ANNUAL REPORT 2022-23

भारतीय वन्यजीव संस्थान
Wildlife Institute of India

Editors: Bitapi C. Sinha, Vishnupriya Kolipakam, Amit Kumar and K.K. Shrivastava
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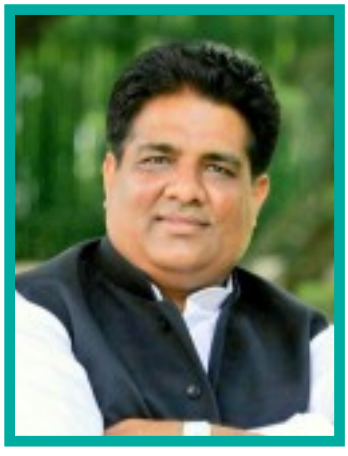
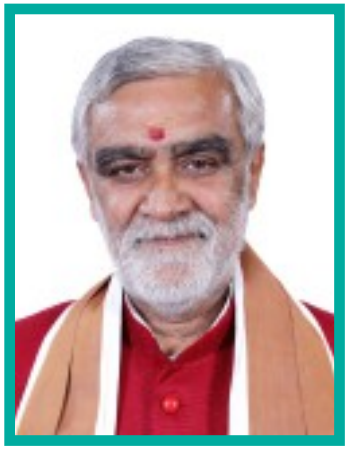


Sh. Bhupender Yadav

Hon'ble Union Minister
Ministry of Environment, Forest & Climate Change
Government of India



Sh. Ashwini Kumar Choubey

Hon'ble Union Minister of State
Ministry of Environment, Forest & Climate Change
Government of India

FROM THE DIRECTOR'S DESK

I am very pleased to state that the Annual Reporting Period 2022-2023 saw the initiation of some new initiatives for PAN India Assessment and Monitoring of Endangered Species, Integrated Development of Wildlife Habitats, Addressing Management Issues of Kaziranga Tiger Reserve and Priority Applied Research, and 'Jalaj'– Connecting River and People to realize Arth Ganga. Efforts towards the conservation of the four wild animal species, viz. the Great Indian Bustard, Gangetic Dolphin, Dugong and the Manipur Deer, got a pace in the ongoing efforts of the 'Endangered Species Recovery Programme' sponsored under National Compensatory Afforestation Fund Management Planning Authority (CAMPA).

All the research, training and academic activities were conducted as per their schedule and pre-decided programmes. As part of the other important activities, Wildlife Institute of India signed a Memorandum of Understanding (MoU) with the Export Promotion Council for Handicrafts, New Delhi on 5 January, 2023 for setting up a 'Pashmina Certification Centre' to assist the Pashmina traders in obtaining authenticity certificates for selling certified and genuine Pashmina products.

The Institute organized programmes to celebrate all the important events, such as World Heritage Day, International Day for Biological Diversity, World Environment Day, Hindi Diwas, GIS Day, World Wildlife Day, and International Day of Action for Rivers, to meet their objectives and spread awareness.

The Institute's commitment towards further promoting a green environment was manifested in the cleanliness activities in the campus. The cleanliness drive was organized many times at many places of the Institute's campus and its surrounds.

The Institute continued to build the capacity of natural resource professionals in the country and the region through training, research, academic programmes and by providing advisory services to its stakeholders.

I would like to acknowledge the precious professional inputs provided by the Institute's governance and administrative committees, faculty colleagues, staff, researchers, students, and various stakeholders that have enabled us to fulfil the Institute's mandate and responsibilities successfully.

(Virendra R. Tiwari)

16 January, 2024

YEAR AT A GLANCE

The year 2022-23 was fruitful in-terms of ensuring the timely execution of mandates of the institute. The regular courses run by the Institute received a good response. Many research projects achieved significant milestones.

The postgraduate programme, i.e. the 18th Batch of the MSc in Wildlife Science, commenced during the reporting period, with 20 students. The students had theory classes and field exposure for semesters I and II. The orientation tour for the students was conducted in Lansdowne Forest Division and Techniques Tour was conducted in Pench Tiger Reserve, Maharashtra. They visited Bhitarkanika, Rushikulya in Odisha and Chambal National Park, Madhya Pradesh as part of their Wetlands tour.

The Institute regularly conducts training programmes for in-service officials of Forest Departments of various states of the country. During the reporting period, the XLII Post Graduate Diploma in Advanced Wildlife Management was concluded. Ten officer trainees of the rank of DCF/ACF from ten states participated in the course. During the reporting period, an International Wildlife Management Study Tour to South Africa was organized for two Batches of Postgraduate Diploma Course in Advanced Wildlife Management trainees, as one batch could not undertake the tour due to COVID pandemic. The 43rd Postgraduate Diploma Course in Advanced Wildlife Management commenced on 1 October 2022.

