



ex-situ

UPDATES



Central Zoo Authority
केन्द्रीय विज्ञानाध्यक्ष प्राधिकरण



Ministry of Environment, Forest
and Climate Change

The quarterly newsletter of
the Central Zoo Authority, New Delhi

Double Edition

Vol 4 | Issue 2 & Vol 4 Issue 3
(April - September 2022)

Lesser known taxa in Indian zoos



Back to the wild

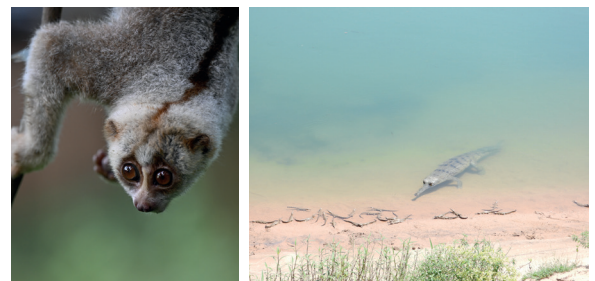


ROTTERDAM ZOO, NETHERLANDS | NAGALAND ZOOLOGICAL PARK | BANNERGHATTA BIOLOGICAL PARK

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PREVIOUS EDITIONS



Cover Photo Credits:

Bengal Slow Loris - Dr Sanjay Kumar Shukla

Gharial - Nandankanan Zoological Park, Bhubaneswar

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Dr Sanjay Kumar Shukla, IFS

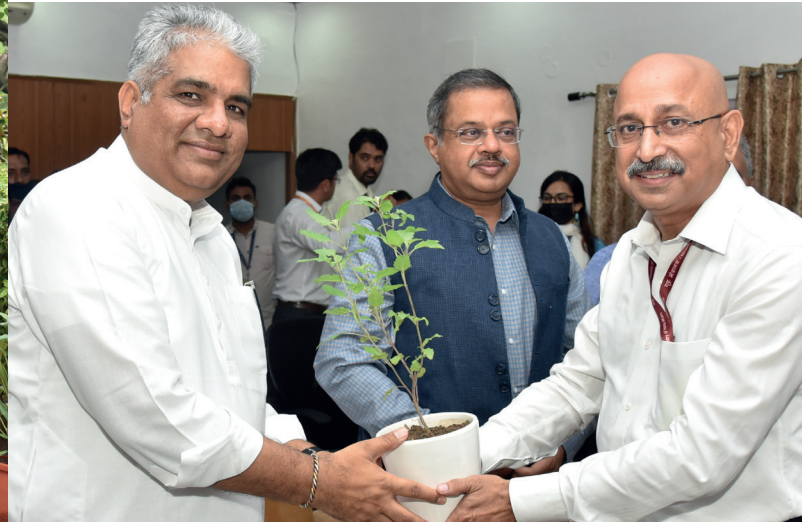
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From the desk of the MEMBER SECRETARY

Time and again we visit the history of zoos, mainly to remind ourselves how far we have come. Not too long ago, zoos were merely large collections of animals for entertainment of the masses. Nowadays, with wildlife documentaries and wider opportunities for travel, there is a growing awareness of ethical and animal welfare issues. Zoos have thus repositioned themselves as places for research, conservation (for example through breeding programs for endangered species) and education. Modern zoos strive to educate visitors about zoo animals and their wild counterparts and species conservation needs while fostering an appreciation for wildlife in general.

However, the animals most in need of protection and breeding are not always the most “charismatic”. Zoos must consciously traverse the thin line to meet diverse species conservation needs while fulfilling the social and ethical obligations to be economically viable centres of both wildlife conservation and education.

Zoos in India house a variety of species, some of these are elusive like the Indian Pangolin, the Honey Badger, the Pygmy Slow Loris and the Asian Giant Tortoise.

These species and many more such are often less studied even in the wild due to their unique natural history traits. Zoos thus have the potential to be excellent

locations to develop, implement, complement and complete scientific research. Zoo populations can enable hypothesis-driven questions to be answered on species/topics that would be challenging in the wild.

Our efforts don't end here, as zoos are striving to successfully breed conservation-priority species in captivity and release them back into their natural habitats. Species like the Red Panda, the Western Tragopan, the Cheer Pheasant, and the Chevrotain are our stories of success and great pride. In this double issue, we focus on some animals, that often take “second place” in popularity ratings but are critical to ecosystems and habitats ranging from 7000 feet above sea level in the forests of Singalila National Park to the Eastern Ghats.

We hope that this strong quote from the Codex Bellum Series by Brian S Wood, “Action does not get one to the destination, action is the destination” continues to inspire zoos to persist in their efforts to focus critical attention on bringing limelight to all species and fulfilling the conservation priorities for the species alike.

Sanjay Kumar Shukla
Member Secretary
Central Zoo Authority

NEWS & EVENTS

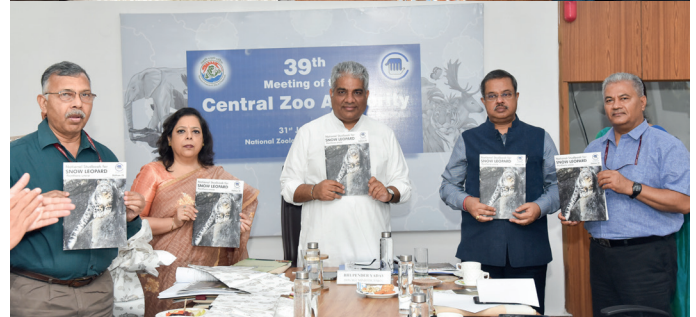
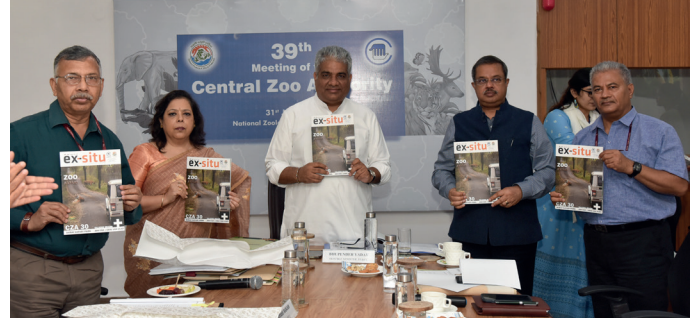
39TH MEETING OF THE CZA

July 31, 2022

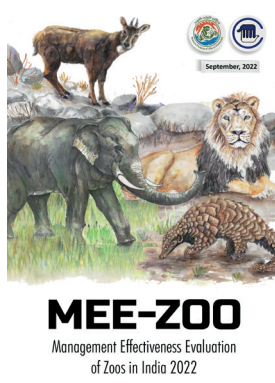
The 39th Meeting of the Central Zoo Authority was held on July 31, 2022 under the chairmanship of the Union Minister of Environment, Forest and Climate Change, Shri Bhupender Yadav at National Zoological Park, New Delhi.

Officials of the MoEF&CC including, Ms Leena Nandan, Secretary; Shri Chandra Prakash Goyal, Director General Forest & Special Secretary; Dr S. P. Yadav, Director, Wildlife Institute of India; Shri Bivash Ranjan, Additional Director General (Wild Life); Shri Pravir Pandey, Additional Secretary & Financial Advisor; Representatives of Indian Veterinary Research Institute and School of Planning and Architecture and other members attended the meeting.

Two publications were released-National Studbook for Snow Leopard and the CZA quarterly newsletter, Ex-situ Updates.



PUBLICATIONS



NATIONAL CONFERENCE FOR ZOO DIRECTORS

SEPTEMBER 10 & 11, 2022

A Two day National conference for Zoo Directors was organized with Nandankanan Zoological Park, Bhubaneswar, Odisha on September 10-11, 2022 with a focus on strengthening the ex-situ conservation network & building national capacity to achieve Vision Plan 2021-2031 targets.

The Conference was inaugurated by HMEFCC Shri Bhupender Yadav, Hon'ble Minister of State Shri Ashwini Kumar Choubey, Hon'ble State Minister for Odisha Shri Pradip Kumar Amat, Hon'ble Member of Parliament - Odisha Constituency Smt. Aprajita Sarangi, Additional Chief Secretary, Forest, Environment and Climate Change, Govt of Odisha, Shri Satyabrata Sahuji, PCCF & Hoff, Govt of Odisha, Shri Debidutta Biswal, PCCF & CWLW, Govt of Odisha. Shri Sushil Kumar Popli.



At the inaugural MEE-ZOO, Field guide for rehabilitation of Indian Pangolin (2nd edition) & Azadi ka Amrit Mahotsav, Conservation to Coexistence: The People Connect Compendium Volume II & video were released by Hon'ble Minister Shri Bhupender Yadav & the esteemed dignitaries.

The valedictory session of the two-day National Conference for Zoo directors was graced by Hon'ble State Minister Shri Pradip Kumar Amat, PCCF & Hoff, Government of Odisha, Shri Debidutta Biswal, PCCF & CWLW, Government of Odisha, Shri Sushil Kumar Popli.

INTERNATIONAL CONFERENCE FOR REPRODUCTIVE BIOLOGY AND COMPARATIVE ENDOCRINOLOGY

SEPTEMBER 14 to 16, 2022

This conference brought together experts, researchers, and students who have worked in the areas of reproductive sciences, vertebrate endocrinology, and fertility control amongst others in the health and welfare of animals and humans. Veterinarians and Biologists

from the 15 vision plan zoos participated in the interactive scientific sessions.

BIO-BANKING FOR CONSERVATION OF ENDANGERED SPECIES IN INDIAN ZOOS

SEPTEMBER 17, 2022

The Central Zoo Authority in collaboration with Centre For Cellular And Molecular Biology - CSIR, organized a one day workshop on "Bio-banking for conservation of Endangered Species in Indian zoos" for zoo veterinarians & biologists at LaCONES, Hyderabad.





West Zone Zoo Directors



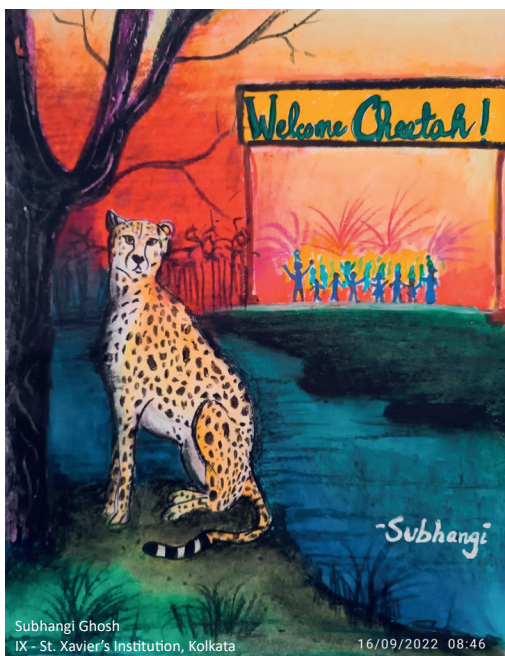
East & North-east Zone Zoo Directors



South Zone Zoo Directors



Speakers of the Zoo Directors Conference

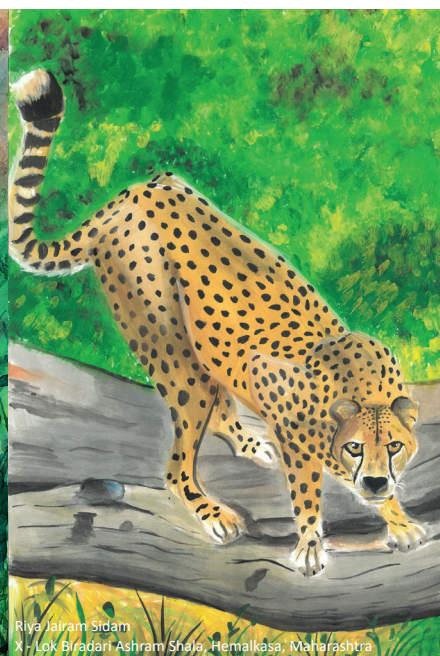


Subhangi Ghosh
IX - St. Xavier's Institution, Kolkata

16/09/2022 08:46



Deepshikha De
VIII - DPS Noida, Uttar Pradesh



Riya Jairam Sidam
X - Lok Biradari Ashram Shala, Hemalkasa, Maharashtra



Aleena. A. P
IX - Carmel Girls Hr. Sec. School, Thiruvananthapuram, Kerala



Veera Dhiraj Kadam
IV - SeMS Satara city, Maharashtra

CHEETAH REINTRODUCTION

SEPTEMBER 17, 2022

On the occasion of reintroduction of Cheetah in India on 17th September 2022, a Painting Competition was organized by the Central Zoo Authority. There were around 150 entries from students across India, from which Top 5 entries were awarded.

