and at the same place.

ENRICHMENT EFFORTS CARRIED OUT FOR HAMADRYAS BABOON

Environment Enrichment

→ A hut made up of paddy straw and bamboo. Were made and placed in the enclosure area.

→ Ropes were tied with the help of poles/tree logs – for playing, hanging purpose.

Feeding Enrichment

→ A bamboo feeder filled with nuts and channas were given in the feeding cubicles.

→ A feeding basket having fruits were given in the feeding cubicles.

Plate 52 Pre enrichment Hamadryas Baboon enclosure

Plate 53 Post enrichment Hamadryas Baboon enclosure

Plate 54 Hamadryas Baboon using bamboo feeder with nuts

Plate 55 Hamadryas Baboon using feeding basket

Note: During the enrichment it was ensured that Safe enrichment material should be used. Keepers working with Primates were involved and time to time observation of the animal after introduction of the enrichment artefacts were carried out.

FEW SUGGESTED ENRICHMENT FOR PRIMATES

→ Feeding Enrichment: Hiding and Hanging of food at various locations in the enclosure, Change in diet, change in feeding timings etc.

→ Physical Enrichment: Different types of resting platforms, water features, log piles etc. Change in substrate of night cells may also be carried out.

→ Sensory Enrichment: Using sprinklers, misters in the enclosure.

SOME SUGGESTED POINTS

→ Safe Enrichment material should be used.

→ Regular Evaluation of Enrichment provided may be carried out.

→ Change in the enrichment should be carried out from time to time to avoid boredom among the animals.

→ Strict maintenance of hygiene and sanitation in and around enclosure.

→ Seasonal changes in Enrichment should also be carried out.

Chapter 5 Enrichment Efforts for Ursids

Ursids belong to the family Ursidae and are omnivorous in nature.

In captivity various types of enrichment in the form of sensory, feeding, physical etc. may be provided to the ursids which will help in maintaining their physical as well as mental health in the captive conditions.

The National Zoological Park, New Delhi housed 2 species of bears- Himalayan Black Bear and Sloth Bear.

Himalayan Black Bear *(Ursus thibetanus)*

Himalayan Black Bear is commonly known as 'Bhalu'. Himalayan Black Bear are forest dweller bear and are found in dense broad leaved and coniferous forests. Himalayan Black Bear has a distinct white or cream "V" marking on its chest and is also called as a Moon Bear because of V marking.

Plate 56 Himalayan Black Bear

SCIENTIFIC CLASSIFICATION

Kingdom	Animalia
Phylum	Chordata
Class	Mammalia
Order	Carnivora
Family	Ursidae
Genus	*Ursus*
Species	*thibetanus*

SOME OF THE IMPORTANT TRAITS OF HIMALAYAN BLACK BEAR

Weight	100-218 kg (males), 50-125 kg (females)
Body Length	130-190 cm with a 12 cm long tail
Life Span	24 years
Breeding Season	Late winter or early spring
Sexual maturity	3-4 years
Gestation Period	210-215 days
Litter size	Two or Three

In the wild, Himalayan Black Bear feeds on variety of fruits, grasses, seeds, honey, fish, meat, invertebrates etc. It means they are omnivorous in nature.

HIMALAYAN BLACK BEAR AT NATIONAL ZOOLOGICAL PARK, NEW DELHI

In captivity, the basic requirement related to the housing, upkeep, healthcare, feed and nutrition is of utmost important for the physical and mental health of the animals. Therefore, enrichment through various means becomes essential part of the zoo management. The National Zoological Park, New Delhi housed 5 numbers of Himalayan Black Bears. The zoo provides the environmental conditions to them which are similar to naturalistic environment having proper space, source of water, shade, trees etc.

The diet of Himalayan Black Bears at National Zoological Park, New Delhi consists of milk, bread, fruits, cucumber, Kheer etc. Seasonal arrangements with regard to feed, housing facilities and veterinary care were also carried out for the animals from time to time.

One enclosure has an arena area of 799 square meter, moat system and night cubicles/ retiring cells. Another enclosure has an arena area of 1465 square meter, moat system, breeding cave and night cubicles/ retiring cells.

REVIEW OF EXISTING ENRICHMENT FOR HIMALAYAN BLACK BEAR

A review of the existing enrichment and facilities provided to the Himalayan Black Bears housed at National Zoological Park, New Delhi was carried out and following observations has been made:

- → A Water pool was present which is used by the bears.
- → Some trees are present which are used as shade
- → Enclosure has rocky shade towards the retiring cells.
- → Some tree logs are also present in the enclosure.
- → Lack of appropriate species specific enrichment.
- → Feed provided at the same time daily and at the same place in the night cells/cubicles.

ENRICHMENT EFFORTS CARRIED OUT FOR HIMALAYAN BLACK BEAR

Environment Enrichment

- → A resting platform was provided.
- → A swing made of bamboo was provided.

Plate 57 Pre-enrichment Himalayan Black Bear Enclosure

Plate 58 Pre-enrichment Himalayan Black Bear Enclosure

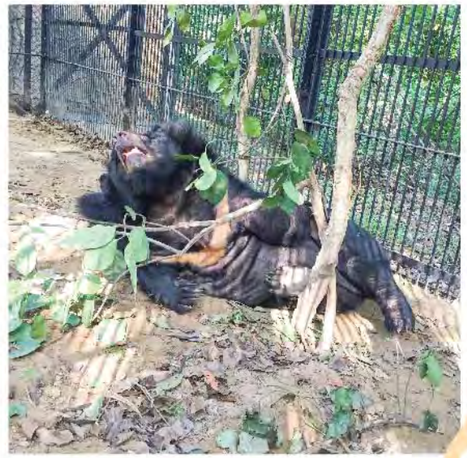
Post-enrichment Himalayan Black Bear enclosure (Bamboo swing) Plate 59

Plate 60 Post-enrichment Himalayan Black Bear (Resting platform)

SPECIAL KRAAL FOR OLD HIMALAYAN BLACK BEAR

It was observed that an old Himalayan Black Bear is not being released in the arena because of impaired vision. A special designed kraal was constructed and the animal was released in the kraal for taking fresh air and sunshine bath.

Plate 61 Special designed Kraal for Himalayan Black Bear



Himalayan Black Bear enjoying in kraal Plate 62

Note: During the enrichment it was ensured that Safe enrichment material should be used. Keepers working with Bears were involved and time to time observation of the animal after introduction of the enrichment artefacts were carried out.

FEW SUGGESTED ENRICHMENT FOR HIMALAYAN BLACK BEAR

- → Feeding Enrichment: Hiding and Hanging of food (fruits, honey) at various locations in the enclosure, termite mounds, fruit dispenser, bamboo feeder with honey or fruits or nuts, Ice blocks having fruits etc.
- → Physical Enrichment: Elevated platforms, wooden poles, tied rope structures, climbing structures, substrate for digging, water pool etc.
- → Social enrichment: appropriate social grouping.
- → Sensory enrichment: live fishes in water pool, sprinklers.
- → Auditory enrichment: use of audio of other species.

SOME SUGGESTED POINTS

- → Safe Enrichment material should be used.
- → Regular Evaluation of Enrichment provided may be carried out.
- → Change in the enrichment should be carried out from time to time to avoid boredom among the animals.
- → Strict maintenance of hygiene and sanitation in and around enclosure.
- → Seasonal changes in Enrichment should be carried out.

Chapter 6 Enrichment Efforts for Felids

Felids belong to the family Felidae of class Mammalia and consist of cats. Felids have slender muscular body, strong flexible forelimbs and retractable claws for holding prey, dental and cranial adaptations for a strong bite, and often have characteristic striped or spotted coat patterns for camouflage.

In captivity, various types of enrichment may be provided to the felids like social enrichment (in case of lions), different types of feeding enrichment, enclosure enrichment etc. The enrichment will help in maintaining the physical as well as mental health of the captive felids.

The National Zoological Park, New Delhi housed 5 species of felids- Asiatic lion, Tiger (Bengal tiger & White tiger), Common leopard, Leopard cat and Jaguar.

The National Zoological Park, New Delhi made efforts to provide enrichment to Tiger (Bengal tiger & White tiger) and Common leopard.

1. Bengal Tiger *(Panthera tigris)*

Bengal tiger is commonly known as 'Bagh'. Bengal tigers are the sub-species found in forests of India, Nepal, Bangladesh, Bhutan and Myanmar. They are highly adaptable animals and are nocturnal and Crepuscular in activity. Bengal tigers are the largest and heaviest animal among all the four big cats.

Plate 69 Bengal Tiger

SCIENTIFIC CLASSIFICATION

Kingdom	Animalia
Phylum	Chordata
Class	Mammalia
Order	Carnivora
Family	Felidae
Genus	*Panthera*
Species	*tigris*

SOME OF THE IMPORTANT TRAITS OF TIGERS

Height	1.2 m (males), 1 m (females)
Weight	180-230 kg (males), 140-180 kg (females)
Body Length	2.7-3.1 m (males), 1.4-1.7 m (females); tail around 85 to 95 cm
Life Span	16-18 years
Breeding Season	No defined breeding season
Sexual maturity	3-4 years (male), 3 years (females)
Gestation Period	95 to 112 days
Litter size	2-4 cubs

In the wild, tigers feeds on deer, antelopes, gaur etc. It means they are carnivorous in nature.

TIGERS AT NATIONAL ZOOLOGICAL PARK, NEW DELHI

In captivity, the basic requirement related to the housing, upkeep, healthcare, feed and nutrition is of utmost important for the physical and mental health of the animals. Therefore, enrichment through various means becomes essential part of the zoo management. The National Zoological Park, New Delhi housed 2 Bengal tigers and 5 White tigers. Zoo provides the environmental conditions to them which are similar to naturalistic environment having proper space, source of water, shade, trees etc.

The diet of tigers at National Zoological Park, New Delhi consists of buffalo calf meat whose quantity may differ during summers and winters. Seasonal arrangements with regard to feed, housing facilities and veterinary care were also carried out for the animals from time to time.