XXXVII Certificate Course in Wildlife Management was completed successfully in February 2023. Eleven officer trainees of the rank of Range Forest Officers, Deputy Range Forest officers & equivalent from different States within the country participated in the course. The participants of the course visited the Protected Areas of Sri Lanka on Management Tour.

Workshops, seminars and short-duration training courses were organized for various stakeholders and participants during the reporting period. The faculty members, researchers and students of the Institute published 84 papers in Peer-Reviewed International Journals, 22 papers in Peer-Reviewed National Journals, and presented papers in various seminars. Besides these, four books were also published during the reporting period.

The Institute worked on 64 research projects during the reporting year and completed 10. A total of 45 research projects were ongoing as per their schedule. Nine new research projects were initiated during this year. Apart from these projects, the Institute carried out work on eleven consultancy projects under Environmental Impact Assessment and completed four of them during the reporting period.

This Annual Report covers all the above activities and much more to present the overall picture of the multi-dimensional activities during the reporting period.

ROLE & MANDATE

Introduction

During the early eighties of the last century, there was a worldwide realisation that natural resources were diminishing at an alarming rate, and the environment was degrading very fast. At the same time, the understanding of environmental issues was still a little hazy, and the initial remedial responses to the complex ecological problems had mixed outcomes.

This realisation and need for conservation initiatives also brought into focus the inadequacy of skilled human resources for wildlife management and wildlife biologists to conduct research and overcome the lack of researched information for promoting proper conservation planning. A need was also felt for establishing an organisation that, through multi-disciplinary research at the field level, could help respond to the challenges of biodiversity conservation and develop holistic approaches for managing wildlife and habitats across the country and the region. This situation led to the setting up the Wildlife Institute of India (WII) at Dehradun in 1982.

WII is a premier training and research institution in the field of wildlife and protected area management in South Asia. In 1986, the Institute was granted the status of an autonomous institution by the Ministry of Environment, Forest and Climate Change (MoEFCC), Government of India. Since its inception, WII has had the benefit of collaboration with international organisations such as UNDP, FAO, USFWS, IUCN and UNESCO. These partnerships have helped the Institute build qualified faculty and staff through rigorous training and exposure to modern research and analytical techniques.

The Institute's vast array of capacity-building programmes provides a practical and realistic direction to the concept and practice of wildlife conservation. By learning from its own and others' experiences, WII is traversing a path of hope and aspiration, which will help strengthen finding answers in addressing wildlife conservation issues and challenges in the country and the South Asian region.

Our Mission

The mission of WII is to nurture the development of wildlife science and promote its application in the field in a manner that accords with our economic and socio-cultural milieu.

Aims and Objectives

- Build up scientific knowledge about wildlife, their habitat and conservation.
- Train forest personnel at various levels in the conservation and management of wildlife.
- Carry out research relevant to management, including the development of techniques appropriate to Indian conditions.
- Provide information and advice on specific wildlife management problems.
- Collaborate with international organisations on wildlife research, management and training.
- Develop as a regional centre of international importance for the conservation of wildlife and natural resources.


भारतीय वायु सेना

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CONSERVATION STATUS, HABITAT EVALUATION AND CONFLICTS OF SLOTH BEAR IN PALKOT WILDLIFE SANCTUARY, JHARKHAND

Funding Source
Jharkhand State Forest Department

Date of Completion
June 2022

Investigator
Dr S. Sathyakumar

Researchers
Avinash Yadav and Shalini Jaiswal

Date of Initiation
April 2021

RESEARCH COMPLETED

Objectives: The objectives of the project were to (i) assess the status, distribution and relative abundance of Sloth bears in Palkot WLS and the surrounding Eco-Sensitive Zone (ESZ); (ii) evaluate sloth bear habitats and suggest management strategies for improvement of degraded sloth bear habitats in the study area; and (iii) assess the Human-Sloth bear conflict patterns based on conflict records and identify conflict hotspots in the study area for monitoring.

Progress and Outcome: Sloth bear occupancy, relative abundance and habitat evaluation were conducted using stratified random sampling and rapid assessment surveys in the Palkot Wildlife Sanctuary and surrounding Eco-sensitive zone. Questionnaire surveys for human-sloth bear conflicts were additionally conducted, and data on conflict related to sloth bears was generated. Information was generated on ecological and anthropogenic parameters, and conflict hotspots were mapped for future monitoring along with management recommendations for conflict reduction. The project has been completed, and the report has been submitted to the concerned department.