A talk was organized by CZA highlighting initiatives of the Government of India, "Cheetah Reintroduction in India" a flagship programme. These outreach activities were aimed at spreading awareness on re-establishing the wild population of the Cheetah in India.

Top 5 Winning entries

Subhangi Ghosh

IX - St. Xavier's Institution, Kolkata

Veera Dhiraj Kadam

IV - SeMS Satara city, Maharashtra

Deepshikha De

VIII - DPS Noida, Uttar Pradesh

Aleena. A. P

IX - Carmel Girls Hr. Sec. School, Thiruvananthapuram, Kerala

Riya Jairam Sidam

X - Lok Biradari Ashram Shala, Hemalkasa, Maharashtra

AZADI Ka Amrit Mahotsav

**Conservation to co-existence:
The People Connect**

April 1st – August 21st 2022



Compiled by:

Arundhati Mohanty

Senior Research Fellow, CZA.

Photos: Credit to the rightful owners for pictures used.

The outreach campaign, “Conservation to Co-existence: The People Connect” initiated by the Central Zoo Authority as part of the Azadi ka Amrit Mahotsav celebrations was aimed at creating awareness about the natural history of 75 conservation-priority species and 75 zoos across India. The campaign concluded on August 21, 2022.

Over the 75 weeks of the campaign, public engagement was taken up by the zoo in-focus every week with guided tours, cycle rallies, marathons, expert talks, awareness drives, and painting/sketching/poster/logo competitions achieving more than 3000 hours of outreach.

The ‘Know your species, Know your zoo’ talk organized by the CZA Secretariat every Wednesday covered 75 species of conservation priority across the 10 bio-geographic zones of India. 150 speakers (Species experts and officers in charge of zoos) delivered talks on the species’ biology, and their natural history along with information on the associated zoos.

The previous issues of the Ex situ Updates includes information on the talks held from week 1 to 55.

Himalayan Musk Deer (*Moschus leucogaster*) and Himalayan Nature Park, Kufri, Himachal Pradesh



The talk gave an overview of the unique species living in the higher altitudes. The deer gets its name because of the secretion of musk and uses this to mark territories and attract females. The talk covered species ecology, threats and ex situ management along with the infrastructural improvements and future vision of the zoo.

Dr. S. Sathyakumar,

Scientist-G, Wildlife Institute of India, Dehradun, Uttarakhand

Mr. Ravisankar IFS,

Officer in charge, Himalayan Nature Park, Himachal Pradesh

Week 56

Himalayan Monal (*Lophophorus impejanus*) and Nehru Pheasantry, Manali, Himachal Pradesh



The talk focused on the Monal, a pheasant native to Himalayan forests and shrublands living at elevations of 2,100–4,500 m (6,900–14,800 ft). It is the national bird of Nepal, and state bird of Uttarakhand, India. The species talk and the talk on the zoo covered aspects of the biology, behavior and the ex-situ conservation breeding.

Dr R. Suresh Kumar,

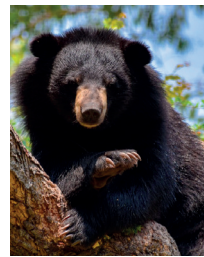
Scientist-E, Wildlife Institute of India, Dehradun, Uttarakhand

Mr. Chaman Lal Thakur,

Range Officer, Nehru Pheasantry, Manali, Himachal Pradesh

Week 57

Asiatic Black Bear (*Ursus thibetanus*) and Renuka Mini Zoo, Himachal Pradesh



The species talk covered the distribution and ecology of the species, including special dietary preferences that vary seasonally, and ethology traits. The zoo talk included the overview of the zoo activities, visitor engagement programs and future plans.

Dr. Nima Manjrekar,

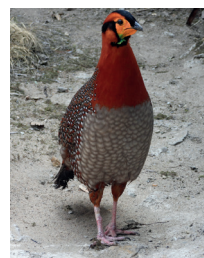
Wildlife Biologist

Mr. Ravisankar IFS,

Officer in charge, Renuka Mini Zoo, Himachal Pradesh

Week 58

Western Tragopan (*Tragopan melanocephalus*) and Sarahan Pheasantry, Sarahan, Himachal Pradesh



The talk covered the species biology and the special features of the ex-situ conservation breeding program and species reintroduction program.

Mr. Lakshminarasimha R,

Scientific Officer, Central Zoo Authority

Mr. Dharamveer Meena IFS,

Officer-in-charge, Sarahan Pheasantry, Himachal Pradesh

Week 59

Blue Sheep (*Pseudois nayaur*) and Himalayan Zoological Park, Sikkim



The talk discussed the species biology, and prey-predator dynamics in the distribution range of the species with an overview of the zoo and its conservation breeding programs.

Dr. Kulbhusansingh Suryawanshi,

Scientist, Nature Conservation Foundation, Bangalore

Mr. Sangay Gyatso Bhutia,

Director, Himalayan Zoological Park, Sikkim

Week 60

Himalayan Goral (*Naemorhedus goral*) and Dehradun Zoo, Dehradun, Uttarakhand



The talk discussed the ecology and conservation status of the species in focus along with the vision, activities undertaken, and efforts made by the zoo for ex-situ conservation of the species in focus.

Dr. Tapajit Bhattacharya,

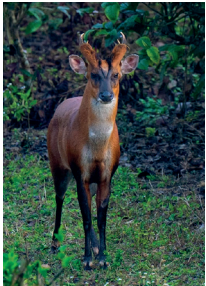
Assistant Professor, Durgapur Government College, West Bengal

Mr. Prasanna Patro,

Director, Dehradun Zoo, Dehradun, Uttarakhand

Week 61

Indian Muntjac (*Muntiacus muntjac*) and Pt. Govind Ballabh Pant High Altitude Zoo, Uttarakhand



The talk detailed the taxonomic complexities, genetics, and conservation challenges faced by the species with an overview of the zoo and the management interventions undertaken by a zoo specializing in species living in the higher altitudes.

Mr. Bhim Singh,

Research Fellow, Wildlife Institute of India, Dehradun

Dr. Himansu Pangti,

Senior Veterinary Officer, Pt. Govind Ballabh Pant High Altitude Zoo, Uttarakhand

Week 62

Hangul (*Cervus elaphus hanglu*) and Dept. of Wildlife Protection, UT of Jammu and Kashmir



The talk covered the initiatives undertaken for the conservation of the species under the Hangul Ecology Project, future conservation measures along with the initiatives taken up by the forest department for species preservation.

Dr. Khurshed Ahmad,

Senior Scientist & Head, Division of Wildlife Science, SKUAST-Kashmir

Mr. Intesar Suhail,

Regional Wildlife Warden, Dept. of Wildlife Protection, UT of Jammu and Kashmir

Week 63

Mugger (*Crocodylus palustris*) and Nawab Wajid Ali Shah Zoological Garden, Uttar Pradesh



The biology of the species, its conservation status, the current crocodile-human interaction scenarios, human-crocodile conflict and mitigation were discussed in the species talk. The talk on the zoo in focus gave an overview of the zoo's amenities especially for the specially-abled, and the conservation breeding programs.

Dr. B.C Choudhary,

Trustee and PI Aquatic Projects, Wildlife Trust of India

Mr. Ashok Kumar,

Director, Nawab Wajid Ali Shah Zoological Garden, Lucknow

Week 64

Sarus Crane (*Antigone antigone*) and Shaheed Ashfaq Ullah Khan Prani Udyan, Uttar Pradesh



The talk discussed the ecology of the species in-focus, its distribution, potential threats to its survival, and suggested conservation measures with an overview of the zoo.

Dr. Gopi Sunder,

Scientist, Seva Mandir, Rajasthan

Mr. H. Raja Mohan IFS,

Director, Shaheed Ashfaq Ullah Khan Prani Udyan, UP

Week 65

Red-crowned Roofed Turtle (*Batagur kachuga*) and Kanpur Zoological Park, Uttar Pradesh



The talk covered the status of the species in focus at key sites of its distribution along with the in-situ hatchery program and ex-situ conservation initiatives with an overview of the zoo and its animal welfare practices.

Dr. Shailendra Singh,

Director, Turtle Survival Alliance-India

Dr. Mohd. Nasir,

Veterinary Officer, Kanpur Zoological Park

Week 66

Gangetic River Dolphin (*Platanista gangetica*) and Sanjay Gandhi Biological Park, Bihar



The talk primarily discussed species biology and the national efforts being undertaken for its conservation in-situ with an overview of the features and future plans of the zoo.

Dr. Nachiket Kelkar,

Head, Riverine ecosystems and livelihoods program, Wildlife Conservation Trust

Mr. Satyajeet Kumar IFS,

Director, Sanjay Gandhi Biological Park, Patna

Week 67

Indian Grey Hornbill (*Ocyceros birostris*) and Marble Palace Zoo, West Bengal



The breeding biology, chronology, and factors influencing the reproductive success of the species in focus with an overview of the zoo were covered in the talk.

Dr. Raju Kasambe,

Scientist, Bombay Natural History Society, Mumbai

Dr. Tapendro Mullick,

Director, Marble Palace Zoo, Kolkata, West Bengal

Week 68

Lesser Adjutant Stork (*Leptoptilos javanicus*) and Jungle Mahal Zoological Park, West Bengal



The talk covered the ecology of the Greater and Lesser Adjutant stork and the community initiatives taken for its conservation within its distribution ranges with an overview of the zoo and its amenities.

Dr. Hilloljyoti Singha,

Professor & Head, Dept. of Zoology, Bodoland University, Assam

Mr. Partha Mukherjee,

Assistant Divisional officer, Jhargram Division

Week 69

Gharial (*Gavialis gangeticus*) and Rasikbeel Mini Zoo, West Bengal



The talk covered the unique biology, behavior, and migration of the species in focus being studied under the Gharial ecology project along with the history of the zoo and the practices employed to ensure the reproductive success of the captive Gharial population at the zoo.

Mr. Jailabdeen A.,

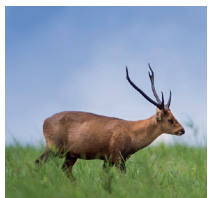
Project Coordinator, Gharial Ecology Project, MCBT

Ms. Angela Bhutia,

Officer in charge, Rasikbeel Mini Zoo

Week 70

Hog Deer (*Hyelaphus porcinus*) and Adina Deer Park, West Bengal



Week 71

The talk discussed the conservation status, ecology, and the impact of land use change on the distribution of the species in-focus with an overview of the zoo.

Dr. Alolika Sinha,
Conservation Biologist, Aaranyak
Mr. B. Siddhartha IFS,
Director, Adina Deer Park

Fishing Cat (*Prionailurus viverrinus*) and North Bengal Wild Animals Park

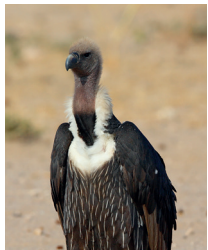


Week 72

The biology of the species in-focus, the role it plays in wetland ecosystems, and the management practices adopted by the zoo for animal welfare and sustainability were discussed.

Ms. Tiasha Adhya,
Co-founder, The Fishing Cat Project
Ms. Dawa Sangmu Sherpa,
Director, North Bengal Wild Animals Park

Vulture spp. (*Gyps spp.*) and Vulture Conservation and Breeding Centre, Haryana

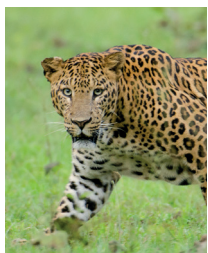


Week 73

Ecosystem services provided by the species in-focus, causes of decline in population, and the conservation efforts undertaken for the species both in-situ and ex-situ were covered in this talk.

Mr. Devinder Singh Dhadwal,
DFO, Assistant Project Director, KFW Project, H.P
Dr. Vibhu Prakash,
Officer in charge,
Vulture Conservation and Breeding Centre, Haryana

Leopard (*Panthera pardus*) and Lion Breeding Centre and Multiple Safari Park, Uttar Pradesh



Week 74

The talk discussed the biology and husbandry practices for captive populations of the species in-focus with an overview of the safari park animal welfare and management regime.

Dr. Devender Kumar,
Evaluation and Monitoring Officer, Central Zoo Authority
Mr. Kartik Dwivedi,
Education Officer, Lion Breeding Centre and Multiple Safari Park, Etawah

Great Indian Bustard (*Ardeotis nigricaps*) and National Zoological Park, New Delhi.