There are two enclosures for tigers at National Zoological Park having enclosure arena area as 1445 square meter with moat system, night cubicles/ retiring cells, a kraal and a keeper room.

REVIEW OF EXISTING ENRICHMENT FOR TIGERS

A review of the existing enrichment and facilities provided to the tigers housed at National Zoological Park, New Delhi was carried out and following observations has been made:

→ Good vegetation, trees, plants are present in the enclosure.

→ A water pool and rocky sheds for resting are present.

→ Feed provided at the same time daily and at the same place in the night cells/cubicles.

ENRICHMENT EFFORTS CARRIED OUT FOR TIGERS

Environment Enrichment

→ Early release of tigers in the enclosure (early morning at around 7:00 am).

→ Hessian bags (in the form of balls) filled with paddy straw have been hanged with the help of tree branches at different sites of the enclosures at appropriate height- used for playing.

→ Some big and long tree logs were placed in the enclosure- for scratching.

→ A resting wooden platform have been formed and placed in the enclosure – for resting.

Plate 64 Pre-enrichment Tiger Enclosure (Beat no. 10)

Post enrichment Tiger enclosure (Beat no. 10) Plate 65

Pre enrichment Tiger enclosure (Beat no. 8)

Plate 66

Plate 67

Post enrichment Tiger enclosure (Beat no. 8)

Post enrichment Tiger enclosure (Beat no. 8)

Plate 68

Plate 69 Hessain bag hanged in Tiger enclosure

Plate 70 **Some Random observations:**
Post-enrichment White Tiger playing with Hessian bag

Plate 71 **Some Random observations:**
Post-enrichment White Tiger smelling dead tree branches

Plate 72 **Some Random observations:** Post-enrichment White Tiger smelling newly introduced rocky ramp

Some Random observations: Post-enrichment White Tiger with filled Hessain bag Plate 73

2. Common leopard *(Panthera pardus)*

Common leopard is commonly known as 'Tendua'. In India, leopards are found throughout the country upto an altitude of 3,000m. They are mainly nocturnal but diurnal and Crepuscular also in activity.

Plate 74 Common Leopard

SCIENTIFIC CLASSIFICATION

Kingdom	Animalia
Phylum	Chordata
Class	Mammalia
Order	Carnivora
Family	Felidae
Genus	*Panthera*
Species	*pardus*

SOME OF THE IMPORTANT TRAITS OF LEOPARD

Height	40-80 cm, Males are larger than female
Weight	37-91 kg (males), 28-60 kg (female)
Body Length	90-190 cm with tail length of 60-110 cm
Life Span	20 years
Breeding Season	Throughout the year
Sexual maturity	2-4 years
Gestation Period	90-105 days
Litter size	2-4 cubs

In the wild, the leopards prefer to feeds on middle sized animals and their diet consists of ungulates, monkeys, rodents, reptiles etc.

LEOPARDS AT NATIONAL ZOOLOGICAL PARK, NEW DELHI

The National Zoological Park, New Delhi has two enclosures for leopards and housed 4 numbers of leopards. The zoo provides the environmental conditions to them which are similar to naturalistic environment having proper space, source of water, shade, trees etc.

The diet of leopards at National Zoological Park, New Delhi consists of Buffalo calf meat whose quantity may differ during summers and winters. Seasonal arrangements with regard to feed, housing facilities and veterinary care were also carried out for the animals from time to time.

The enclosure has a 294 square meter of the area with night cubicles/ retiring cells.

REVIEW OF EXISTING ENRICHMENT FOR LEOPARD

A review of the existing enrichment and facilities provided to the leopards housed at National Zoological Park, New Delhi was carried out and following observations has been made:

→ Good vegetation, trees, plants are present in the enclosure.

→ Some tree logs inclined at different angles are present.

→ Feed provided at the same time daily and at the same place in the night cells/cubicles.

→ There are two pairs of common leopard, out of which one pair was released daily in one enclosure and in the other enclosure the common leopards are released on rotation basis i.e. either a male common leopard or female common leopard.

ENRICHMENT EFFORTS CARRIED OUT FOR LEOPARD

Environment Enrichment and Social Enrichment

→ Early release of leopards in the enclosure (early morning at around 7:00 am).

→ Hessian bags (in the form of balls) filled with paddy straw have been hanged with the help of tree branches at different sites of the enclosures at appropriate height- used for playing.

→ Some big and long tree logs were placed in the enclosure- for scratching.

→ A resting wooden platform have been formed and placed in the enclosure – for resting.

→ Pair of common leopards released in both the enclosure daily.

Plate 75

Pre-enrichment Common Leopard enclosure

Plate 76

Post Enrichment Common Leopard enclosure with and hanged Hessian bag and resting platform

Plate 77

Some Random observations: Post-enrichment/Common Leopard using log

Plate 78 **Some Random observations:** Post-enrichment/Common Leopard with filled Hessian bag

Plate 79 **Some Random observations:** Post-enrichment/Common Leopard using resting platform

Plate 80 Social Enrichment

Note: During the enrichment it was ensured that Safe enrichment material should be used. Keepers working with Felids were involved and time to time observation of the animal after introduction of the enrichment artefacts were carried out.

FEW SUGGESTED ENRICHMENT FOR FELIDS

→ Feeding Enrichment: Scattered food items, change in diet and timing of feed give, change in feed presentation, hiding of feed at various locations in the enclosure, placing of feed at an elevated platform or level.

→ Physical Enrichment: various water features, use of logs, tree branches, use of visual barriers, natural den like structures, perching areas etc.

SOME SUGGESTED POINTS

→ Safe Enrichment material should be used.

→ Regular Evaluation of Enrichment provided may be carried out.

→ Change in the enrichment should be carried out from time to time to avoid boredom among the animals.

→ Strict maintenance of hygiene and sanitation in and around enclosure.

→ Seasonal changes in Enrichment should be carried out.

Chapter 7

Enrichment Efforts for Aves

Birds consist of a group of warm-blooded vertebrates. They belong to class Aves, which are characterized by having feathers, toothless beaked jaws, lay eggs, have high metabolic rate, a four-chambered heart, and a strong yet lightweight skeleton.

In captivity, the birds should be given a sense of freedom. Spacious aviaries, natural environment, proper feed and veterinary care are of utmost importance. Apart from that, the enrichment in the form of physical, social, feeding should be introduced for the birds from time to time so that the stress related health and other behavioural problems should be checked in advance.

The National Zoological Park, New Delhi housed various species of birds like Raptors, Pheasants, Finches, Parakeets, Cockatoos, Macaw etc. and enrichment efforts has been made for some species of Pheasants, Owls and Parakeets.

1. Great Horned Owl *(Bubo bubo)*

Great Horned Owl is commonly known as 'Ghughu'. They are resident bird of India and are found throughout the country. 'Ghughu' inhabits plains as well as hills. They are nocturnal in activity. They do not construct their own nests but rather search for sheltered nesting site or an abandoned nest in trees, underground burrows or in buildings and caves.

Plate 81 Great horned Owl

SCIENTIFIC CLASSIFICATION

Kingdom	Animalia
Phylum	Chordata
Class	Aves
Order	Strigiformes
Family	Strigidae
Genus	*Bubo*
Species	*bubo*

SOME OF THE IMPORTANT TRAITS OF GREAT HORNED OWL

Weight	1,100 gms approximately
Length	56 cm
Life Span	20-30 years
Breeding Season	February-April
Incubation Period	45 days
Clutch size	2-4 eggs

In the wild, they prefer to feed on rats, mice, frogs, large insects etc.

GREAT HORNED OWL AT NATIONAL ZOOLOGICAL PARK, NEW DELHI

The National Zoological Park, New Delhi has one enclosure for Great Horned Owl and housed four Great Horned Owls.

The diet of Great Horned Owl at National Zoological Park, New Delhi consists of minced keema.

REVIEW OF EXISTING ENRICHMENT FOR GREAT HORNED OWL

A review of the existing enrichment and facilities provided to the Great Horned Owl housed at National Zoological Park, New Delhi was carried out and following observations has been made:

→ A nest box placed at the floor in a corner of an enclosure.

→ Few plants present in the enclosure.

→ Potable water in steel tray is provided for drinking.

→ Feed provided at the same time and at the same place.

→ Poles, rods at height were present.

→ Owl seen siting in the top corners of the enclosure.

→ There is one owl which can not fly high and prefer sitiing at the floor or at low height.

ENRICHMENT EFFORTS CARRIED OUT FOR GREAT HORNED OWL

Environment Enrichment

→ A hut like structure made by paddy straw is mounted at the wall of top corner, facing the display area of the enclosure- for perching.

→ A swing is made and hanged in the enclosure.

→ More plantations of trees carried out.

→ Poles/rods already present were wrapped by ropes.

→ There is one owl in the enclosure which cannot fly high- for that owl- a proper hiding place (hut like structure of Paddy Straw) is placed, a nest (of paddy straw and natural nesting material) is placed.

→ Water provided in earthen bowl for drinking.

→ A basket with nesting material placed in the corner at an appropriate height.

Plate 82 Pre-enrichment Great horned Owl enclosure

Plate 83 Post-enrichment Great horned Owl enclosure (upper view of enclosure)

Plate 84 **Some Random observations:**
Post-enrichment Great horned Owl using the perch provided

Plate 85 **Some Random observations:**
Post-enrichment Great horned Owl using nest provided

Plate 86 **Some Random observations:**
Post-enrichment Great horned Owl using hut like structure

2. Barn Owl *(Tyto alba)*

Barn Owl is commonly known as 'Ullu'. They are found in every continent except Antarctica. 'Ullu' inhabits cultivated areas and human habitations. They are crepuscular and nocturnal in activity. They do not construct their own nests and lay eggs in open in the ruins or in the space between ceiling and roof of a building or in hollow tree trunks.