Milestone: Establishment of baseline data for monitoring vegetation and anthropogenic pressure in Palkot WS, enabling strategic outcomes and habitat management.

CAUSES AND REMEDIES OF MAN-ANIMAL CONFLICT IN UTTAR PRADESH (PHASE I)

Funding Source
Uttar Pradesh Forest Department

Date of Initiation
April 2022

Investigator
Dr S. Sathyakumar

Date of Completion
September 2022

Researchers
Dr Srishti Gwal,
Harshal Balakrishna Waghmare,
Pavan C, Maitreyee Vishwas Bhave,
Shashank Arya and Prashant Kumar

RESEARCH COMPLETED

Objectives: The project has the objectives of (i) identification of critical gaps for prevention of humans in Uttar Pradesh; (ii) sensitivity mapping of the state from the perspective of man-animal conflict; (iii) study of the present strategy of human suggestions for necessary amendments in it; (iv) identification and prioritization of areas for resettlement of tigers and leopards who came out of the natural habitat by wandering in other suitable habitats of the state such as in Tiger Reserve / Wildlife Sanctuary / Reserved Forest Area; (v) suggestions on the use of current technology and equipment for the prevention of human-wildlife conflict and inclusion of latest technology/equipment; and (vi) capacity development of human resource for prevention of human-wildlife Conflict.

Progress and Outcome: Phase I of the study analyzed secondary data from the past 11 years to understand the Human Wildlife Conflict (HWC) scenarios in Uttar Pradesh. The study revealed that leopards, elephants, and tigers were the main species involved in conflicts, with most incidents occurring during the monsoon season. The report also examined land use and forest fragmentation, showing marginal changes at the state level but significant changes in the Terai Arc landscape. The study emphasized the importance of addressing critical gaps and mapping sensitive areas for HWC, particularly for leopards, tigers, and elephants. Logistic regression models assessed conflict risk probabilities based on various factors. The findings indicated the need to consider proximity to protected areas, human settlements, and other variables when predicting HWC occurrences. The project has been completed, and the report has been submitted to the concerned department.

Milestone: Phase-I analysis revealed Human Wildlife Conflict (HWC) patterns and conflict risk assessment, guiding strategic measures for managing human-wildlife conflicts in Uttar Pradesh.

WILD TIGERS OF SIMILIPAL: A STUDY ON SPATIAL DISTRIBUTION, ABUNDANCE AND POPULATION GENETICS

Funding Source
Odisha Forest Department

Date of Initiation
January 2019

Investigators
Dr Samrat Mondol, Dr Bivash Pandav, Dr Bilal Habib, Dr Manoj Nair, IFS; Dr Debabrat Swain, IFS

Date of Completion
December 2022

Researcher
Harshvardhan Singh Rathore

RESEARCH COMPLETED

Objectives: The objectives of the project are to (i) estimate the population density of tiger and their co-predators, (ii) estimate the spatial distribution and ecological density of wild ungulate prey species, (iii) estimate genetic relatedness social dynamics and population structure of tigers; and (iv) investigate the underline genetic mechanism responsible for tiger melanism.

Progress: During the project's duration, the researchers focused on estimating the population density of tigers and leopards in Similipal Tiger Reserve (STR) for the All India Tiger Estimation 2022 exercise. A camera-trapping plan was prepared, and the entire STR was overlaid by a grid of 2 sq km in which a pair of camera traps was to be deployed. Each camera-trap location was decided to be kept functional for at least 25 days. All the ranges of the core were targeted for camera trapping. The exercise was to be conducted in two blocks. The first block covered the six forest ranges: Thakurmunda WL, Kendumundi WL, Upper Barakamuda, Bhanjabasa, National Park, Gurguria WL, and Jenabil. The second block encompassed four forest ranges: Nawana an intensive sign survey was conducted in each 2 sq km grid to determine the best location for the camera traps. The researchers also

collected all the large carnivore scats encountered during our survey to subsequently fulfil other project objectives. In total, 459 camera-trap locations were deployed in the exercise. The data from all the locations was retrieved, and all the images were geo-tagged. Subsequently, all the leopard and tiger images were sorted and cross-checked to create uniquely identified tiger and leopard using their pelage pattern.

Line transects were also walked to determine the density of prey in the entire Similipal Tiger Reserve. In total, 74 line transects were walked with an effort of 1,243 km. The team conducted opportunistic camera-trapping in Kuldiha WLS to ensure the tiger's presence and movement from Similipal Tiger Reserve.