Week 75

The conservation challenges and safeguarding strategies for the species in-focus with an overview of the zoo, its management practices, and conservation breeding programs were covered in the talk.

Dr. Sutirtha Dutta,
Scientist-D, Wildlife Institute of India
Mr. Dharmdeo Rai IFS,
Director, National Zoological Park

In addition to the Know your species, Know your zoo talk, two more webinars were organized for the grand culmination of the Azadi ka Amrit Mahotsav talk series.

Day 1
Snow Leopard (*Panthera uncia*)



Week 75

The talk discussed the species' habitat, biology, and community initiatives undertaken for its conservation in India.

Dr. Yash Veer Bhatnagar,
Scientist, High Altitudes Program,
Nature Conservation Foundation

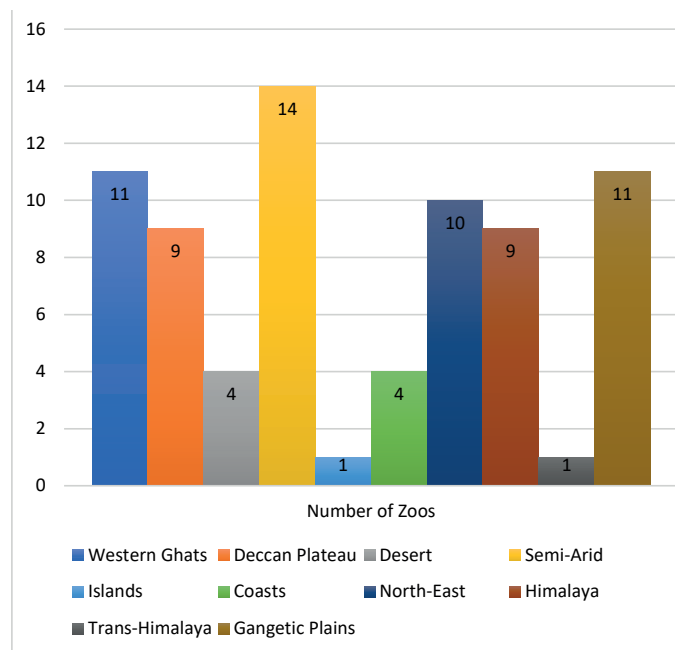
Day 2
Himalayan Newt (*Tylototriton verrucosus*)



Week 75

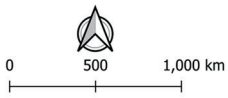
The talk covered the biology and conservation status of the Himalayan newt and other lesser-known amphibian species in India.

Dr. Karthikeyan Vasudevan,
Chief Scientist, CSIR-Centre for Cellular and Molecular Biology,
Hyderabad



The 10 bio-geographic zones of India were represented by 75 zoos and 75 species. Figure above, depicts the number of zoos in each zone that was showcased. Based on the 75 conservation priority species highlighted, the maximum representation was seen from zoos that were situated in the Semi-Arid biogeographic zone and the minimum was seen in the Trans-Himalaya and Islands.

The Map illustrates the 10 biogeographic zones and locations of the 75 zoos therein with the State/UT-wise representation.

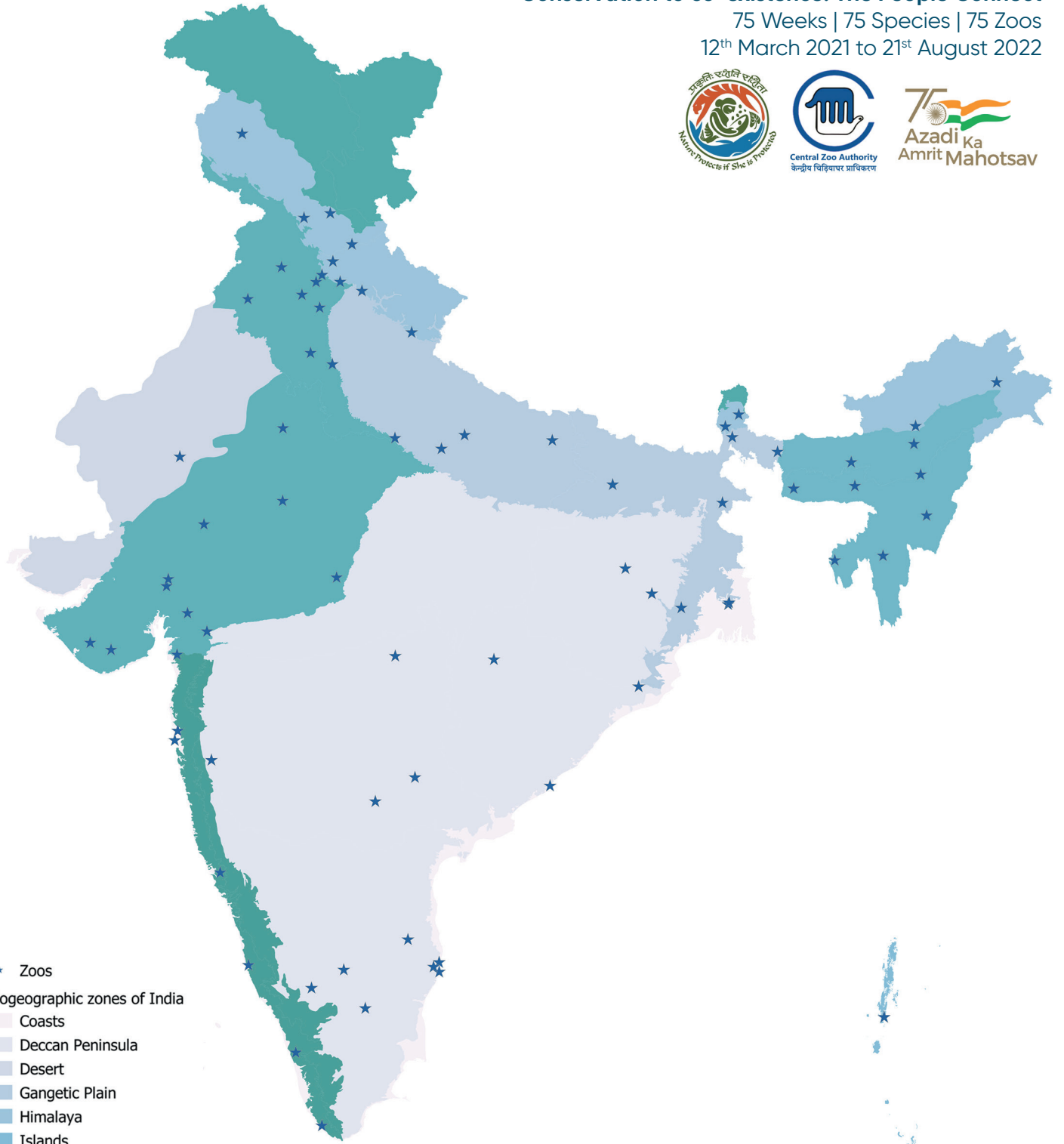


AZADI Ka Amrit Mahotsav

Conservation to co-existence: The People Connect

75 Weeks | 75 Species | 75 Zoos

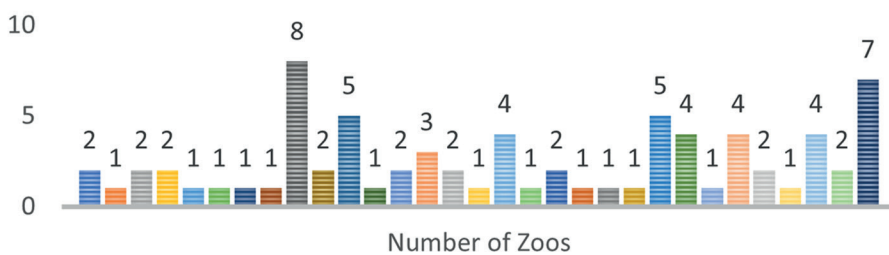
12th March 2021 to 21st August 2022



* Zoos

Biogeographic zones of India

- Coasts
- Deccan Peninsula
- Desert
- Gangetic Plain
- Himalaya
- Islands
- North-East
- Semi-Arid
- Trans-Himalaya
- Western Ghats



- Andhra Pradesh
- Assam
- Bihar
- Chhattisgarh
- Delhi
- Goa
- Gujarat
- Haryana
- Himachal Pradesh
- Jammu & Kashmir
- Jharkhand
- Karnataka
- Kerala
- Madhya Pradesh
- Maharashtra
- Manipur
- Meghalaya
- Mizoram
- Nagaland
- Nagaland
- Rajasthan
- Tamil Nadu
- Telangana
- Tripura
- Uttar Pradesh
- Uttarakhand
- West Bengal



Lesser Known Taxa in Zoos

Text:

Mr Lakshminarasimha R

Scientific Officer

Central Zoo Authority

It is often the case that large-bodied charismatic species such as Bengal Tiger (*Panthera tigris*), Sloth Bear (*Melursus ursinus*), Asiatic Lion (*Panthera leo*), Giraffe (*Giraffa camelopardalis*), Greater One-horned Rhino (*Rhinoceros unicornis*) are portrayed as flagship species in faunal conservation. Although fish and birds outnumber mammals, reptiles and amphibians, studies have shown that large-bodied mammals remain the main focus of animal collections in zoos.

One of the areas in which zoos play an important role is by improving our knowledge of species biology. They offer insights on behaviour, physiology and other aspects of the biology which are difficult to observe in the wild. This is especially important in the case of threatened and elusive species.

The overall focus of collections in Indian zoos still remains on charismatic mammals and birds, there is an increasing trend in targeting lesser-known taxa.

The Central Zoo Authority has identified 74 species of threatened native fauna for the planned conservation breeding programs. These breeding programs are aimed at establishing “insurance populations” in captivity which may have the potential of supporting species restoration efforts in the wild.



The planned breeding programs are ongoing for several species from the lesser-known taxa including several threatened species such as White-rumped Vulture (*Gyps bengalensis*), Western Tragopan (*Tragopan melanocephalus*), Nilgiri Langur (*Semnopithecus johnii*), Clouded Leopard (*Neofelis nebulosa*), Himalayan Newt (*Tylototriton verrucosus*), Red-crowned Roof Turtle (*Batagur kachuga*) and Four-horned Antelope (*Tetracerus quadricornis*).

The zoos holding collections of threatened lesser-known species are represented in the map on the right.



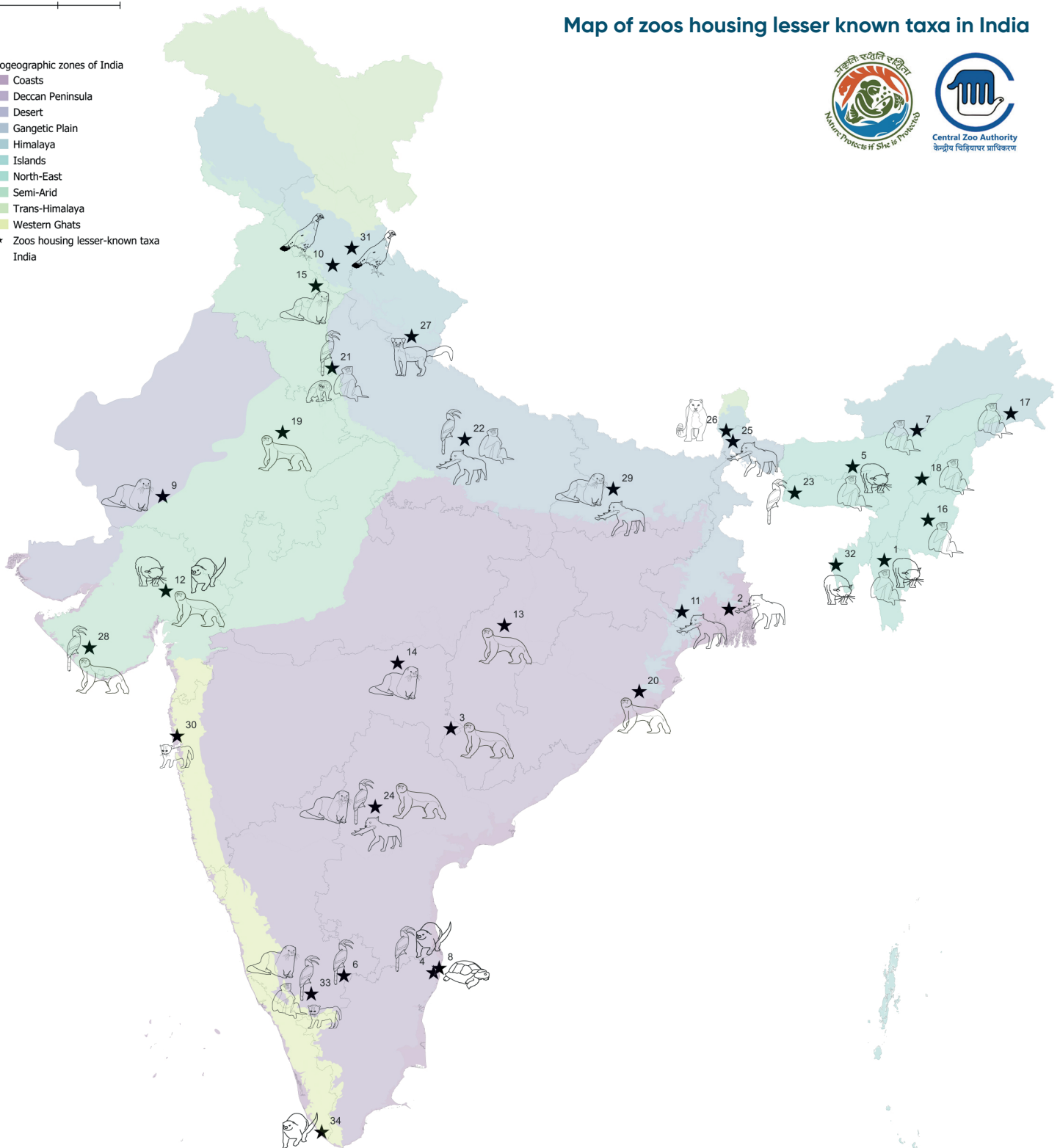
Lesser Known Taxa in Zoos

Map of zoos housing lesser known taxa in India



Biogeographic zones of India

- Coasts
- Deccan Peninsula
- Desert
- Gangetic Plain
- Himalaya
- Islands
- North-East
- Semi-Arid
- Trans-Himalaya
- Western Ghats
- ★ Zoos housing lesser-known taxa India