Plate 87 Barn Owl

SCIENTIFIC CLASSIFICATION

Kingdom	Animalia
Phylum	Chordata
Class	Aves
Order	Strigiformes
Family	Tytonidae
Genus	*Tyto*
Species	*alba*

SOME OF THE IMPORTANT TRAITS OF BARN OWL

Weight	470 gms approximately
Length	36 cm
Life Span	34 years
Breeding Season	Throughout the year
Incubation Period	32 to 24 days
Clutch size	4-7 eggs

In the wild, the Barn owl prefers to feed on rats, mice and small birds etc.

BARN OWL AT NATIONAL ZOOLOGICAL PARK, NEW DELHI

The National Zoological Park, New Delhi has one enclosure for Barn owl and housed eight numbers of Barn owls.

The diet of Barn owls at National Zoological Park, New Delhi consists of minced keema.

REVIEW OF EXISTING ENRICHMENT FOR BARN OWL

A review of the existing enrichment and facilities provided to the Barn owls housed at National Zoological Park, New Delhi was carried out and following observations has been made:

- → A nest box placed at the floor in a corner of an enclosure.
- → Few plants present in the enclosure.
- → Potable water in steel tray is provided for drinking.
- → Feed provided at the same time and at the same place.
- → Poles, rods at height were present.
- → Owls seen siting in the top corners of an enclosure.

ENRICHMENT EFFORTS CARRIED OUT FOR BARN OWL

Environment Enrichment

- → A hut like structure made by paddy straw is mounted at the wall of top corner, facing the display area of the enclosure- for perching.
- → Existing nest box was modified by opening the front. The nest box is hanged at the appropriate height.
- → A swing is made and hanged.
- → More plantations of trees carried out.
- → Poles/rods already present were wrapped by ropes.
- → Withdrawal area introduced (made by paddy straw and bamboo).
- → A basket with nesting material placed in the corner at an appropriate height.

Plate 88 Pre-enrichment Barn Owl enclosure

Plate 89 Pre-enrichment Barn Owl enclosure

Plate 90 **Some Random observations:** Post-enrichment Barn Owl using poles/log wrapped with rope

Plate 91 **Some Random observations:** Post-enrichment Barn Owl using nest box placed at an appropriate height

Plate 92 **Some Random observations:** Post-enrichment Barn Owl using perch provided

3. Brown Fish Owl *(Ketupa zeylonensis)*

Brown Fish Owl is native from Turkey to South and Southeast Asia. They inhabit forests and wooded wetlands. They are most common of all the four living species of fish owls.

Plate 93 Brown fish Owl

SCIENTIFIC CLASSIFICATION

Kingdom	Animalia
Phylum	Chordata
Class	Aves
Order	Strigiformes
Family	Strigidae
Genus	*Ketupa*
Species	*zeylonensis*

SOME OF THE IMPORTANT TRAITS OF BROWN FISH OWL

Weight	1.1-2.5 kg
Length	48-61 cm with a wingspan 125-140 cm
Breeding Season	November to April
Incubation Period	38 days or less
Clutch size	1-2 eggs

In the wild, the Brown Fish Owl prefers to feed on fishes, frogs, rodents, birds, reptiles and large beetles etc.

BROWN FISH OWL AT NATIONAL ZOOLOGICAL PARK, NEW DELHI

The National Zoological Park, New Delhi has one enclosure for Brown Fish Owl and housed four numbers of Brown Fish Owl.

The diet of Brown Fish Owl at National Zoological Park, New Delhi consists of minced keema.

REVIEW OF EXISTING ENRICHMENT FOR BROWN FISH OWL

A review of the existing enrichment and facilities provided to the Brown Fish Owl housed at National Zoological Park, New Delhi was carried out and following observations has been made:

- → A Nest box placed at the floor in a corner of an enclosure.
- → Few plants present in the enclosure.
- → Potable water in steel tray present for drinking.
- → Feed provided at the same time and at the same place.
- → Poles, rods at height were present.
- → Owls seen siting in the top corners of the enclosure.

ENRICHMENT EFFORTS CARRIED OUT FOR BROWN FISH OWL

Environment Enrichment

- → A hut like structure made by paddy straw is mounted at the wall of top corner, facing the display area of the enclosure- for perching.
- → Existing nest box was replaced with a tree trunk with a hole which is hanged at the appropriate height.
- → A swing is made and hanged.
- → More plantations of trees.
- → Poles/rods already present were wrapped by ropes.

Plate 94
Pre-enrichment
Brown fish Owl enclosure

Plate 95
Post-enrichment Brown fish Owl enclosure (from inside)

Plate 96
Some Random observations: Post-enrichment/Brown fish Owl using perches and hut like structure

Plate 97
Some Random observations: Post-enrichment/Brown fish owl using perches

4. Indian Peafowl *(Pavo cristatus)*

Indian Peafowl is commonly known as Mor and Mayur. They are resident bird and commonly found throughout the India. They inhabit undergrowth in a forests and scrub near streams, villages, agricultural field etc. They nest on ground among dense undergrowth, semi feral birds on buildings. The National Zoological Park, New Delhi has white peafowl also in its collection.

Plate 98 Indian Peafowl

SCIENTIFIC CLASSIFICATION

Kingdom	Animalia
Phylum	Chordata
Class	Aves
Order	Galliformes
Family	Phasianidae
Genus	*Pavo*
Species	*cristatus*

SOME OF THE IMPORTANT TRAITS OF INDIAN PEAFOWL

Weight	2.75-6 kg
Body Length	180-230 cm excluding train
Breeding Season	January to September
Sexual maturity	2-3 years
Incubation Period	28 days
Clutch size	4-6 eggs

In the wild, the Indian Peafowl prefers to feed on ticks, termites, ants, flower parts, seeds, some reptiles, amphibians etc.

INDIAN PEAFOWL DIET AT NATIONAL ZOOLOGICAL PARK, NEW DELHI

The diet of Indian Peafowl at National Zoological Park, New Delhi consists of mixed dana etc.

REVIEW OF EXISTING ENRICHMENT FOR INDIAN PEAFOWL

A review of the existing enrichment and facilities provided to the Indian Peafowl housed at National Zoological Park, New Delhi was carried out and following observations has been made:

- → Few plants present.
- → Elevated platform for resting and perching present in the enclosure.
- → A steel feeding platform present where the feed is provided daily.
- → Water in steel tray for drinking.
- → Paddy straw placed in one corner of the enclosure.
- → Feed provided at the same time and at the same place.

ENRICHMENT EFFORTS CARRIED OUT FOR INDIAN PEAFOWL

Environment Enrichment

→ A hut like structure made by paddy straw is provided on the ground.

→ A perching place at an appropriate height made of natural material (bamboo & paddy straw) is provided.

→ Nesting material like twigs, grasses, dried leaves etc. has been placed in the enclosure.

→ More plantations of trees have been done.

→ Potable water provided in earthen bowls for drinking.

Feeding Enrichment

→ A tray with feeding material (sprouting wheat/barley in a tray filled with soil) has been provided.

Pre-enrichment Indian Peafowl

Plate 99

Pre-enrichment White Peafowl

Plate 100

Post-enrichment Indian Peafowl enclosure

Plate 101

Plate 102

Some Random observations:
Post-enrichment Indian Peafowl using perches

Plate 103

Some Random observations:
Post-enrichment Indian Peafowl feeding of sprouting wheat trays provided as feeding enrichment

Plate 104

Some Random observations: Post-enrichment/Indian Peafowl using newly introduced perches

5. Rose Ringed Parakeet *(Psittacula krameri)*

Rose Ringed Parakeet is commonly known as Tota. They are found throughout India. They inhabit forests, open woodland and cultivation. They nest in hollow tree trunks high above ground.

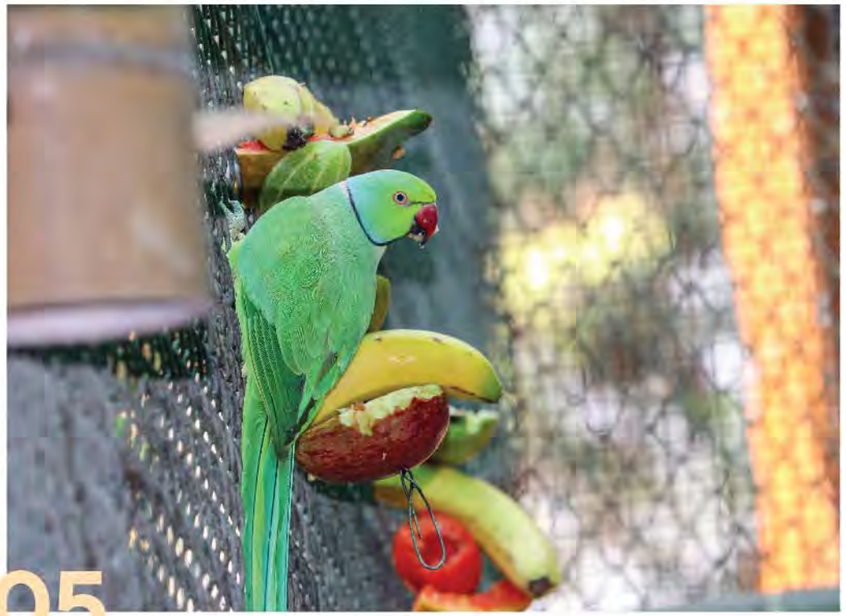


Plate 105 Rose-ringed Parakeet

SCIENTIFIC CLASSIFICATION

Kingdom	Animalia
Phylum	Chordata
Class	Aves
Order	Psittaciformes
Family	Psittacidae
Genus	*Psittacula*
Species	*krameri*

SOME OF THE IMPORTANT TRAITS OF ROSE RINGED PARAKEET

Body Length	42 cm with 18-23 cm pointed tail
Breeding Season	January to April
Sexual maturity	2-3 years
Age at weaning	4 weeks
Clutch size	3-4 eggs

In the wild, the Rose Ringed Parakeet prefers to feed on variety of fruits, vegetables, grains, seeds, flower buds etc.