- | | | | |
|--|----------------------|--|------------------------|
| | Asian Brown Tortoise | | Pygmy Slow Loris |
| | Binturong | | Rusty-spotted Cat |
| | Eurasian Otter | | Smooth-coated Otter |
| | Fishing Cat | | Snow Leopard |
| | Great Hornbill | | Western Tragopan |
| | Honey Badger | | Yellow-throated Marten |
| | Hoolock Gibbon | | |

- | | | | |
|----|--|----|---|
| 1 | Aizawl Zoological Park, Lungverh | 18 | Nagaland Zoological Park, Rangapahar |
| 2 | Alipore Zoological Garden, Kolkata | 19 | Nahargarh Biological Park, Jaipur |
| 3 | Amtes Animal Ark, Hemalkasa | 20 | Nandankanan Biological Park, Bhubaneswar |
| 4 | Arignar Anna Zoological Park, Chennai | 21 | National Zoological Park, New Delhi |
| 5 | Assam State Zoo Cum Botanical Garden, Guwahati | 22 | Nawab Wazid Ali Shah Zoological Garden, Lucknow |
| 6 | Bannerghatta Biological Park, Bengaluru | 23 | Nehru Park Zoo, Tura |
| 7 | Biological Park, Itanagar | 24 | Nehru Zoological Park, Hyderabad |
| 8 | Chennai Snake Park, Guindy | 25 | North Bengal Wild Animals Park, Siliguri |
| 9 | Dr. Shyama Prasad Mukherjee Zoological Garden, Surat | 26 | Padmaja Naidu Himalayan Zoological Park, Darjeeling |
| 10 | Himalayan Nature Park, Kufri | 27 | Pt. Govind Ballabh Pant High Altitude Zoo, Nainital |
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SPECIES IN FOCUS

Fishing Cat

West Bengal Zoo Authority, Kolkata

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The Fishing Cat, *Prionailurus viverrinus* (Bennett, 1833) is one of the more charismatic felid species. They are found throughout South-East Asia; in India, Bangladesh, Bhutan, Sri Lanka, Indonesia, Malaysia and Java. Their presence has also been recently reported in Thailand, Cambodia and Nepal. In India, they are distributed in the Terai region, Rajasthan (Bharatpur), Western Ghats (Southern), West Bengal (Sunderbans), Odisha (Chilika Lake) and the Northeast region. They are considered umbrella species for wetland and marshland habitats. They predominantly inhabit swamps and marshy areas, mangroves, tidal creeks, reed beds, scrubland and dense jungles that are near water sources.

According to the Wild Life (Protection) Act, 1972, the Fishing Cat is included in Schedule I and is classified as 'Vulnerable' by the IUCN Red List for Endangered Species. The main causes of population decline are habitat fragmentation and degradation, poaching,



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retaliatory killing and road kills. In 2012, the Fishing cat was declared 'The State animal of West Bengal'. Given the threatened status of the species in the wild ex-situ conservation and captive breeding has received significant attention over the years.

The Garchumuk Deer Park, located in Howrah, West Bengal presently houses ten (3:7:0) Fishing Cats. The enclosure for the species is placed close to an artificial water source. The individuals rescued from human-dominated areas are brought here for primary veterinary care and rehabilitation.

Healthy individuals of the species that are kept for long-term care are included in the captive breeding programme after ensuring compatibility. The pairs are maintained in separate night shelters and individual behaviours are recorded in a standardised format to make informed management decisions for augmenting the program. For the identification of physically, genetically, and behaviorally healthy founders research programmes are being taken up with LaCONES/CCMB, Hyderabad, and Presidency University, Kolkata.

The first record of captive breeding in the zoo was between the months of July and September 2021. Two pairs of individuals gave birth to a litter of 2 and 4 kittens respectively, which are being monitored.

Fishing Cat husbandry involves all aspects related to diet, housing, health care, hygiene and sanitation of enclosures. As the exclusive Conservation Breeding Center for the species is under development. The zoo has additionally developed an enclosure with a paddock area of 496 sq.m. It additionally has, 2 kraals, a night shelter with 8 feeding/retiring cells, and other features that ensure adequate sunlight and ventilation.

CCTV cameras have been installed in each night shelter and in the paddock area to record ethograms. The individuals housed are fed fish and chicken which is near to their natural diet. The landscaping in the paddock area is done to create a near naturalistic habitat (similar to a wetland) inside the enclosure. The habitat is cultivated with tall reeds and grasses such as *Typha elephantina roxb*, *Saccharum spontaneum*, *Colocasia esculenta* etc. Besides, the area is also enriched with



© Fishing Cat Conservation Alliance

several shade trees such as *Vachellia nilotica*, *Mangifera indica*, *Citrus maxima* etc. Fish rearing is being taken up in a natural pond within the zoo premises to nurture natural behavior amongst the captive individuals.

The exhibit and off-display areas are cleaned with Kohrsolin to prevent disease and infection. Potassium permanganate solution is used in the foot bath and as a disinfectant for equipment. The water, feeder and litter are cleaned daily and Butox/Clinaris is sprayed monthly inside the enclosures. In muddy/marshy areas, calcium carbonate is sprinkled during the monsoon. Additionally, soil and water testing of the enclosure is done once a year to ensure optimal standards of care are maintained.

In an effort to prevent the spread of endoparasites, the Fishing Cats are dewormed three times a year. Twice a year, scat samples are sent to a lab for microbiological testing to identify harmful microbes and place detection and treatment protocols for health maintenance.

The individuals' social, biological, and reproductive behaviour, as well as their overall health, are documented in the keeper's diary. Daily reports, animal history cards, locally maintained studbooks, treatment cards, and nutritionist records are also maintained.

Conservation Outreach is another crucial component of this endeavour to begin captive breeding of this vulnerable species. Visitors are made aware of the key threats and mitigation measures that one can undertake through eye-catching signages. Information, Education and communication materials in print, audio-visual media and interactive displays (street plays, awareness rallies, seminars, webinars, quizzes, drawing competitions etc.) are also organized on the species in focus and associated flora and fauna from time to time.

Field research for the identification of suitable habitats for the future release of the captive-bred population in the wild in Howrah district is presently underway.







© David Raju

SPECIES IN FOCUS

INDIAN STAR TORTOISES

Arignar Anna Zoological Park, Chennai

Text & Photos:

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The Indian Star Tortoise, (*Geochelone elegans*) is found in dry deciduous and scrub thorn forest habitats of India, Sri Lanka and Pakistan (Smith 1963, Daniel 1992, Das 1995). This species is one of the many illegally traded wild animals and is smuggled to different countries, as a part of the pet trade or for preparation of traditional medicines.

An illegal consignment of 1073 star tortoises of different age classes were confiscated at Chennai Airport by the Directorate of Revenue Intelligence (DRI) department in September 2017 and transferred in three consignments

to the Arignar Anna Zoological Park for rehabilitation. These animals were housed in the quarantine area of AAZP adjacent to the Veterinary Hospital. The enclosure was made of chainlink on all sides and the top. A part of the top (roof) was covered with shade net.

The enclosure was enriched using hollow tree logs, small rocks and plants. The tortoises were initially fed twice a day (morning and evening) with carrot, greens, tomatoes, okra, beans, and pumpkin. Feed supplements like Ostocalcium syrup, Liv-52 liquid and vimeral liquid were also added to the food.

Potable water was provided in shallow plates at various points in the enclosure. Random, pooled fecal samples were collected weekly and checked for endoparasite loads. Based on the results deworming was done by mixing anthelmintic in the feed. A luke-warm water tip was given to avoid dehydration. The top layer of sand in the enclosure was removed once a month and new sand



Habitat and carrying star tortoises in basket



Star tortoise released by Veterinary Officer and Biologist



Marked star tortoises



Movement of released star tortoise

was provided to avoid infection.

Genetic identification of the Star tortoises for understanding distribution demographics was carried out at the Centre for Cellular and Molecular Biology, Hyderabad (CCMB). The results from CCMB, Hyderabad geotagged these individuals to the Southern Zone of India.

Since the individuals were fit for release into the wild. Rehabilitation and reintroduction into a suitable habitat as per distribution range was initiated. IUCN guidelines were followed where possible through the rehabilitation and translocation process.

As per the geotags, a survey was carried out on 9th March, 2020 in the Thirupattur divisions by the team of veterinarians and biologists of the zoo for the presence of Star tortoises. The survey also covered details of edible plants in the area, water sources, hiding places and suitability of the area for the releases. Based on

the results, in Thirupattur division, Metalam, Karapattu, Amburdurg, Yelagiri, Alangayam and Kavalur Reserve Forests were selected for release.

The diet fed in captivity was gradually replaced with different wild edible plants and their preference was observed. 400-star tortoises, marked blue on the carapace for identification and monitoring post release were transported to Thirupattur divisions by road. These marked individuals were released in 4 different locations except Yelagiri as per the order of Principal Chief Conservator of Forests & Chief Wildlife Warden of Tamil Nadu. A suitable sex ratio was maintained amongst the individuals identified for release to ensure population stability for the future. The staff of each Reserve was sensitized about the species and efforts to rehabilitate the remaining individuals is currently underway.



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SPECIES IN FOCUS

Birds of Prey - Owls

Zoological Garden, Thiruvananthapuram

Text:

Sangeetha Mohan

Curator Gr. II

Zoological Garden, Thiruvananthapuram

The Zoological Garden, Thiruvananthapuram, is among the oldest zoos in India and continues to operate from its original location as a tourist attraction for people visiting the temple city of Kerala. Since its establishment in 1859 by the Maharaja of Travancore, Uthram Thirunal Marthanda Varma, the zoo has steadily expanded its animal collection and visitor footfall.

Of the total exhibits in the zoo, a few nocturnal species are also housed. Of these, Owls are at the forefront.

Owls are intriguing birds that provide essential ecosystem services and easily capture one's attention.

They are the most widespread terrestrial bird species in the world with significant cultural influence. Carnivorous, their diet primarily comprised of rodents leading to the title "farmer friends" as they prevent crop loss. Though the majority of owls are nocturnal, many species hunt at dusk and dawn (crepuscular).

At present the Zoological Garden, Thiruvananthapuram houses 3 species of owls viz.

- Barn Owl (*Tyto alba*)
- Brown fish Owl (*Ketupa zeylonensis*)
- Spot Bellied Eagle Owl (*Bubo nipalensis*)



Four young barn owls at a nest in a barn. © John MarkhamRSPBImages

The owls are housed in near-natural enclosures with good ventilation. The enclosures are provided with attics that help reduce stress during day time. Nest boxes, perches, rocky masses, hollow wooden pieces, and water-filled basins are also provisioned within the enclosure for improving overall enrichment.

A healthy eating plan, developed by the zoo veterinarian based on physiological and seasonal needs is followed religiously. Calcium, an important mineral for maintaining reproductive needs, is supplemented through the diet.

Routine deworming using Pyrantel pamoate, Albendazole, Fenbendazole, and Praziquantel is done thrice after fecal microscopy. Vitamin supplements, liver tonic, and mineral mixture (readily made for caged birds) are provided occasionally based on their health profile. Ectoparasitic spray is done as and when required.

The Owls housed at the Zoo have also helped in the control of rodents on the island of Lakshadweep. The use of rodenticides had caused a decline in this bird of prey from the island. As a result of this decline, the

rodent population grew exponentially on the island causing significant damage to the coconut yield (a major income source).

Since, the islands house no other natural predators for rodents, the damage to the coconut yield and in turn the economy was significant. The inhabitants of the island practice organic farming as the use of chemicals/rodenticides were eliminated when Lakshadweep was declared as an Organic agricultural area under the Participatory Guarantee System. The Lakshadweep administration then formulated a pilot project on 'Biological Control of Rodents by using Barn Owls (*Tyto alba*) in Kavaratti island'.

As part of this pilot project, three healthy pairs of barn owls were transferred to the island of Kavaratti on 28.10.2018 from the Zoological Garden, Thiruvananthapuram. The selected individuals were microchipped, screened for parasites, dewormed, and quarantined prior to the transfer to Lakshadweep. Thiruvananthapuram and Lakshadweep have similar climatic conditions, aiding in the acclimatization of these individuals post-transfer. The owls were released



Stage 10: Releasing of owls from cage on 25th June 2019 by Shri Damodar A.T., IFS, Secretary (Agriculture) in presence of Dr. Abdul Gafoor V.M., Scientist KVK (CMFRI), Dr. B. Sabeer, Veterinary surgeon, E&F and Technical staff of Department of Agriculture.

gradually from the enclosures. The enclosures were also left open for food provisioning in the event that the released birds failed to catch prey.

Based on preliminary reports the three pairs of Barn Owls shifted to the Lakshadweep islands from Kerala in 2018 have proven helpful in controlling the rat population. The project has also created new hope for the Lakshadweep administration in managing the rodent menace on the island. Studies have shown that the population of Barn owls in Kavaratti is also on the rise with the hatching of several owlets.

The results of the first phase of the introduction of Barn owls in controlling rodent menace have renewed the hope of the Lakshadweep administration for the expansion of the project by recruiting more Barn owls for guarding the coconut plantations.

The facilitation provided by the Zoological Garden, Thiruvananthapuram for the introduction of Barn owls to the Lakshadweep islands is a fine example of how zoos can contribute towards captive breeding and reintroduction of wild species.





A barn owl in Thrissur, Kerala. The species is widespread in India but there is a lack of official data on barn owl distribution and population.
© Satheesan.vn/Wikimedia Commons.

Barn owls to play Tom to fight Jerry in Lakshadweep

Three pairs from Kerala 'recruited' to fight rodent menace on island

TIKI RAJWI
THIRUVANANTHAPURAM
With a thriving rat population playing havoc with its coconut yield, the Union Territory of Lakshadweep is turning to barn owls for help.

The scenic islands have 'recruited' three pairs of barn owls from Kerala to fight what has so far been a losing battle against the rodents. After a lengthy bureaucratic process that began in 2017, the winged hunters have now reached Kavaratti by ship. For the time being, the three males and three females are getting acclimatised in specially built cages. "They will gradually be released into the coconut plantations under a closely monitored breeding and rodent management programme," Damodhar A.T., Secretary, Environment and Agriculture, Lakshadweep Islands, said. According to the authorities, the owls were chosen from among healthy birds rescued by the Kerala Forest Department.

Biocontrol measure
The biocontrol measure is spearheaded by the Lakshadweep Administration, with the Krishi Vigyan Kendra (KVK) at Kavaratti providing the technical know-



how. Coconut is an important money-spinner for the islands, but the pesky rodents account for 30 to 40% of the yield loss. Total production stood at 8.76 crore nuts in 2017-18. However, employing owls to hunt down rats is not exactly a new idea for the islanders. "You could say we are witnessing a reintroduction of the birds. Even the British had made an attempt in the 19th century for rodent management," said Abdul Gafoor, subject matter specialist with the KVK.

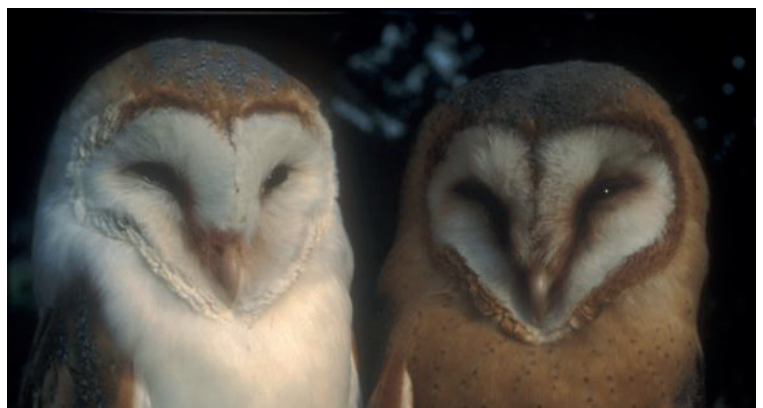
Past attempts
Similar attempts were reportedly made in the 1960s as well. "Again, it's not just about collecting a few birds and releasing them into the coconut plantations. It has to be a breeding programme. Also, these are birds in the scheduled list and need to be cared for as such," he said. Why barn owls? Why not other ac-

complished rat hunters like cats or rat snakes? The reason is that the rats in the Lakshadweep Islands practically live on treetops.

Why barn owls?

"The coconut palms here grow so close together that they resemble a jungle. The fronds overlap, allowing the rodents to move easily from one tree to another," Thamban C., Principal Scientist, Central Plantation Crops Research Institute (ICAR-CPCRI), Kasargod, said. Besides, the nocturnal barn owls are natural rat hunters, armed with a powerful auditory mechanism. There is also an important environmental angle to Lakshadweep's decision to choose biocontrol. The islands being a designated organic zone, use of chemicals for pest control is a strict no-no.

If successful, the barn owl campaign will be extended to other islands in Lakshadweep as well.



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ZOO IN Focus INDIA

NAGALAND ZOOLOGICAL PARK, RANGAPAHAR, DIMAPUR

Text & Photos:

Nagaland Zoological Park,
Rangapahar, Dimapur

The Nagaland Zoological Park was inaugurated on 28th August 2008 from the erstwhile Rangapahar Wildlife Sanctuary. The Park spans an area of 176 Ha and is located about 8 km from the commercial city, of Dimapur. At inception, 10 different species of wild animals, totaling 64 individuals were displayed. Today, the zoo is home to over 44 species, including 9 endangered species. The Nagaland Zoological Park forms a connect between the thousands of visitors that throng the zoo and the animals housed by providing a sneak-peek into the natural world.

The zoo also houses a rich diversity of plant species including fruit-bearing trees which attracts many species of birds. Planting of native species is also undertaken each year to increase tree cover and improve habitat quality. The zoo also hosts a high diversity of bird

and butterfly species apart from various free-ranging mammals such as the Barking Deer, Sambar, Spotted Deer, Leopard Cat, Monitor Lizard, etc. An abundance of free-ranging reptiles and amphibians are also spotted in the zoo.

As part of the zoo's efforts to save endangered species, conservation breeding programs for two threatened species viz. Asian Giant Tortoise (*Manouria emys*) and Blyth's Tragopan (*Tragopan blythii*) have been taken up.

The Asian Giant tortoise (*Manouria emys*) is a large tortoise found across the Northeastern states of India. This species has been wiped out from most of its distribution range in South Asian countries, with the last record from the wild in 2010 from Manipur. Threatened on a global scale, this species is hunted for bush meat as

well as for the pet market, not to mention the current populations being severely impacted by fragmented habitats, leading to its classification as “Critically Endangered” by IUCN. It is one of the few tortoise species that display parental care. Females build a nest with leaf mulch and routinely maintain the nest, unlike other chelonians that lay their eggs in nesting burrows and cease to visit the natal site again.

In collaboration with the Turtle Survival Alliance India (TSA-India) the zoo has successfully established an assurance colony, the largest in India for the species through a captive husbandry program. Under this long-term collaboration, the project team of TSA-India has provided the zoo staff with training and scientific expertise. The program entailed standardization of a wide range of nesting, breeding, and incubation variables. Twenty individuals hatched successfully in the zoo with the help of artificial incubation in the first year (2018). The survivability of the hatchlings, however, depends on various factors.

The team is now looking forward to releasing ten captive-bred juveniles tagged with Very High Frequency (VHF) transmitters and PIT tags in the Wokha district, Nagaland on a pilot basis during the end of 2022.

The other conservation breeding program taken up is for Blyth’s Tragopan (*Tragopan blythii spp. blythii*), the state bird of Nagaland. The Blyth’s Tragopan occurs in a restricted range across its distribution in Northeast India and is threatened by habitat loss, fragmentation, and hunting. The Nagaland zoological park is identified as the coordinating zoo for the conservation breeding of this species. In 2012, the Conservation & Breeding Centre was set up as a satellite facility in Kohima under a formal MOU with the Central Zoo Authority. At present, 15 individuals are housed in the breeding centre and efforts are being made to establish self-sustaining, viable populations which will act as insurance stock.

Among the available visitor facilities are eco-friendly battery-operated vehicles, universal accessibility, and

potable water. Observation decks at various locations provide a magnificent view of the free-ranging bird species inside the zoo.

The zoo also seeks to encourage the identification, protection, and preservation of the cultural and natural heritage of the state by promoting traditional knowledge and showcasing local skills by making bamboo huts called ‘Morungs’ for visitors and staff.

A scenic visitor route in the zoo named ‘butterfly pass’ due to the presence of butterflies adds to the value of the zoo. Nature trails, that impart attention to the natural features of the park are also demarcated for visitors as per guidelines.

The zoo is committed to sustainable conservation and improvements to ensure sustainability and nature-positive operations are promoted in day-to-day operations. Solar panel streetlights are also a popular sight at the zoo as they strive to reduce emissions while meeting the daily energy requirements.

Going forward, strengthening the conservation breeding programs, prioritizing partnerships for conservation, and developing impactful information-education-communication material that promotes the interconnectedness of people and nature will be prioritized.



Eggs at Nesting Site
© Vinoto K Rochill



ZOO IN Focus

INDIA

Butterfly Park Bannerghatta Biological Park

Text & Photos:

Bannerghatta Biological Park,
Bengaluru, Karnataka

Butterflies are important flagship taxa for invertebrate conservation. They come under the order Lepidoptera and based on their morphological characters are divided into six major families. Over the years butterfly parks have been established globally to conserve the species and impart education to the local population on their life traits and ecosystem services. The butterfly gardens represent forests at a smaller scale and provide an opportunity to local populace for viewing.

Butterfly parks can be Closed, Open or a Combination of both types. A closed butterfly park comprises of a closed structure wherein the entire garden is covered with green nets or metal mesh. An open Butterfly Park has free ranging butterfly species, no effort is made to

capture these individuals. However, host plants that are used by the resident species are planted to attract butterflies to the park. A third type is a combination of a closed and open structure, this is a hybrid enclosure where some part of the land is dedicated to a closed structure like a dome (covered with green net or metal mesh). In this infrastructure, the rearing areas are different from the release areas. The butterflies here are reared in separate areas and released into the enclosed areas as adult butterflies. And the rest of the area will be dedicated to an open garden where enough nectar plants (adult food plant) and larval food plant for egg laying has been maintained.

The butterfly park at the Bannerghatta Biological Park, Bangalore which spreads over 7 acres has the following components:

- Butterfly garden
- Butterfly conservatory



- Research and captive breeding laboratory and,
- a museum

The establishment of this butterfly park required the following components; a closed dome to release butterflies for display, a flight cage for maintaining adult butterflies for egg laying, a larval rearing house, and a host plant garden.

The Flight cage or enclosure is the area where adult butterflies are released for mating and egg laying. The dimension of the flight cage depends on the species and number of butterflies released. The minimum size is 20 sq metres with sufficient shade. 50% of the cage is to be roofed with galvanised sheets. The cage is to be provisioned with sufficient number of larval host plants and nectar plants to facilitate egg laying. The larval rearing house where the larvae are collected and reared can be established using the Box rearing method or the Sleeve rearing method.