ROSE RINGED PARAKEET DIET AT NATIONAL ZOOLOGICAL PARK, NEW DELHI

The diet of Rose Ringed Parakeet at National Zoological Park, New Delhi consists of fruits like apple, papaya, banana, ground nut, chillies, maize etc.

REVIEW OF EXISTING ENRICHMENT FOR ROSE RINGED PARAKEET

A review of the existing enrichment and facilities provided to the Rose Ringed Parakeet housed at National Zoological Park, New Delhi was carried out and following observations has been made:

- → Few fruiting plants present.
- → Earthen pots for nesting present.
- → Bamboo nests.
- → Poles/rods for perching.
- → A steel feeding platform where the feed is provided daily.
- → Potable Water provided in steel tray for drinking.
- → Paddy straw placed in one corner of the enclosure.
- → Feed provided at the same time and at the same place.

ENRICHMENT EFFORTS CARRIED OUT FOR ROSE RINGED PARAKEET

Environment Enrichment

→ Swings made from bamboo and logs have been installed in the enclosure.

→ Baskets with nesting material has been placed at appropriate sites and also been hanged.

→ More earthen pots has been provided (where not present).

→ Potable water provided in earthen bowls for drinking.

→ Nesting material has been placed in the enclosure.

→ Hollow tree trunks have been provided for nesting.

Feeding Enrichment

→ More fruiting plants has been introduced in the enclosures.

→ Fruits have been hanged at various locations inside the enclosure.

Plate 106

Pre-enrichment Rose-ringed Parakeet

Plate 107

Post-enrichment Parakeet

Plate 108

Some Random observations:
Post-enrichment Parakeet using bamboo swings

Plate 109

Some Random observations: Post-enrichment Parakeet enjoying feeding enrichment (hanging of food)

Plate 110

Some Random observations: Post-enrichment Parakeet enjoying feeding enrichment

6. Large Indian Parakeet *(Psittacula eupatria)*

Large Indian Parakeet is commonly known as Heeraman tota. They are resident bird of Indian subcontinents. They inhabit dry and moist deciduous forests, open woodland and cultivation. They nest in holes present in large trees high above ground.

Plate 111 Large Indian Parakeet

SCIENTIFIC CLASSIFICATION

Kingdom	Animalia
Phylum	Chordata
Class	Aves
Order	Psittaciformes
Family	Psittacidae
Genus	*Psittacula*
Species	*eupatria*

SOME OF THE IMPORTANT TRAITS OF LARGE INDIAN PARAKEET

Weight	70-85 gm
Body Length	56-62 cm with a 22-35 cm tail
Breeding Season	December to April
Sexual maturity	2-3 years
Incubation Period	19-21 days
Clutch size	2-4 eggs

In the wild, the Large Indian Parakeet prefers to feed on variety of fruits, vegetables, grains, seeds, flower buds etc.

LARGE INDIAN PARAKEET DIET AT NATIONAL ZOOLOGICAL PARK, NEW DELHI

The diet of Large Indian Parakeet at National Zoological Park, New Delhi consists of fruits like apple, banana, papaya, chillies, ground nut, maize etc.

REVIEW OF EXISTING ENRICHMENT FOR LARGE INDIAN PARAKEET

A review of the existing enrichment and facilities provided to the Large Indian Parakeet housed at National Zoological Park, New Delhi was carried out and following observations has been made:

- → Few fruiting plants present.
- → Earthen pots for nesting .
- → Bamboo nests.
- → Poles/rods for perching.
- → A steel feeding platform present where the feed is given daily.
- → Potable water in steel tray for drinking.
- → Paddy straw placed in one corner of the enclosure.
- → Feed provided at the same time and at the same place.

ENRICHMENT EFFORTS CARRIED OUT FOR LARGE INDIAN PARAKEET

Environment Enrichment

→ Swings made from bamboo and logs have been provided.

→ Baskets with nesting material has been placed at appropriate sites and also been hanged.

→ More earthen pots has been provided (where not present).

→ Potable water provided in earthen bowls for drinking.

→ Nesting material has been placed in the enclosure.

→ Hollow tree trunks have been provided for nesting.

Feeding Enrichment

→ More fruiting plants has been introduced in the enclosures.

→ Fruits have been hanged at various locations inside the enclosure.

Post-enrichment Large Indian Parakeet

Plate 112

Plate 111 Pre-enrichment Large Indian Parakeet

Note: During the enrichment it was ensured that Safe enrichment material should be used. Keepers working with Aves were involved and time to time observation of the animal after introduction of the enrichment artefacts were carried out.

FEW SUGGESTED ENRICHMENT FOR AVES

Withdrawal area, Dust baths (for Pheasants), Proper plantation (creepers, seasonal fruiting plants etc.), Nest boxes to be made natural or to be replaced with suitable nest baskets, Regular changing of soil/substrate, change in feed, providing local fruits from locally available trees in zoo, change in timing and frequency of feed, more perching opportunities, roosting areas, withdrawal areas etc.

SOME SUGGESTED POINTS

→ Safe Enrichment material should be used.

→ Regular Evaluation of Enrichment provided may be carried out.

→ Change in the enrichment should be carried out from time to time to avoid boredom among the animals.

→ Strict maintenance of hygiene and sanitation in and around enclosure.

→ Seasonal changes in Enrichment should be carried out.

Chapter 8

Enrichment Efforts for Reptiles

Reptiles consists of a group of cold-blooded animals which are tetrapod vertebrates having dry and scaly skin. They occupy various habitat conditions and ecological niches. Reptiles may be terrestrial, arboreal, aquatic etc.

In captivity, Enrichment for Reptiles is of utmost importance so that their biological, behavioural and physiological needs may be addressed.

At National Zoological Park, New Delhi following species of Reptiles housed at Reptile House:

1. Indian Cobra *(Naja naja)*
2. Indian Rock Python *(Python molurus molurus)*
3. Indian Sand Boa *(Eryx johnii)* and Red Sand Boa
4. Common Rat Snake *(Ptyas mucosus)*
5. Checkered keelback *(Fowlea piscator)*
6. Diadem Snake *(Spalerosophis diadema)*
7. Common Indian Monitor Lizard *(Varanus bengalensis)*
8. Turtles *(Red eared slider)*

The National Zoological has made efforts to enrich the environment of enclosures for species of snakes and other reptiles like Monitor lizard and turtle.

1. Indian Cobra *(Naja naja)*

Indian Cobra is commonly known as 'Nag'. They are native to Indian subcontinent. Cobra habitat consists of thick forest, open cultivated land and even the populated areas and old buildings. They are diurnal and nocturnal in activity and one of the four most Venomous snake of India. They lay eggs in underground nests.

Plate 114 Indian Cobra

SCIENTIFIC CLASSIFICATION

Kingdom	Animalia
Phylum	Chordata
Class	Reptilia
Order	Squamata
Family	Elapidae
Genus	*Naja*
Species	*naja*

SOME OF THE IMPORTANT TRAITS OF INDIAN COBRA..

Body Length	183-244 cm
Life Span	10-20 years
Egg laying Season	April to July.
Incubation Period	48-69 days
Clutch size	8-45 eggs

In the wild, Indian Cobra feeds on rodents, frogs, toads, birds etc.

INDIAN COBRA AT NATIONAL ZOOLOGICAL PARK, NEW DELHI

The National Zoological Park, New Delhi has two enclosures for Indian Cobra and housed five Indian Cobra .

At National Zoological Park, New Delhi, Indian Cobra fed with one alive chick once in a week (on every Friday, when the zoo is closed for visitors).

REVIEW OF EXISTING ENRICHMENT FOR INDIAN COBRA

A review of the existing enrichment and facilities provided to the Indian Cobra housed at National Zoological Park, New Delhi was carried out and following observations has been made:

→ Few logs/poles were present.

→ Paddy straw placed in a corner of the enclosure.

→ Small shallow pool.

→ Few plants were present.

ENRICHMENT EFFORTS CARRIED OUT FOR INDIAN COBRA

Environment Enrichment

→ Earthen bowl for potable water- drinking purpose.

→ Plants were planted for hiding and making the enclosure more naturalistic

→ Dried leaves and dead tree barks were placed in the enclosure- as hiding places

→ Change in position of logs used as perches were carried out.

→ Earthen pots provided for resting and hiding

→ In one enclosure where no log was present, an elevated log has been introduced- for climbing and hanging.

Plate 115 Pre-enrichment in Indian Cobra enclosure (Enclosure no. 1)

Post-enrichment in Indian Cobra enclosure (Enclosure no.1) Plate 116

Plate 117
Pre-enrichment in Indian Cobra enclosure (Enclosure no. 2)

Post-enrichment in Indian Cobra enclosure (Enclosure no. 2)

Plate 118

Plate 119
Some Random observations:
Post-enrichment Indian Cobra using dried leaves and dead tree barks for hiding

Plate 120
Some Random observations:
Post-enrichment Indian Cobra using plants for hiding

Plate 121
Some Random observations:
Post-enrichment Indian Cobra using dead tree bark

2. Indian Rock Python *(Python molurus)*

Indian Rock Python is commonly known as 'Ajgar'. They are found in India and Sri Lanka. Habitat of Ajgar ranges from scrub forests, rain forests, swamps, marshes, grasslands, mangroves, open forests etc. They prefer rocky areas near the water body. They are diurnal and nocturnal in activity and non-venomous in nature. They usually lay eggs in caves, hollow tree or hole.

Plate 122 Indian Rock Python

SCIENTIFIC CLASSIFICATION

Kingdom	Animalia
Phylum	Chordata
Class	Reptilia
Order	Squamata
Family	Pythonidae
Genus	*Python*
Species	*molurus*

SOME OF THE IMPORTANT TRAITS OF INDIAN ROCK PYTHON

Body Length	366-750 cm
Life Span	20 years
Egg laying Season	March to June
Incubation Period	48-69 days
Clutch size	8-100 eggs

In the wild, Indian Rock Python feeds on rats, birds, small mammals etc.