In the box rearing method, the larval house is about the same size as the flight cage and the larval rearing house will be provisioned with shelves along one side to accommodate boxes for rearing. This type of rearing house is adequately screened with standard-sized mosquito screening to restrict the entry of larger parasitoids and pests. In the Sleeve Rearing method, the rearing house should be bigger than the flight cage or house used in the box-rearing method, and it is often convenient to build it attached to or near the flight cage. Here the larva is reared on the growing host plants, and the whole or part of a plant is covered with netting. The size of the holes in the netting material are small which prevent caterpillars from moving out and prevent the entry of smaller predators. In this method, once the larva stops feeding and changes its colour, they are transferred into the pupa chamber with sticks for pupation.

The butterflies that emerge at the pupa chamber are then further released into the closed dome which is provisioned with host plants for food, mud puddling

spot, amongst other requirements like water fall and sprinklers for temperature maintenance, air blowers for air circulation, and thermometers to monitor the temperature.

The Butterfly Park at the Bannerghatta Biological Park consists of a closed landscaped garden under a polycarbonate roof of 10500sqft (also called the conservatory dome). The garden is surrounded by metal mesh supported with concrete pillars and roofed with transparent polycarbonate sheets. Summer management practice for the conservatory includes adjusting the top of the roof with a small motor and pipe connection for water cascade all over the roof, earthen pots with small holes are placed along the roof towards the inside of the dome to control echo (acoustic).

A garden that contains a variety of plants that are the larval host plants of the housed butterflies is maintained to meet the food requirement of the larvae in the rearing labs. At Bannerghatta Biological Park, a variety of host and nectar plants are raised in different blocks with accessible paths. The garden spreads over 10 acres with 14 different species of host plants.

Butterfly species that are locally available are usually selected on the basis of the availability of their larval host plants along with their associated abiotic factors. At the butterfly park in Bannerghatta Biological Park, adult butterflies are collected and reared in separate enclosures. The larvae that hatch from the fertilized eggs are collected and reared in separate boxes till the butterflies emerge. On emergence, they are released into the closed conservatory. Due to the absence of any predator in the conservatory, the butterflies survive till they die naturally.

Some Some of the practices to be followed while taking up captive breeding of Butterflies:

- The rearing box should be cleaned and sterilised thoroughly on regular basis. Sodium hypochlorite solution is used for sterilising containers and work surfaces.
- Caterpillars should not be handled with bare fingers as the pressure exerted can damage caterpillars and at the same time larva causes skin irritation. A horse hair brush may be used for handling the caterpillars.
- Feed production and maintenance needs to be constant, through regular irrigation and timely manuring to produce sufficient food.
- Larval host plants need to be monitored regularly for diseases. Chemical fertilizers, weedicides and insecticides should not be used, as this affects butterfly breeding.
- Nectar and fruit supplementation should be done when nectar source is low.



Sl.No	Host plants	Common name of host plant	Butterflies
1	<i>Murraya Koenigii</i>	Curry leaf	Common Mormon
2	<i>Citrus Spp.</i>	Lime species	Lime butterfly
3	<i>Cassia siamia</i>	Tangadi	Common emigrant
4	<i>Aegle marmelos</i>	Bilvapatre	Blue mormon
5	<i>Cassia fistula</i>	Kakke	Mottle emigrant
6	<i>Calotropis gigantea</i>	Yekka	Plain tiger
7	<i>Michelia champaca</i>	Sampige	Graphium butterfly
8	<i>Nerium olender</i>	Kanigale	Common crow
9	<i>Wattakaka volubilis</i>	Wattakaka	Blue tiger
10	<i>Terminalia catappa</i>	Kaadu badami	Baron
11	<i>Polyalthia longifolia</i>	Ashoka	Tailed jay
12	<i>Capparis zelanica</i>	Capparis	Pioneer
13	<i>Asclepias curassavica</i>	Milk weed	Plain tiger
14	<i>Aristolochia indica</i>	Eshwariballi	Crimson rose
15	<i>Cinnamomum macrocarpum</i>	Chakke	Common mime



Common Mormon
Papilio polytes



Lime Butterfly
Papilio demoleus



Tailed Jay
Graphium agamemnon



Crimson Rose
Atrophaneura hector



Blue Mormon
Papilio polymnestor

ZOO IN Focus

INTERNATIONAL

Rotterdam Zoo, Netherlands

Text & Photos:

Stephan Lugthart

Conservation, Education, and Research Department,
Rotterdam Zoo

In Northwestern Europe, bordering Germany to the east and Belgium to the south, lies the Netherlands, which may sometimes better be known by the name of Holland. Rotterdam, the country's second-largest city and Europe's largest seaport, holds the 34-hectare-sized Royal Rotterdam Zoological and Botanical Gardens (abbreviated the Rotterdam Zoo). With more than 1.5 million visitors per year, on average it is the most frequently visited zoo in the Netherlands.

Founded in 1857, the Rotterdam Zoo is one of the oldest zoological institutes in Europe and is currently celebrating its 165th anniversary. The zoo was initially established in the city centre of Rotterdam and was shifted to its current location in the Blijdorp district in 1940.

At inception, the zoo was one of the few zoos in the world to have been designed entirely by a single architect. At present, as many as 21 national monuments that date back to the year of opening in 1940 are displayed within the premises. In 2001, the zoo opened its 'Oceanium', a huge public aquarium complex showing life found in the oceans, along coastlines, and on islands. The whole complex contains about 8 million litres of seawater. With an extensive filtration system in combination with the zoo's agreement with a shipping company for transferring their vessels' ballast water into the Oceanium, all aquaria are continuously supplied with fresh and clean seawater.



The Rotterdam Zoo has continuously modeled itself to the changing times with the opening of modern enclosures taking into account the latest animal husbandry and welfare standards, such as the tropical butterfly dome 'Amazonica' showing the Amazon basin and its biodiversities like the gigantic *Victoria amazonica* as well as 'Congo', displaying the Central African rainforest with okapis (*Okapi johnstoni*) and African birds and plants.

Today, approximately 600 animal species are housed at the zoo and over 80 species are managed in accordance with the EAZA Ex situ Programme (EEP). Five of the EEP programs are coordinated by curators of the Rotterdam Zoo. The species include the Asian elephant (*Elephas maximus*), Red Panda (*Ailurus fulgens*), Tufted deer (*Elaphodus cephalophus*), Rüppell's vulture (*Gyps rueppelli*), and Kleinmann's tortoise (*Testudo kleinmanni*).

Besides having a comprehensive zoological collection, the Rotterdam Zoo is also an acknowledged botanical garden with its botanical collection being accredited by the Botanic Gardens Conservation International (BGCI), ArbNet, and the Dutch Dendrological Society (NDV). As such, it manages the National Primula (*Primulaceae*) and Bromeliad (*Bromelioideae*) collections.

As an institutional member of several collaborations, the zoo collaborates on multiple levels with fellow zoological gardens nationwide via the Dutch Zoo Association (NVD), across Europe through the European Association of Zoos and Aquaria (EAZA), as well as worldwide via the World Association of Zoos and Aquariums (WAZA). Besides coordinating the EEP, the zoo also coordinates the WAZA's Global Species Management Plan (GSMP) for the Red Panda. Furthermore, the zoo works in tandem with the Red Panda Network (RPN) in Nepal, which is committed to the conservation of wild Red Pandas and their habitat. Part of the collaboration involves GPS research, which was funded by the Rotterdam Zoo.





Mixed savannah exhibit with reticulated giraffes and greater kudus

The GPS collars which are currently used for research in Nepal were developed and tested here at the Rotterdam Zoo. Apart from the RPN, financial support is also provisioned to more than 20 in-situ conservation projects worldwide.

Visitors can now learn about the Red Panda research and the in-situ and ex-situ conservation in the educational Forest Guardian hut of the zoo. This educational exhibition is located in the new Himalaya-themed area of the park, next to the zoo's recently renovated monumental enclosure tailored to house red pandas.

Apart from accommodating a growing number of master's and Ph.D. students for conducting scientific research projects in various disciplines. The employees also, contribute to several scientific studies and publications on a yearly basis. Therefore, the zoo maintains a wide network with several universities and other institutes, such as the municipal health service and national laboratories. The in-house research facilities available, including an extensive veterinary department. This department consists of a modern treatment/surgery room, a pharmacy, an autopsy room, and a large laboratory. In the laboratory, a wide

spectrum of tests can be run ranging from bacteriology, fungal cultures, cytology, parasitology, and hormone analyses to hematology and chemistry. Since 2018, the Rotterdam Zoo is in the possession of its own PCR lab for running qPCR tests on Endothelial Elephant Herpes Virus. In March 2022, the Nature Conservation, Education, and Research Department were established, thereby centralizing the coordination of the key activities associated with a modern zoological institute.

At present, research is currently being conducted on the prevalence and cause of ataxia in Asiatic lions, iron overload disorder in black rhinos, and the development of solar panel-fuelled breeding systems for marine fish. Further, in cooperation with Wageningen University and Research, the EAZA Biobank, and Asian elephant EEP participants, thorough research on Asian elephant genomics is currently being performed in the Rotterdam Zoo. State-of-the-art genomics tools are used to gain insight into the genetic status of subspecies of Asian elephants in captivity and in the wild. Based on these insights, the EEP Asian elephant population could be accurately divided into subpopulations. The effect of different management strategies – managing the species as a single group or managing the subspecies separately



Tropical butterfly dome 'Amazonica'

– on genomic parameters of the captive population, such as inbreeding status, will be simulated. Simulations will also be performed to determine the reintroduction potential of the captive population. These results will be used to develop management guidelines on how to best preserve the Asian elephant in the future.

The world is changing rapidly. We are in the middle of a climate and biodiversity crisis and society seems to be losing touch with nature. The Rotterdam Zoo feels an obligation to contribute to tackling these challenges by playing a prominent role in nature conservation. These ambitions have been formulated in the Rotterdam Zoo's new strategic plan for the coming decade: the 'Masterplan 2030'.



Lion-tailed macaque



Geladas



Renovated monument used for housing geladas

Back to Wild

The Science behind Reintroduction of species

Text:
Editorial Team,
Central Zoo Authority

Over the years, the word 'Reintroduction' has been used in different contexts when we speak of species conservation. Reintroduction in itself means "a repeated or renewed introduction" from "re-" meaning "back or again" and "introduction" meaning "the act of bringing into existence".

The reintroduction of species in former distribution ranges has taken precedence in recent years due to the alarming rate at which species populations are dwindling. Globally, several locally extinct species have been reintroduced into their former distribution ranges. Be it the Grey Wolf in Yellowstone National Park or the American Black Bears in Arkansas or the Bonelli's eagle in Mallorca. In the context of India, we have had several reintroduction programs of our own. The major ones are the reintroduction of the Bengal Tiger in Sariska Tiger Reserve, Gaur in Bandhavgarh Tiger Reserve, and more recently the transcontinental reintroduction of the African Cheetah to Kuno National Park.

The pertinent question however remains, why is reintroduction done? Does it make sense in the larger scheme of things to bring back a species in a region where it had once become locally extinct? The response is usually a decision made based on the bigger picture.

The loss of a species from a particular ecosystem has two broad implications. One, the increased probability of an ecosystem imbalance, and Two, the loss of the gene pool.



The first step while looking at the viability of a conservation intervention is the identification of the factors that were responsible for the original extirpation of the particular species from the region.

India, has high human density which in certain areas (such as forest fringes) leads to greater anthropogenic pressure. In such cases an assessment of the biological factors. An assessment of the biological factors of the species such as its behaviour, ecology, and genetics, and the regional socioeconomic, cultural, and administrative frameworks need to be conducted.

Often cross-sectoral collaborations are required to demarcate the factors of contention and place measures for mitigation. Only then can conservation interventions be reviewed and revisited with rigour.

From the ex-situ perspective, zoos, play a major role in the restocking of species in the wild. Globally, several

Flow Chart of the Six-step process involved in reintroduction programs.

Step 1

Setting specific goals and targets for the reintroduction program to ensure deliverable outcomes coupled with a thorough risk assessment.

Step 2

Identification of the contributing factors that led to the extirpation of the species [Direct, Indirect, Stochastic].

Step 3

Strategizing on the elimination of the factors that contributed to the local extirpation.

Step 4

Assessing the technical details pertaining to the biological traits of the species, the ideal age-sex composition, size required, source of founders, etc.

Step 5

Evaluation and acknowledgment of the long-term economics for establishing the reintroduction program

Step 6

Regular monitoring of the program against the pre-defined goals of step 1.

captive breeding programs have been conceptualized to support the in-situ efforts. The captive breeding of a species for conservation is a process conceptualized to ensure demographic and genetic backup for the wild populations by establishing a large enough insurance population at the breeding centres. This population allows for the restocking/reintroducing of the species back to its natural habitat in the wild from where it may have been extirpated. This entire exercise is made possible through a coordinated consortium of zoos and agencies at national and international levels.