INDIAN ROCK PYTHON AT NATIONAL ZOOLOGICAL PARK, NEW DELHI

The National Zoological Park, New Delhi has three enclosures for Indian Rock Python and housed eight Indian Rock Python .

At National Zoological Park, New Delhi, Indian Rock Python fed with one alive rabbit once in a week (on every Friday, when the zoo is closed for visitors).

REVIEW OF EXISTING ENRICHMENT FOR INDIAN ROCK PYTHON

A review of the existing enrichment and facilities provided to the Indian Rock Python housed at National Zoological Park, New Delhi was carried out and following observations has been made:

- → Few rocks were present.
- → Steel tray for potable water .
- → Few logs/poles were present.
- → Paddy straw placed in a corner of the enclosure.
- → Small shallow pool.

ENRICHMENT EFFORTS CARRIED OUT FOR INDIAN ROCK PYTHON

Environment Enrichment

- → Earthen bowl for potable water was placed in the enclosures.
- → Plants were planted for hiding and making the enclosure more naturalistic.
- → Dried leaves and dead tree barks placed in the enclosure- as hiding places.
- → Logs in inclining position were installed in such a way so that the snakes may use the same for climbing, hanging etc.
- → Tree trunk with holes for resting and hiding.
- → Rocks were arranged near the water pool area and extended upto certain area of the enclosure.
- → Wooden chips placed in one corner of the enclosure.

Pre enrichment Indian Rock Python enclosure (Enclosure no. 4)

Plate 123

Post enrichment Indian Rock Python enclosure (Enclosure no. 4)

Plate 124

Pre enrichment Indian Rock Python enclosure (Enclosure no. 7)

Plate 125

Plate 126 Post enrichment Indian Rock Python enclosure (Enclosure no. 7)

Pre enrichment Indian Rock Python enclosure (Enclosure no. 12) Plate 127

Plate 128 Post enrichment Indian Rock Python enclosure (enclosure no. 12)

Post enrichment Indian Rock Python enclosure (enclosure no. 12): side area Plate 129

Plate 130

Some Random observations: Post-enrichment Indian Rock Python using tree trunk with hole

Plate 131

Some Random observations: Post-enrichment Indian Rock Python using tree trunk with hole

Plate 132

Some Random observations: Post-enrichment Indian Rock Python using dead tree barks and wooden chips

3. Indian Sand Boa *(Eryx johnii)* (and Red Sand Boa)

Indian Sand Boa is commonly known as 'Do Muha Sanp'. They are found in Africa, the Middle East to Pakistan and India etc. Habitat of 'Do Muha Sanp' ranges from dry, semi-desert scrub plains and rocky dry foothills etc. They prefer sandy soil i.e. loose sand. They are diurnal and nocturnal in activity and non-venomous in nature. They are live bearers i.e. female retain embryos inside body and gives birth fully developed little sand boas.

SCIENTIFIC CLASSIFICATION

Kingdom	Animalia
Phylum	Chordata
Class	Reptilia
Order	Squamata
Family	Boidae
Genus	*Eryx*
Species	*johnii*

SOME OF THE IMPORTANT TRAITS OF INDIAN SAND BOA

Weight	1 kg
Body Length	60-90 cm
Life Span	20 years
Breeding Season	August to September
Gestation Period	4 months
Number of young ones	6-9

In the wild, Indian Sand Boa feeds on rats, mice and some other small rodents etc.

INDIAN SAND BOA AT NATIONAL ZOOLOGICAL PARK, NEW DELHI

The National Zoological Park, New Delhi has one enclosure for Indian Sand Boa and housed three Indian Sand Boa (one Common Sand Boa & two Red Sand Boa).

At National Zoological Park, New Delhi, Indian Sand Boa fed with one alive chick once in a week (on every Friday, when the zoo is closed for visitors).

REVIEW OF EXISTING ENRICHMENT FOR INDIAN SAND BOA

A review of the existing enrichment and facilities provided to the Indian Sand Boa housed at National Zoological Park, New Delhi was carried out and following observations has been made:

→ A log in one corner of the enclosure.

→ Few plants are present.

→ Empty water pool.

→ Paddy straw placed in one corner.

→ Water in earthen bowl for drinking

ENRICHMENT EFFORTS CARRIED OUT FOR INDIAN SAND BOA

Environment Enrichment

→ Loose sand was spread everywhere in the enclosure.

→ Empty water pool area filled with loose sand and covered with dried leaves.

→ Inverted Earthen pot placed in one corner with half-filled loose sand- for resting and hiding purpose.

→ More Plantation carried out - for hiding and making the enclosure more naturalistic.

Plate 133 Pre-enrichment Indian Sand Boa enclosure

Post-enrichment Indian Sand Boa enclosure Plate 134

Plate 135 **Some Random observations:** Post-enrichment Indian Sand Boa using plants and sand

Plate 136 Post-enrichment Indian Sand Boa enclosure

Plate 137 **Some Random observations:** Post-enrichment Indian Sand Boa using sand and dried leaves provided

4. Common Rat Snake *(Ptyas mucosus)*

Common Rat Snake is commonly known as 'Dhaman'. In India, they are found throughout the country. They inhabit almost every type of habitat ranging from thick forests, villages, urban areas etc. Their egg laying season usually varies as per climate. They are diurnal in activity and non-venomous in nature.

Plate 138 Common Rat Snake

SCIENTIFIC CLASSIFICATION

Kingdom	Animalia
Phylum	Chordata
Class	Reptilia
Order	Squamata
Family	Colubridae
Genus	*Ptyas*
Species	*mucosus*

SOME OF THE IMPORTANT TRAITS OF COMMON RAT SNAKE

Body Length	1.65 m to 2 m (on an average). Males are longer in size than female
Life Span	11 years
Egg laying Season	Varies as per climatic conditions
Incubation Period	2-3 months
Clutch size	6-14 eggs.

In the wild, Common Rat Snake feeds on rodents, frogs, toads, some birds etc. .

COMMON RAT SNAKE AT NATIONAL ZOOLOGICAL PARK, NEW DELHI..

The National Zoological Park, New Delhi has two enclosures for Common Rat Snake and housed five Common Rat Snakes.

At National Zoological Park, New Delhi, Common Rat Snake fed with one alive chick once in a week (on every Friday, when the zoo is closed for visitors).

REVIEW OF EXISTING ENRICHMENT FOR COMMON RAT SNAKE

A review of the existing enrichment and facilities provided to the Common Rat Snake housed at National Zoological Park, New Delhi was carried out and following observations has been made:

→ A paddy straw placed in one corner.

→ A shallow water pool present.

→ Few logs were present in an inclined position.

→ Water in earthen bowl for drinking was present.

ENRICHMENT EFFORTS CARRIED OUT FOR COMMON RAT SNAKE

Environment Enrichment

→ Earthen bowl for potable water (where not present) was provided.

→ Plantation was carried out in the enclosures for hiding and making the enclosure more naturalistic.

→ Dried leaves and dead tree barks provided- as hiding places.

→ Logs in inclining position were installed in such a way so that the snakes use the same for climbing, hanging etc. (where not present).

→ Tree trunk with hole for resting and hiding introduced.

→ Inverted Earthen pot with loosed sand placed -for hiding and resting.

→ Wooden hut like structure installed in the enclosure.

Post enrichment Common Rat Snake enclosure (enclosure no. 10)

Plate 139

Plate 140 Pre-enrichment Common Rat Snake enclosure (enclosure no. 10)

Post enrichment Common Rat Snake enclosure (enclosure no. 13) Plate 141

Plate 142 Pre-enrichment Common Rat Snake enclosure (enclosure no. 13)

Some Random observations: Post-enrichment Rat Snake using earthen pot Plate 143

Plate 144

Some Random observations: Post-enrichment Rat Snake using hollow tree trunk

Plate 145

Some Random observations: Post-enrichment Rat Snake using hollow tree trunk

5. Checkered Keelback Snake *(Fowlea piscator)*

Checkered Keelback Snake is commonly known as Asiatic water snake and are endemic to Asia. They are commonly found in or near freshwater lakes or rivers, marshes and agricultural fields. Their breeding season usually ranges from winters to summers. They are diurnal and nocturnal in activity and non-venomous in nature.

Plate 146 Checkered Keelback Snake

SCIENTIFIC CLASSIFICATION

Kingdom	Animalia
Phylum	Chordata
Class	Reptilia
Order	Squamata
Family	Colubridae
Genus	*Xenochrophis*
Species	*piscator*

SOME OF THE IMPORTANT TRAITS OF CHECKERED KEELBACK SNAKE.

Body Length	60-80 cm
Life Span	9-10 years
Egg laying Season	October-November
Incubation Period	37-60 days
Clutch size	8-91 eggs

In the wild, Checkered Keelback Snake feeds on small fishes and water frogs etc.

CHECKERED KEELBACK SNAKE AT NATIONAL ZOOLOGICAL PARK, NEW DELHI

The National Zoological Park, New Delhi has one enclosure for Checkered Keelback Snake and housed two Checkered Keelback Snakes.

At National Zoological Park, New Delhi, Checkered Keelback Snake fed with one alive chick once in a week (on every Friday, when the zoo is closed for visitors).

REVIEW OF EXISTING ENRICHMENT FOR CHECKERED KEELBACK SNAKE

A review of the existing enrichment and facilities provided to the Checkered Keelback Snake housed at National Zoological Park, New Delhi was carried out and following observations has been made:

→ A paddy straw placed in one corner.

→ A shallow water pool present.

→ Few plants present.

ENRICHMENT EFFORTS CARRIED OUT FOR CHECKERED KEELBACK SNAKE

Environment Enrichment

→ Earthen bowl for potable water provided.

→ Plants for hiding and making the enclosure natural.

→ Dried leaves and dead tree barks placed at one place in the enclosure- as hiding places

→ Dried tree log placed in inclined position - for climbing, hanging, perching place etc.

→ Few rocks were placed at some locations in the enclosure.

→ Inverted Earthen pot with loosed sand placed -for hiding and resting.

Plate 147
Post-enrichment Checkered Keelback Snake enclosure

Pre-enrichment Checkered Keelback Snake enclosure

Plate 148

Plate 149 **Some Random observations:** Post-enrichment
Checkered Keelback Snake using dried leaves and dead tree barks

6. Diadem Snake *(Spalerosophis diadema)*

Diadem Snake are found in North Africa (Algeria) and India (upto East Uttar Pradesh and up to Kutch). They inhabit semi-arid and arid areas. They are diurnal in activity and non-venomous in nature.

Plate 150 Diadem Snake

SCIENTIFIC CLASSIFICATION

Kingdom	Animalia
Phylum	Chordata
Class	Reptilia
Order	Squamata
Family	Colubridae
Genus	*Spalerosophis*
Species	*diadema*

SOME OF THE IMPORTANT TRAITS OF DIADEM SNAKE

Body Length	122-200 cm (average)
Life Span	11 years
Egg laying Season	May to July
Incubation Period	2-3 months
Clutch size	8-16 eggs

In the wild, Diadem Snake feeds on rodents, frogs, lizards etc.

DIADEM SNAKE AT NATIONAL ZOOLOGICAL PARK, NEW DELHI

The National Zoological Park, New Delhi has one enclosure for Diadem Snake and housed one Diadem Snake.

At National Zoological Park, New Delhi, Diadem Snake fed with one alive chick once in a week (on every Friday, when the zoo is closed for visitors).

REVIEW OF EXISTING ENRICHMENT FOR DIADEM SNAKE

A review of the existing enrichment and facilities provided to the Diadem Snake housed at National Zoological Park, New Delhi was carried out and following observations has been made:

→ A paddy straw placed in one corner.

→ Water in earthen bowl was present.

→ Logs/poles in inclined position present.

→ Few plants present.

ENRICHMENT EFFORTS CARRIED OUT FOR DIADEM SNAKE

Environment Enrichment

→ Plants for hiding and making the enclosure natural.

→ Dried leaves and dead tree barks placed at one place in the enclosure- as hiding places.

→ Few rocks were placed at some locations in the enclosure.

→ Inverted Earthen pot with loosed sand placed -for hiding and resting.

Plate 151 Post-enrichment Diadem Snake enclosure

Pre-enrichment Diadem Snake enclosure Plate 152

Plate 153

Some Random observations: Post-enrichment Diadem Snake using tree log

Plate 154

Some Random observations: Post-enrichment Diadem Snake using earthen pot

Plate 155

Some Random observations: Post-enrichment Diadem Snake using log

7. Common Indian Monitor Lizard *(Varanus bengalensis)*

Common Indian Monitor Lizard is found throughout India, Bangladesh and Sri Lanka. Their habitat ranges from evergreen forests to deserts. They usually lay eggs in holes (ground), termite mounds, hollow logs or in piles of leaves. They are diurnal but more active during morning and evening time.

SCIENTIFIC CLASSIFICATION

Kingdom	Animalia
Phylum	Chordata
Class	Reptilia
Order	Squamata
Family	Varanidae
Genus	*Varanus*
Species	*bengalensis*

SOME OF THE IMPORTANT TRAITS OF COMMON INDIAN MONITOR LIZARD

Body Length	155-175 cm with around 100 cm tail
Life Span	15 years
Egg laying Season	April to October
Incubation Period	2 months
Clutch size	7-30 eggs

In the wild, Common Indian Monitor Lizard feeds on rats, birds, small mammals, insects etc.

COMMON INDIAN MONITOR LIZARD AT NATIONAL ZOOLOGICAL PARK, NEW DELHI

The National Zoological Park, New Delhi has two enclosures for Common Indian Monitor Lizard and housed three Common Indian Monitor Lizards.

At National Zoological Park, New Delhi, Common Indian Monitor Lizard fed with boiled eggs.

REVIEW OF EXISTING ENRICHMENT FOR COMMON INDIAN MONITOR LIZARD

A review of the existing enrichment and facilities provided to the Common Indian Monitor Lizard housed at National Zoological Park, New Delhi was carried out and following observations has been made:

→ A paddy straw placed in one corner.

→ Water in earthen bowl was present.

→ Some big rocks were present.

→ A tree log was present at one place.

→ Few plants present.

ENRICHMENT EFFORTS CARRIED OUT FOR COMMON INDIAN MONITOR LIZARD

Environment Enrichment

→ Plantation done - for hiding and making the enclosure natural.

→ Dried leaves and dead tree barks placed- as hiding places.

→ More rocks were provided at several places.

→ Rocky cave like structures were made.

→ Loose sand mounds were made at different places.

→ Loose sand was spread in the enclosure.

Plate 156 Post-enrichment Common Indian Monitor Lizard (enclosure no. 8)

Plate 157 Pre-enrichment Common Indian Monitor Lizard (enclosure no. 8)

Plate 158 Post-enrichment Common Indian Monitor Lizard (enclosure no. 9)

Plate 159 Pre-enrichment Common Indian Monitor Lizard (enclosure no. 9)

8. Red-eared slider *(Trachemys scripta)*

Red-eared slider turtle are native to the southern United States and northern Mexico. They are semi-aquatic in nature and are used as pets in United States.

Plate 160 Red-eared Slider

SCIENTIFIC CLASSIFICATION

Kingdom	Animalia
Phylum	Chordata
Class	Reptilia
Order	Testudines
Family	Emydidae
Genus	*Trachemys*
Species	*scripta*

SOME OF THE IMPORTANT TRAITS OF RED-EARED SLIDER TURTLE

Length	15 to 20 cm, Females larger than males
Life Span	20-30 years
Egg laying Season	March to June
Incubation Period	59-112 days
Clutch size	2-30 eggs

In the wild, Red-eared slider turtle feeds on plants, small fishes, snail, worms, tadpole etc.

RED-EARED SLIDER TURTLE AT NATIONAL ZOOLOGICAL PARK, NEW DELHI

The National Zoological Park, New Delhi has one enclosure for Red-eared slider turtle and housed two Red-eared slider turtle.

At National Zoological Park, New Delhi, Red-eared slider turtle fed with chopped vegetables.

REVIEW OF EXISTING ENRICHMENT FOR RED-EARED SLIDER TURTLE

A review of the existing enrichment and facilities provided to the Red-eared slider turtle housed at National Zoological Park, New Delhi was carried out and following observations has been made:

- → Few plants present.
- → Small pond present.
- → Sand placed in one corner of the enclosure.

ENRICHMENT EFFORTS CARRIED OUT FOR RED-EARED SLIDER TURTLE

Environment Enrichment

- → Plantation done - for hiding and making the enclosure natural.
- → Some rocks were introduced.
- → Loose sand was provided.

Plate 161 Post-enrichment in Red-eared Slider enclosure

Red-eared Slider using rocks provided as enrichment Plate 162

Note: During the enrichment it was ensured that Safe enrichment material should be used. Keepers working with Reptiles were involved and time to time observation of the animal after introduction of the enrichment artefacts were carried out.

FEW SUGGESTED ENRICHMENT FOR SNAKES

→ Misting, Perches, water features, natural substrate, species-specific plants, visual barriers etc.

SOME SUGGESTED POINTS

→ Safe Enrichment material should be used.

→ Regular Evaluation of Enrichment provided may be carried out.

→ Change in the enrichment should be carried out from time to time to avoid boredom among the animals.

→ Strict maintenance of hygiene and sanitation in and around enclosure.

→ Seasonal changes in Enrichment should be carried out.

Chapter 9

Enrichment Efforts: Capacity Building Workshops

The Delhi Zoo have played a pivotal role in sensitizing the visitors by creating awareness about the importance and conservation of wildlife by way of maintaining healthy animals in near natural environmental conditions. The Zoo also organizes various awareness programmes and campaigns for different masses of the city on the importance of animals and their ecological role.

Further, the overall management of the any zoo is carried out successfully by the efforts of a dedicated team consisting of various officers, officials and staff members at various levels. On such staff member who plays a crucial role in the welfare of animals at zoo is the Zoo Keepers also known as Animal Keepers. In any Zoo, an animal keeper plays an important role in upkeep and healthcare of the animal i.e. the overall management of zoo animals. They are the one who knows the animal more closely than anyone else in the zoo and are therefore considered as the main pillar of animal husbandry and management practices at zoo. Apart from that, the Keepers also helps in disseminating the message of importance and conservation of animals among the zoo visitors by way of keeping the animals healthy which in turn display their natural behaviour, by means of keeper's talk or may be through interaction by the visitors etc.

Besides, in order to introduce to the world of latest animal management techniques/research and to upgrade the knowledge of the Zoo personnel, the Zoo from time to time encourage their officials working at various levels to participate in various workshops, conferences and training programmes. Therefore, the regular up-brushing of the knowledge of especially at keeper level with regard to the latest zoo animal keeping and its related aspects for managing animals in a better way is of utmost importance so that the keepers may perform their roles and duties more efficiently and professionally.

In this regard, the National Zoological Park, New Delhi for the first time since its inception has thought of organizing an in-house training programme for their Zoo keepers. A total of four training programmes/workshops was organized (i.e. in four phases) for both the Zoo Keepers and the Animal Attendants working in the Animal section as an Assistant Keepers i.e. an Orientation programme for Animal Attendants and Refresher programme for Zoo Keepers.

The workshop organized was a kind of field interaction and knowledge sharing session followed by group activities. The theme of the programme was "FEED, HEALTHCARE, HYGIENE AND ENRICHMENT FOR ANIMALS". Further, due to the prevailing conditions of the COVID-19, the programme was conducted near the respective Animal beats involving minimum number of participants in each of the four workshops by following precautionary measures with respect to COVID-19.

The workshops organized were mainly focused on Aves, Reptiles, Primates and Herbivores. Attempt has been made to sensitize the Zoo Keepers and Animal Attendants about the animal welfare, upkeep & healthcare of the animals, Hygiene & Sanitation, Enrichment & its importance, roles & duties of the Zoo Keepers etc. During the workshops, hands-on training on the different types of enrichment has been carried out and the participants of the workshop were also engaged in enrichment related group activities.