The Central Zoo Authority has identified and prioritized 74 threatened native species for the conservation breeding program. These breeding programs are conceptualized in a way that ensures that all eggs are not in one basket! Multiple zoos that fall within the species distribution limits are involved which ensures viable numbers are dispersed in small groups at each breeding

centre. This method also eliminates the possibility of losing the entire population to any stochastic factors.

The individuals of the species that are part of the breeding program are paired based on breeding recommendations to preserve maximum genetic variability. This helps in obtaining a demographically stable population. Studbooks [a registry of all individuals] are used as a management tool for recording the individual life tables of the species. This registry is usually maintained at a local, national and international level (for select species).

Indian zoos are doing remarkably well in some of the breeding programs. Population restoration and reinforcement are being carried out in several regions by the state forest departments in close collaboration with the zoos; the detailed accounts of which are reported from time to time in our newsletter and the media.

A synoptic view of the science behind reintroduction remains that of its conservation benefit. Uplifting the status of the focal species, and/or restoring the natural ecosystem functions or processes that may have been imbalanced by way of reintroduction always needs a thorough assessment. Given the multifarious nature and impacts of reintroducing a species in regions where it has been extirpated from, a cost-benefit analysis (biological and economic) of reintroduction as an intervention and alternative conservation actions viz. the long-term implications are especially at the forefront while contemplating policy level decisions.

The success of reintroducing a focal species into a habitat however lies in how well the biological traits of the introduced individuals amalgamate with the new habitat. While we do have success stories from the wild, we still have a long way to tread to improve scientific rigor for building insurance populations for several threatened species.



BACK TO THE WILD



Red Panda

Padmaja Naidu Himalayan Zoological Park, Darjeeling

Text & Photos:

Dr Basavaraj Holeyachi IFS¹, Shri Saurabh Chaudhuri IFS²

1. Director, Padmaja Naidu Himalayan Zoological Park, Darjeeling
2. Member Secretary, West Bengal Zoo Authority

The Red Panda (*Ailurus fulgens*), a conservation priority species is distributed from Nepal in the west through western China. In India, it is found in Sikkim, West Bengal (Darjeeling hills), Arunachal Pradesh, and Meghalaya. It is categorized under Schedule I of the Wild Life (Protection) Act and as 'Endangered' by the IUCN Red List of Threatened Species.

The Red Panda augmentation program is an ambitious project initiated by the Padmaja Naidu Himalayan Zoological Park in collaboration with the wildlife wing of the West Bengal Forest Department. The aim of this project is to release 20 individuals in Singalila National Park and Neora Valley National Park over a 5-year period. This is being done to strengthen the wild populations through the release of genetically, biologically, and behaviourally viable captive-bred populations. The release is planned in a phased manner for ensuring viable populations for long-term survival.

The Red Pandas that are part of the conservation breeding program have been genotyped by LaCONES, Centre for Cellular and Molecular Biology (CCMB), Hyderabad, and the Indian Institute of Science Education and Research (IISER), Kolkata. On the basis of the analysis, 2:2 (2 male and 2 female) Red Pandas were selected for release in the Singalila National Park in Phase 1 of the project. The convenor of the Global Species Management Plan (GSMP) for Red Pandas based in Rotterdam Zoo Netherlands provided pedigree information of the captive-bred Red Pandas based on studbook analysis in PMx. The individuals with the highest heterozygosity for the 12 microsatellite marker loci analyzed and distant pedigree were selected for release.

Custom-made LITETRACK IRIDIUM 130 TRD-L (around 250gms) collars were used. This particular collar can transfer GPS data via the Iridium Satellite system.



On field, these collars can be tracked via Very High-Frequency (VHF) radio communication. They also have a mortality function and TRD-L (Timed release Device) drop-off function. Geo-fencing of the collar is done, wherein it gives a signal if the animal crosses pre-set GPS boundaries.

The individuals selected for released were prepared for rehabilitation back to the wild firstly through a gradual reduction (to 0%) of the zoo-provisioned diet over a 21-day period and secondly by introducing them to the soft release facility.

The soft release facility is located at Garibans inside the Singalila National Park at an altitude of 2626 m asl. The four individuals selected were released in this facility on 15th January 2022. A team comprising two researchers and two field assistants were posted at the facility to observe the animals daily through direct sighting, VHF antenna, and camera traps. Scats of the animals were collected on a weekly basis to study gut microbe biome, feed composition, and parasitic load which will be further compared with that of other captive-bred individuals and wild individuals.

After collaring the individuals and ascertaining their viability to adapt to the wild over a period of two months, the gates of the Soft Release Facility were opened on 26th March 2022 by Dr. Sanjay Kumar Shukla,

Member Secretary, Central Zoo Authority.

The Red pandas released will be tracked and monitored for a period of 70 weeks using GPS data and a VHF antenna. Observations regarding their home range, behavior, feeding habit, health, reproductive behavior, and the birth of offspring will be recorded and compared to the available scientific literature.

The area of release shares borders with Nepal. Given the known home ranges of the species, the likelihood of the released individuals entering Nepal borders is high. A collaborative approach is being taken up by us with Nepal authorities under the 'International Red Panda Network' to monitor the individuals.

Post the success of Phase 1, the second phase is now in implementation to achieve the target of releasing 20 Red Pandas over the next 4-5 years in the two regions identified timely. This project is also being framed in a way that future reintroduction goals can be met in partnership with GSMP.



BACK TO THE WILD

Cheetah

“CHEETAHS IN THEIR NEW HOME”

© Sanjay Kumar Shukla

Text:

Vidya Venkatesh

Director,

Last Wilderness Foundation, Mumbai

The Kuno National Park has recently been in the limelight as it received its new guests from Namibia in Southern Africa, the Cheetahs (*Acinonyx jubatus*)! With only around 7000 individuals left in the wild, efforts are being made globally to conserve the animal that is known to be the fastest mammal on land and is native to African & Asian continents. Currently, under the Cheetah Introduction Program in India, 5 female and 3 male Cheetahs have been brought to Kuno National Park, in Madhya Pradesh, India.

With a thin built, long legs, and a long tail designed to adapt to speed, the Cheetah is capable of running up to 128 km/hour and can weigh up to 72kgs. They have claws that are blunt, slightly curved, and non-retractable (also known as semi-retractable), which helps them to have a good grip on the ground while chasing fast-

moving prey. While this characteristic is similar to that seen in dogs, there are only a few cats in the world that have them, like the Fishing cat.

The Cheetah is the only large carnivore that has gone extinct from India since its Independence in 1947. As per studies, the main reasons for the decline of Cheetah in India were large-scale capture of animals from the wild for coursing, bounty and sport hunting, extensive habitat conversion along with a consequent decline in prey base. The last three Cheetahs recorded in India are believed to have been shot down in 1947 by Maharaja Ramanuj Pratap Singh Deo of Koriya. Subsequently, in 1952, the Indian Government declared the Cheetah extinct in the country.

After 70 years of extinction, the spotted feline is now back in India in the State of Madhya Pradesh, which also boasts of hosting the highest number of Tiger, Leopard, Gharial, Vulture, and Indian Wolf populations in the country.

History of Kuno National Park:

The Kuno National Park was initially established as a wildlife sanctuary in 1981 over an area of 344.68 sq. km. It forms a part of the Khathiar-Gir dry deciduous forests ecoregion. This ecoregion in northwestern India stretches across Gujarat, Rajasthan, and Madhya Pradesh. In the 1990s, this area was selected as a potential site for the Asiatic Lion Reintroduction Project. Between 1998 and 2003, 24 villages were resettled outside the protected area and a vast area of land was readily available without human habitation. Subsequently, in 2009, Kuno was proposed as a possible site for Cheetah relocation and in 2018, it was given the status of a national park.

Based on the assessments conducted by the Wildlife Institute of India and the Wildlife Trust of India, Kuno National Park was found to have suitable habitat and adequate prey base for the Cheetahs to be introduced. It is also devoid of any human settlements and forms part of the larger Sheopur-Shivpuri dry deciduous open forest landscape spanning an area of 6,800 km².

- 1981: Kuno Wildlife Sanctuary was established - 344.68 km²
- 1990's: Asiatic Lion Reintroduction Project site selected
- 1998-2003: 24 villages were resettled outside the PA and 6258-hectare area was made available.
- 2002: An area of 924 km² surrounding the wildlife sanctuary was added as a buffer zone for human settlements.
- 2009: Kuno Wildlife Sanctuary was proposed as one of the possible sites for Cheetah reintroduction in India
- 2018: Changed the status of the wildlife sanctuary to Kuno National Park

Bringing Cheetahs to India can be a new chapter globally for the field of wildlife conservation since this is the first time in the world that a large carnivore is being relocated from one continent to another. The Action Plan for Introduction of Cheetah in India (with emphasis

on the first release site- Kuno National Park) has been published by the Wildlife Institute of India (WII), National Tiger Conservation Authority (NTCA) & Madhya Pradesh Forest Department (MPFD). As per the plan, 50+ Cheetahs will be introduced in different National Parks of the country over a span of 5 years. The plan also emphasizes simultaneous engagement with local communities.

Landscape-level conservation programs cannot be sustained without the help of local communities.

The Kuno landscape is home to the Jatav, Dhakad, Gujjar, Kushwaha, Yadav, Moghiya, Sahariya, and Bhil communities. Each of these communities has its own unique connection with the forest depending on their reliance on the forest and wildlife resources.

Joint Forest Management is a concept of developing partnerships between the fringe forest user groups (local communities and tribal) and the Forest Department. This partnership is based on mutual trust and jointly defined roles and responsibilities for forest protection and growth. The MPFD in partnership with Last Wilderness Foundation (LWF) is engaging with the local communities to discuss various challenges and their possible solutions. Providing sustainable alternate livelihoods is one of the key actions that will be taken up through this project. In addition, education, outreach, and awareness programs are being undertaken in this landscape regularly, so as to sensitize people on the impact of anthropogenic activities on forests and wildlife.

The Cheetah project is also expected to boost the local economy through ecotourism and other job opportunities. With the help of MPFD and LWF, local people are now being trained to run homestays, become nature guides, and make handicraft products. These activities will not only boost the local economy but will also give a sense of shared responsibility toward nature conservation in the long run.



BACK TO THE WILD

Indian Chevrotain

Nehru Zoological Park, Hyderabad

Text & Photos:

M.Sandeep,
Biologist,
Nehru Zoological Park, Hyderabad

The Indian Chevrotain, commonly known as Mouse Deer is a small ungulate that belongs to the family Tragulidae. They are very timid and disappear in dense vegetation at the least hint of noise. It prefers to feed exclusively on plant material. The Species is threatened due to habitat destruction and hunting which leads to declining of its population in the wild. At present, the species is highly threatened and is listed as a Schedule-I in the Wild Life (Protection) Act, of 1972.

The Indian Chevrotain is one of the 74 endangered species identified by the Central Zoo Authority, New Delhi for conservation breeding. The Nehru Zoological Park, Hyderabad is the coordinating zoo for this program. Conservation breeding of the species as the name suggests aims to breed animals in captivity to help maintain genetic diversity and produce viable individuals

for release (insurance populations) and in the long term mitigate species extinction. Re-introduction of a viable number of individuals of the Indian Chevrotain in the wild requires regular monitoring of the individuals and implementing management regimes that ensure survivability.

The conservation breeding centre was established on 03.03.2010 with a founder population of 2 males & 4 females Indian Chevrotain. The enclosure built has four chambers measuring 15 x 8 sq. m. in a total area of 480 sq.m. Plantation has been done in each enclosure to mimic the species' natural environment. Genetic profiling of the species identified for conservation breeding was done with the help of LaCONES, Hyderabad. Based on the analysis individuals were paired for breeding.

One of the objectives of conservation breeding is fulfilled through reintroductions which are a success in the wild. Therefore, after successfully breeding the



Indian Chevrotain in the conservation breeding centre, the reintroduction of the species in suitable habitats in the wild was decided. Different locations in the state of Telangana i.e Amrabad Tiger Reserve, Kinnerasani Wildlife Sanctuary, Mrugavani National Park, Pocharam Wildlife Sanctuary, Nirmal forest division, and Jannaram forest were identified as potential release sites for the species.

IUCN Guidelines for Reintroductions and Other Conservation Translocations are followed during the pre- & soft release process.

Once individuals are identified for release, they are shifted for soft release which involves gradually familiarizing the individuals with their new environment before release into that location. A six-step methodology is followed for the reintroduction of the individuals.