The Glimpses of all the four Workshops is as below:

Plate 163 Director, National Zoological Park interacting with the participants of the Workshop on Aves

Plate 164

Participants attending the workshop on Aves

Plate 165

Participants listening to the speaker of the workshop on Aves

Plate 166

Participants taking part in the discussion

Plate 167

Group I activity in progress:
Enrichment of enclosure for Birds

Plate 168

Group II activity in progress:
Enrichment of enclosure for Birds

Plate 169

Group III activity in progress:
Enrichment of enclosure for Birds

Plate 170

Introducing nest box, swing, basket with nesting material, trees etc. in the enclosure carried out by participants during group activities (enrichment) for Birds

Plate 171

Providing perches and fruiting trees as a means of enrichment by participants during group activities for Birds

Plate 172

Introducing fruiting trees/plants, swings, baskets as an enrichment for Birds

Plate 173

Participants of the workshop on primates and reptiles

Plate 174

Participants discussing about the animal upkeep and healthcare

Plate 175

Keeper's Talk on Snakes

Plate 176

Director, National Zoological Park interacting with the participants

Plate 177

Group Activity: Enrichment of Baboon enclosure in progress

Plate 178

Participants introducing logs during group activity of enrichment

Plate 179

Participants introducing logs and ropes during group activity of enrichment

Plate 180 Participants preparing huts through paddy straw and bamboo during group activity of enrichment

Plate 181 Baboon enclosure after enrichment by participants

Plate 182 Reptile enclosure after enrichment by participants

Plate 183 Enrichment material provided during workshop

Plate 184 Director, National Zoological Park interacting with the participants

Plate 185 Interactive session during the workshop

Plate 186 Zoo Ranger interacting with the participants

Plate 187 Assistant Veterinary Officer interacting with the participants

Plate 188 Group Activity: Enrichment of Bonnet Macaque enclosure in progress

Plate 189 Group Activity: Enrichment of Bonnet Macaque enclosure in progress

Plate 190 Group Activity: Enrichment of Bonnet Macaque enclosure in progress

Plate 191
Bonnet Macaque enclosure after enrichment by participants

Plate 192
Bonnet Macaque enclosure before enrichment

Plate 193
Post-enrichment Hyena enclosure

Plate 194
Director, National Zoological Park interacting with the participants

Plate 195
Participants during the workshop

Plate 196 Participants doing enrichment in enclosure

Participants doing enrichment in enclosure Plate 197

Plate 198 Participants doing enrichment in enclosure

Participants doing enrichment in enclosure Plate 199

The National Zoological Park, New Delhi hopes that this kind of interactive sessions, field discussions and organization of hands on training for zoo keepers and Animal Attendants on different aspects of husbandry and management of animals including Enrichment aspects from time to time (on regular basis) will definitely enhance the Zoo Keepers knowledge about the Animal Feed & Nutrition, Upkeep & Healthcare, Hygiene & Sanitation and Importance of different types of enrichment for animals in zoo. The same will also motivates them to work with more dedication in the area of Animal Welfare and Conservation Education.

Chapter 10 Impact of Enrichment Efforts

10.1 Feedback Analaysis

The National Zoological Park, New Delhi organised the In-house Orientation and Refresher Workshop in four phases for the Zoo Keepers and Animal Attendants on the feed, healthcare and enrichment of captive animals. During the workshop, the Zoo Keepers and Animal Attendants were also given hands-on training on the basic enrichment practices and were given group exercises on the animal enclosure enrichment.

Through the workshop, the National Zoological Park, New Delhi tried to up-brush the knowledge of the participants regarding the feed, health, hygiene aspects of the animals and also the basics about the enrichment and encouraged participants to work in the area of animal welfare and practice enrichment for the animals regularly.

The Workshop was concentrated at the level of Zoo Keepers as they are responsible for the upkeep and health care of animals in captivity which includes feeding, maintaining cleanliness in and around the enclosures, making behavioural observation, record keeping everything on the day to day basis, exhibit maintenance and, providing different types of enrichment for the animals under their care etc.

After the successful completion of the workshop, an attempt was made to assess the perception of Zoo Keepers and Animal Attendants about the knowledge and experience they gained during the workshop. For this purpose, a simplified feedback form consisting of questionnaires regarding the content of the workshop, discussion, enrichment activities conducted etc. were circulated among the participants (Zoo Keepers and Animal Attendants). Such information is necessary for the Zoo Authorities to known about the level of understanding gained by the Zoo Keepers and Animal Attendants with the help of in-house workshops, their views and suggestions. This will also help in organising such type of workshops in near future for the employees of other departments as well.

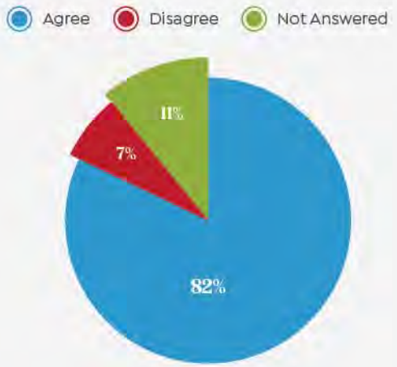
Feedback form prepared in English and was translated in Hindi for the participants and was accordingly distributed among the Zoo Keepers and Animal Attendants. The feedback form consist of three types of questions (a) open questions i.e. participant's opinion in the form of scoring, (b) closed questions i.e. yes or no and (c) multiple choice questions i.e. suitable choice options.

When asked about whether the workshop was informative and useful to them, 86% of the respondents strongly agreed that the workshop was very informative and useful. Shown in Figure 1.

Figure 1: Workshop was informative and useful?

This indicates that the majority of participants found that the awareness and information disseminated through the workshop is useful for them. Further, with regard to the question regarding understanding the objectives of the workshop, 82% strongly agreed that they understood the workshop objectives, the results shown in Figure 2.

Figure 2: Objectives of the workshop was understandable?

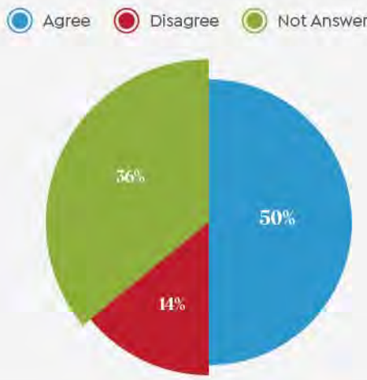


Similarly, when asked about the effectiveness in discussing and explaining the topics, knowledge gained during the discussion/interactive session, the concerns/issues raised by the participants taken into account, whether gained good insight into animal welfare and keeper's role, whether workshop introduced them to the new level of animal upkeep and healthcare, able to understand the need and importance of enrichment and learned about enclosure enrichment during group activities then similar results has been obtained i.e. 82% of the participants agreed on the same, 7% disagree and 11% not answered.

This shows that the participants of the workshop understood the objectives and content of the workshop and are able to gain insight into the Keeper's role, animal welfare and importance & need of animal enclosure enrichment.

Besides, when asked upon that whether after the workshop, they have planned enrichment for the animals under their animal beats then 50 % of the participants agreed that they have planned the enrichment in the animal enclosures where they have been working, whereas 36% not answered the question and only 14% disagreed. The results are shown in Figure 3.

Figure 3: After the workshop, planned enrichment for the animals



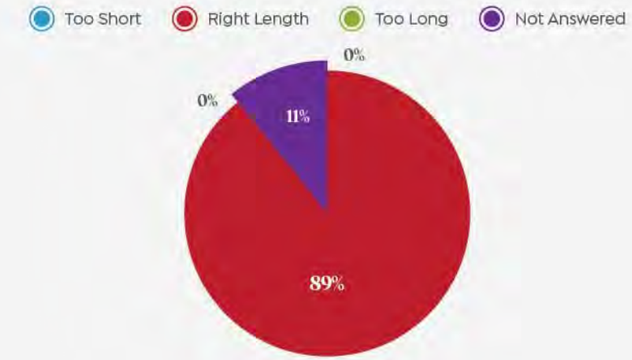
The results indicated that atleast 50% of the participants initiated planning enrichment work in the animal enclosure/beats where they are working and the workshop has motivated them in the area of animal welfare.

When the participants of the workshop were asked that whether after the workshop, they have implemented enrichment for the animals under their animal beats, then 53% of the participants agreed with that, 36% preferred not answering the question and only 11 % disagree that they have not implemented the enrichment for animals after workshop. The results of the same are shown in Figure 4.

Figure 4: After the workshop, have started implementing enrichment for the animals

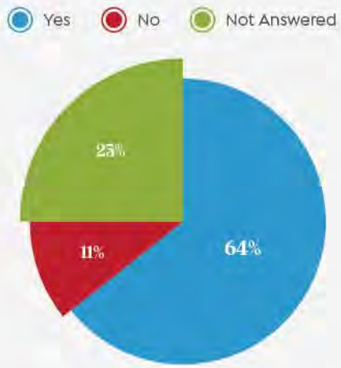
The participants of the workshop were asked about whether the duration of the workshop was too short or right length or too long, then majority of the participants i.e. 89% responded that the duration of the workshop was of right length while 11% preferred not answering the question. The results are shown in Figure 5.

Figure 5: Duration of the workshop



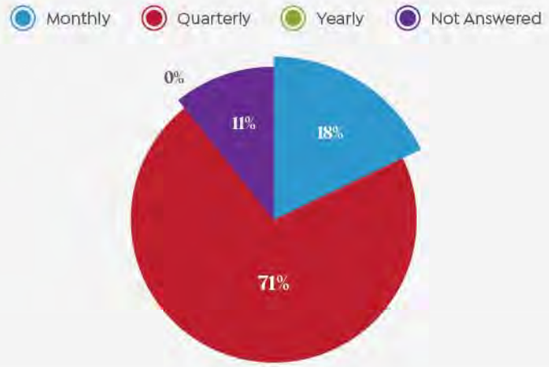
Further, when asked about whether such type of workshops should be organized from time to time, then 64% of the participants responded Yes. The results are shown in Figure 6.