Stage 1: Stabilization

The translocated mouse deer are kept in an enclosure for

fourteen days and fed with mixed fruits and vegetables (processed) as given at the conservation breeding centre in Nehru Zoological Park, Hyderabad. In addition to this, wild fruits from the reserve forest such as *Terminalia bellirica*, *T. chebula*, *Phyllanthusemblica*, *Ficus species* are also offered. The proportion of processed fruits and vegetables is reduced gradually every two days, for example, on the first two days 100% processed fruits and vegetables are given, followed by reducing every two days to 75%, 50%, 25%, and 12.5%. Foraging of processed and natural food is monitored through camera traps in video mode with 10-second recording and direct observation. After a period of 14 days eventually, the animals are shifted to the next compartment of the soft release facility.

Stage 2: Acclimatization stage

In this stage, the mouse deer are kept for fourteen days and, fallen leaves and wild fruits (*Terminalia bellirica*, *Terminalia chebula*, *Phyllanthusemblica*, and *Ficus sp.*) are given.

Stage 3: Pre-release

In this stage, although shelter is available, no food items and water is provided. The exit door of the enclosure is kept open from 10 am morning to 5 pm in the evening. The Mouse deer are allowed to move freely in and out of the enclosure.

Stage 4: Monitoring animals in the soft release site:

At the soft release site, about ten camera traps are deployed to monitor the readiness and fitness of the individuals to be released into the wild. The camera traps operate in video mode with 10 seconds of recording which helps in documenting the behavioral correlates of the species. Visual observations are also made to find out whether they are responding to environmental stimuli.

Stage 5: Manual survey

Post-release, sign surveys are conducted weekly with base camp watchers around the released area. Based on this data, the camera trap locations are changed to record survival and ranging patterns from the release facility.

Stage 6: Camera trap in wild habitat:

Camera traps are also deployed in the wild habitat where the individuals are released for post-release monitoring. Each camera trap is placed at a 300-meter distance at a height of 30-35 cm from the ground. This height is ideal to capture the diminutive mouse deer, 3-5 m away from narrow trails that could potentially be used by them to reliably detect mouse deer and identify individuals.

Per cent coverage of the area in different day schedules proposal at Pre & soft release enclosure.			
S.No	Days	Percentage of area-wise release (hectares)	Percentage of feed reduced
1	1 – 14	25% (1/4hectare)	100%
2	15-29	50% (1hectare)	50%
3	30-42	25 % (1/4 hectare)	0%

A total number of 212 (54:158) Mouse deers have been released in different sites of Telangana over the past 5 years.

2017 - 18	2:6:0:8 in Amrabad Tiger Reserve
2018 - 19	14:38 in Amrabad Tiger Reserve 3:9 in Kinnerasani Wildlife Sanctuary 2:6 in Mrugavani National Park
2019 - 20	14:42 in Amrabad Tiger Reserve 04:12 in Kinnerasani Wildlife Sanctuary
2020 - 21	04:12 in Amrabad Tiger Reserve 04:12 in Pocharam Wildlife Sanctuary, Medak 03:07 in Nirmal Division, Mancherial District 02:08 in Jannaram Division, Nirmal District
2021 - 22	02:06 in Tejovanam Urban Park, Siddipet

Observations made on the mating of the individuals at the soft-release facility a Soft-release facility and births recorded in Kinnerasani Wildlife Sanctuary indicate a bright future for this species. The conservation breeding and reintroduction of mouse deer in wild may prove to be their second chance at surviving in the natural environment. However, measuring the success rate of reintroduction for this small frugivorous ungulate is not the final step of this program. The desired outcome of this program is to ensure the adaptability of the captive-bred individuals in the wild.







BACK TO THE WILD

Gharial

Nandankanan Zoological Park and Wildlife Wing, Forest Department of Odisha

Text & Photos:

Nandankanan Zoological Park and
Wildlife Wing, Forest Department of
Odisha.

Gharial has been on earth for over 80 million years and is now on the verge of extinction. The long-snouted gharial has more than 100 razor-sharped interlocking teeth to catch its prey. It is currently found in 14 different habitats in the Himalayan-fed river systems of Nepal, northern India and in the river Mahanadi of Odisha. Odisha is the only state of India with all three crocodylian species; Gharial (*Gavialis gangeticus*), Mugger (*Crocodylus palustris*) and Saltwater crocodile (*Crocodylus porosus*).

Mahanadi is one of the major rivers of India, and the southernmost distribution limit of the gharial. The river Mahanadi originates from the Bastar plateau in the state of Chhattisgarh. It flows through 11 districts of Odisha forming a huge composite delta and drains through its numerous distributaries to the Bay of Bengal. Conservation of the critically endangered gharial was initiated way back in 1975. Under this programme, a captive breeding centre at Nandankanan Zoological Park, Bhubaneswar, Odisha and a rearing centre - Gharial

Research and Conservation Unit at Tikarpara, Odisha was established to rehabilitate captive bred/reared gharials in the river Mahanadi. As per available records, in 1980, the first captive breeding of Gharials happened in Nandankanan Zoological Park. Despite all conservation efforts, including the release of 860 Gharials mostly of 1m size into the river Mahanadi between 1977 to 2016, the Gharial population did not show a significant improvement. Only 8 gharials were reported in the 2018-19 census.

To rehabilitate Gharials in the river Mahanadi following strict monitoring protocols, the Forest Department of Odisha initiated a project "Species recovery of Gharial in river Mahanadi" in 2019. Under the project, it was proposed to release 35 gharials (12M:23F) bred and reared at the Nandankanan Zoological Park, Bhubaneswar into the river Mahanadi in a phase-wise manner to build a sustainable population in the wild. Before the release, pre-release survey was conducted to find out suitable release site(s) by evaluating river geo physiography and anthropogenic activities. It also includes tagging all the released Gharials with transmitters to track their dispersal and survival using technology as well as technical field



staff. Implementation of a 10km 'NO FISHING ZONE' in Satkosia gorge, involvement of 14 forest divisions on both sides of the river Mahanadi, community participation and awareness, compensation for damaged fishing net and a reward of Rs. 1000 for a live gharial if caught in the net, were some other measures put into place during the survey period.

Accordingly, from 2019 till August 2022 a total of 19 Gharials consisting of 7 males and 12 female Gharials in the river measuring 1.5m to 3.85m in length and aged between 5 to 16 years were released in different batches. All released Gharials were tagged with transmitters; 13 with radio transmitters and 6 with satellite transmitters for post-release monitoring. Three research scholars were engaged in post-release monitoring. The transmitters helped the technical team track Gharials individually, their daily activity, habitat use, seasonal dispersal pattern, breeding biology and threats.

One of the adult female Gharials moved downstream about 120km and passed through a nylon fishing net and got its jaws wrapped up in the torn net. She was rescued successfully with the cooperation of the rescue team from Nandankanan, local forest staff and fishermen using cast net and encirclement net. At present 5 adult individuals are being tracked. The other 8 Gharials have been reported dead and for the remaining, 6 numbers of Gharials' presence/absence could not be ascertained

due to loss of signal. Out of the 8 recorded deaths, 2 died due to blasting, 4 by entanglement in nylon nets, 1 was killed by a Mugger, and 1 died from an infection, the cause of which under investigation. Indicating major threats to survival as deleterious fishing activities, disturbed habitat, perceived interspecific conflict between gharial and mugger in the habitat.

After a gap of 40 long years, the Satkosia gorge sanctuary welcomed 28 hatchlings of Gharials in May 2021 and 32 hatchlings of Gharials in May 2022 owing to the stringent protection efforts taken up for reducing anthropogenic pressures. In 2021 and 2022 till date, 7 numbers of gharial hatchlings/yearlings caught in fishing net were handed over by local fisherman to local field staff/technical team. These hatchlings/yearlings were brought to Nandankanan Zoological Park for post-rescue care and will be subsequently released back into the river near their mother after the flood season.

The implementation of the Species recovery of Gharial in river Mahanadi project has helped in identifying the factors affecting the survival of gharial in the river Mahanadi. This improved understanding of their ecology and behaviour will help in shaping the implementation of future conservation measures to save this species in its southernmost habitat.



TRIBUTE

Remembering Tyson

A male Snow Leopard, Padmaja Naidu Himalayan Zoological Park, Darjeeling remembers Tyson.

Tyson, came to us on 28th January 2002 from Nordic Ark Zoo, Sweden almost 6700 airmiles far away. When he reached Darjeeling, he was a young energetic six-and-a-half-year-old. He came to bolster our Conservation and Breeding Programme on Snow Leopards. Proving to be a torchbearer in our prestigious programme, within six

months of his arrival he sired a lovely male cub.

Thereafter there was no looking back, Tyson contributed significantly to take forward our programme by siring 8 cubs (4:4) to the then existing population over a span of 4 years. He left us on 14th September 2013 at the ripe age of 18 years 1 month and 6 days, which a record for the longest surviving male back then.

Today we would like to inform that, his lineage gave Padmaja Naidu Himalayan Zoological Park 18 cubs of which 3 are still alive and in the prime of their health. We have sent two of his cubs to Gangtok, Sikkim, one to Shimla and another to Nainital. Like Tyson, keeping up with his legacy two of his cubs, Subhas had attained age of 17 years and Yesmin 18 years. We remain ever grateful to Tyson for the pain he had taken to come to us all the way from Sweden and contributing to the lineage, so much so that we take pride, that we take pride in being known as successful Snow Leopard breeding centre globally.



ZOO CLIQUE

Capturing species in zoos from across India



Species: Himalayan Tahr

Zoo: Padmaja Naidu Himalayan Zoological Park, Darjeeling

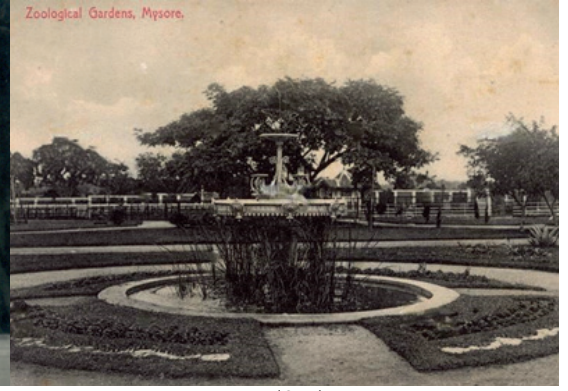
Credits: Dr Sanjay Kumar Shukla



His Highness Sri Chamarajendra Wodeyar



Zoo Entrance Gate During 1918



Band Stand

ZOO IN HISTORY

Sri Chamarajendra Zoological Gardens, Mysuru, Karnataka

Text & Photos:

Ajit Kulkarni IFS

Executive Director,

Sri Chamarajendra Zoological Gardens, Mysuru

Sri Chamarajendra Zoological Gardens, popularly known as 'Mysore Zoo', was established in 1892, by His Highness, the erstwhile Ruler of Mysore "Sri Chamarajendra Wadiyar Bahadur". It started on a small patch of 10.9 acres as a menagerie for animals received by the Maharajas of Mysore and as an "Orphanage" for rearing abandoned wild animals rescued from nearby forest; and has now spread over 80 acres.

The Maharaja availed the services of Mr G H Krumbeigal, a German Horticulturist to develop and manage the zoo. An Australian by the name Mr Huge was engaged as Superintendent of the Zoo and later Mr Sidderaje Urs and Mr S Anantramaiah worked as Zoo Superintendents. Post-independence, the zoo was managed by the Departments of Parks and Gardens and was handed over to Karnataka State Forest Department in 1972. Since 1979, it is managed by the Zoo Authority of Karnataka.

Sri Chamarajendra Zoological Garden has always maintained a diverse animal collection of both native and non-native species. The zoo has a history of housing species like Gorilla, Chimpanzee, Orangutan, Black Rhino, White Rhino, African Elephant, Giraffe, Zebra, Baboons, Binturong, Secretary Bird, Eland, Barberrry Sheep, etc along with native species like Bengal Tiger, Asiatic Elephants, Leopards, Lions, Gaur, The Maharaja availed, etc. The zoo has always made an effort to adopt best practices in animal housing, husbandry and collection management.

The zoo continues to upgrade itself in terms of husbandry practices, enclosure designs, visitor facilities and amenities and is constantly incorporating modern technologies for improved management. In 2015, the zoo started a dedicated rescue and rehabilitation facility which is spread over 113 acres of land and is at a distance of 20 km from the zoo. The zoo also has a conservation breeding centre for Gaur, Wild Dog and Grey Wolf. In the coming days, the zoo proposes to start conservation breeding of Grey Jungle Fowl, Giant Squirrel and Nilgiri Langur.



Central Zoo Authority

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Garden Area



Female Gorilla named Sumathi