Figure 6: Workshop should be organized from time to time



When asked about what should be the frequency of such kind of in-house workshops then 71% of the participants responded that it should be quarterly, 18% responded that it should be monthly while 11% preferred not answering the question. The results also show that none of the participant preferred organizing the in-house workshop on yearly basis. The same is depicted in Figure no. 7.

Figure 7: Frequency of such workshops



The participants were also asked about what they liked and disliked the most in the workshop. Some of the participants mentioned that they liked the most about the workshop was providing playing material to the animals in the form of enrichment, about importance of hygiene and sanitation for animals, about using waste material for enrichment, about enrichment work carried out for birds, releasing animals early morning in the enclosure etc. The participants not answered about their disliking. Further, following are the suggestions given by the participants:

- → Providing more enrichment materials for playing of animals.
- → Elephant may be provided tyre for playing.
- → Live fishes may be provided to Crocodiles as feeding enrichment.
- → Live chicks may be provided to owls as feeding enrichment.
- → Perches may be provided to birds.
- → Sprouted feed may be grown in trays and may be provided to the birds.
- → Sunflower may be planted inside the Parakeet enclosures.
- → Hessain bags filled with feed may be provided to the birds.
- → Fruits may be hanged in the enclosure of birds.
- → The fruiting plants available inside the zoo premises may be used as feed for the birds on seasonal basis.
- → Baskets may be hanged in the enclosures of birds
- → All Animal related work may be carried out as a team.

The feedback given by the participants has been a pioneer source for the Zoo management in various aspects. It has provided the data on the opinion and experience gained by the Zoo Keepers and Animal Attendants regarding captive animals, their feed, health issues, enrichment, role & duties of Zoo keepers and Attendants through the in-house workshop. It also showed that majority of the participants got motivated in planning and implementing enrichment in the animal enclosures which is one of the purposes of the workshop. Further, the participants were keen that such kind of in-house orientation and refresher workshop should be organised on quarterly as well as monthly basis. Besides, the group activities on enrichment during the workshop also helped in bridging the gap between their knowledge and practical experiences and helped them to understand the importance of team efforts in the area of animal welfare.

This shows that the National Zoological Park, New Delhi should organize such kind of in-house workshops for the Zoo Keepers and Animal Attendants on various animal aspects from time to time so that the formal or informal education regarding the zoos, its animals, importance of conservations, animal healthcare etc. should be provided to them. Provision of Hands-on training may also be included with easy to read and understandable reading material (may be in pictorial form). As the Zoo Keepers and Animal Attendants are only the ones who work very closely with the zoo animals, therefore regular up-brushing their knowledge about the animals and the information regarding the latest technological use for maintaining the animals in captivity from time to time is of utmost importance.

10.2 Glimpses of The Enrichment Efforts Made by Zoo Keepers and Animal Attendants after The Workshop

During the three months duration a lot of changes in the animal enclosures has been witnessed especially after the four phased in-house workshop. The Zoo Keepers and Animal Attendants took keen interest and started planning and implementing the enrichment in the animal enclosures in various forms. Following gives glimpses of the efforts made by them in their respective animals/ animal beats:

Beat no. 3: Enrichment for Civets and Blackbuck

In beat no. 3, Sh. Ram Manohar, Zoo Keeper and Sh. Ashok, Animal Attendant has made efforts in providing enrichment to the Civets and Blackbucks housed in animal beat, under their care.

Plate 200 Enrichment in Civet enclosure

Plate 201
Enrichment carried out in Civet enclosure

Plate 202
Feeding enrichment for Blackbucks (by hanging of fodder)

Plate 203
Sh. Ram Manohar, Zoo Keeper and
Sh. Ashok, Attendant

Plate 204
Team providing enrichment (Beat no. 3)

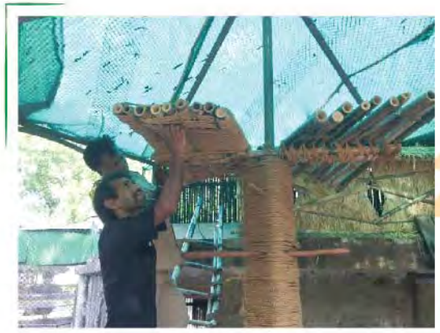


Plate 205
Team providing enrichment (Beat no. 3)

Beat no. 4: Enrichment for Sloth bear

In beat no. 4, Sh. Ram Samojh, Animal Attendant has made efforts in providing enrichment to the Sloth bear housed in animal beat under his care.

Plate 206 Feeding enrichment for Sloth Bear (by giving ice block)

Plate 207 Feeding enrichment for Himalayan Black Bear (by giving bamboo feeder)

Beat no. 7: Enrichment for Indian Cobra and Indian Rock Python

In beat no. 7, Sh. Vinod Nath, Zoo Keeper and Sh. Rahul, Animal Attendant has made efforts in providing enrichment to the Indian Cobra and Indian Rock Python housed in animal beat under their care.

Plate 208 Enrichment carried out in Indian Cobra (providing dead circular shaped tree barks)

Plate 209 Sh. Vinod Nath, Zoo Keeper, Reptile House

Plate 210 Keeper providing enrichment in Python enclosure (Beat no. 7)

Plate 211 Keeper providing enrichment in Python enclosure (Beat no. 7)

Beat no. 17: Enrichment for Asiatic lion

In beat no. 17, Sh. Ram Kesh, Zoo Keeper and Sh. Anil, Animal Attendant has made efforts in providing enrichment to the Asiatic lion housed in animal beat under their care.

Plate 212 Enrichment carried out in Asiatic Lion (providing hanging Hessian bag filled with paddy straw for activity)

Beat no. 19: Enrichment for Birds

In beat no. 19, Sh. Suresh Tripathi, Zoo Keeper; Sh. Tirath Raj, Animal Attendant and Sh. Sanjay, Animal Attendant has made efforts in providing enrichment to the Birds housed in animal beat under their care.

Swing and baskets introduced in Parakeet enclosure Plate 213

Plate 214 Hanging baskets and bamboo swings introduced in Parakeet enclosure

Plate 215 Feeding enrichment carried out in Pheasants (providing wheat/barely sown in soil)

Feeding enrichment for Parakeets (by hanging feed) Plate 216

Plate 217 Providing more perching areas

Sh. Suresh Tripathi, Zoo Keeper; Sh. Tirath Raj, Attendant and Sh. Sanjay, Attendant (Beat no. 19)

Plate 218

Beat no. 20: Enrichment for Birds

In beat no. 20, Sh. Ramesh, Zoo Keeper and Sh. Krishna, Animal Attendant has made efforts in providing enrichment to the Birds housed in animal beat under their care.

Plate 219 Enrichment carried out in Macaw enclosure (planting trees and providing baskets with nesting material)

Enrichment carried out in Macaw enclosure (planting trees and providing baskets with nesting material)

Plate 220

Plate 221
Enrichment for Grey Parrot (providing bamboo swings)

Plate 222
Enrichment in finches (providing nesting material)

Chapter 11 Conclusion & Recommendations

The efforts made in providing different kinds of enrichment in various species of animals housed at National Zoological Park, New Delhi revealed that Environment Enrichment performed into the enclosures of various species has positively affected the behaviour of animals and the animals has been shown interest in the enrichment artefacts and used the enrichment provided. In other words, the animals interacted with even small enrichment given to them and it makes animal physically active. Witnessing animals using even the simplest enrichment provided was really motivating as during the work only the locally avaiable materials was used as enrichment for the animals.

This shows that such kind of enrichment should be provided on regular basis to the zoo animals. A zoo enriched in all aspects provides a kind of environment to its animals which resembles their natural habitat and helps them perfom their natural instinct behaviour and activities. Besides this, the enriched enclosure may also helps in keeping the animals healthy which in turn attracts more visitors and thereby also adds to main moto of Conservation Education through Animal Welfare.

On the other hand, organisation of In-house workshops for the Zoo Keepers and Animal Attendants also revealed that the similar kind of in-house workshops, capacity building trainings, hands-on trainings etc. plays an important role in regularly adding to their knowledge. These kinds of workshops also works as a motivational source for them as during the workshop they took keen interests in the topics discussed and took part in the interactive sessions and also talked about the changes they needed for the animal's diet, enclosure etc.

Further, after the workshops a drastic change in the way of their daily tasks and performance has been noticed and the Zoo Keepers and Animal Attendants have seen taking interests by way of planning and implementing enrichment in the animal enclosures. The Zoo Keepers and Animal Attendants were even noticed taking part in the enclosure enrichment carried out in their nearby animal beats and worked as a team i.e. a sense of working as a team has also been developed among the Zoo Keepers and Animal Attendants so that they work effectively in the area of Animal welfare collectively.

Therefore, the efforts made at the National Zoological Park, New Delhi during three months of time proved to be enriching both for the animals and the team members involved. The work also proved to be motivating, encouraging as well as satisfying for the Team Members, Zoo Keepers and Animal Attendants.

Therefore, the enrichment efforts done recommends that the species specific enrichment plan

should be made and implemented for the captive animals. A more scientific and long term behaviour study may be carried out for the selected animals with regard to the different types of Environment Enrichment. Besides, the enrichment provided may be regularly changed i.e. Enrichment devices and strategies need to be presented on a varied schedule and in a variety of context so that animal do not get habitual and bored of it.

With regard to the Capacity building workshops, the Zoo keepers, Animal Attendants and other Zoo Staff should be provided with regular training and workshops on species-specific behaviours, enrichment and other aspects of zoo management. Zoo keepers may also be trained to give formal instructions and briefing about the animals under their care and be able to deliver Keeper's Talk from time to time. The Zoo may also work on the challenges, key problem areas and may work in the area of evaluating the status of each animal enclosure with respect to animal health, feed, behaviour, hygiene, sanitation, research, education, keeper's role and overall zoo maintenance and management.

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