Outputs and Outcomes: The researchers captured 16 individual tigers in Block I and Block II, of which seven were melanistic. The researchers also photographed eleven tiger cubs with a female, indicating that the Similipal population is still breeding. It is probably the last breeding tiger population in the entire East-Central landscape (The states of Chattisgarh, Jharkhand, Odisha, and South Bengal put together).

The project work also ascertained the tiger's return to Kuldiha Wildlife Sanctuary after a decade and its movement from Similipal Tiger Reserve.

The estimates of prey density in Similipal Tiger Reserve have been generated from the line transect data, with the Hanuman Langur, Semnopithecus entellus being the most abundant prey in the tiger reserve and Chital, Axis axis being the most abundant ungulate species.

Milestone: The researchers assisted the Odisha Forest Department in successfully conducting All India Tiger Estimation (AITE), 2022, in Similipal Tiger Reserve. Capacity building exercise was carried out by imparting training on MSTrIPES Ecological application to foresters of multiple forest circles of Odisha State to conduct Phase I of AITE, 2022 successfully. The photograph of eleven tiger cubs in a trapping season is the highest since the project's initiation and highlights the potential increase in tiger numbers at Similipal Tiger Reserve.

The movement of a tiger from Similipal to Kuldiha highlighted the functionality of the corridor between the two protected areas, and the finding is crucial, keeping in mind that the tiger returned to Kuldiha after a decade of their local extinction. The team successfully generated the prey density estimates for the core and buffer of Similipal Tiger Reserve, which would help in planning Tiger Conservation Plan of the reserve.

ASSESSMENT OF SPATIAL AND TEMPORAL OCCUPANCY OF TIGER AND ELEPHANT IN RELATION TO HABITAT CHARACTERISTICS AND ANTHROPOGENIC FACTORS FOR THE CREATION OF ECO-SENSITIVE AREAS IN SAWANTWADI AND DODAMARG TALUKAS OF SINDHUDURG DISTRICT IN WESTERN GHATS OF MAHARASHTRA, INDIA

Funding Source
Maharashtra Forest Department

Date of Initiation
November 2020

Investigators
Dr Bilal Habib, Dr Gautam Talukdar and Dr S.P. Goyal

Date of Completion
January 2023

Researchers
Dr Rohit Chaudhary, Dr Rahul De and Dr Vinay Kumar

RESEARCH COMPLETED

Objectives: The objectives of the project are to (i) assess spatial and temporal variation in occupancy of tiger, elephant and other wildlife species in relation to habitat characteristics and anthropogenic factors; (ii) assess the functionality of the corridor of villages of Sawantwadi and Dodamarg talukas of Sindhudurg district for linking

Syadhari landscape in the north with the central Western Ghats based on genetic approaches; and (iii) identify and delineate areas if needed for the creation of Eco-Sensitive Area (ESA) for retaining the functionality of corridor between northern and central Western Ghats.

Progress: The project is aimed at understanding the status of a functional wildlife corridor in Dodamarg and Sawantwadi taluka of Sindhudurg district, enabling us to delineate the villages under an eco-sensitive zone. The researchers used three different approaches to achieve the aims of the project, *viz*. (i) use of camera traps to assess the presence of mammalian fauna in different villages, (ii) habitat quantification at the village level to determine the quality of habitat and GIS and Remote Sensing data analysis. The team conducted fieldwork to determine the status of wildlife and habitat between March 2021 and May 2022 of Dodamarg and Sawantwadi talukas. These were determined in 442 grids, each of 2 sq km covering 15 (126 sq km) and all villages (500 sq km) of Sawantwadi and Dodamarg talukas, respectively.

The researchers assessed spatial variation in wildlife species occurrence and abundance concerning habitat characteristics using camera traps, habitat quantification, terrain complexities, the extent of human disturbance, structured questionnaire, crop depredation compensation data of Dodamarg taluka, and Remote Sensing and GIS analysis. The team deployed 323 camera traps; however, data could be retrieved only from 304 camera traps due to theft (14) and non-functional (5). These functional camera traps resulted in 9,281 trap nights.

Outputs and Outcomes: During the study period, camera trap sampling resulted in 21 species of mammals such as Tiger, Panthera tigris, leopard, Panthera pardus fusca, wild dog, Cuon alpinus, sloth bear, Melursus ursinus, gaur, Bos gaurus, sambar, Rusa unicolor, barking deer, Muntiacus muntjac, four-horned antelope, Tetracerus quadricornis, mouse deer, Moschiola indica, wild pig, Sus scrofa, bonnet macaque, Macaca radiata, hanuman langur, Semnopithecus entellus, Indian hare, Lepus nigricollis, Indian porcupine, Hystrix indica, palm civet, Paradoxurus hermaphroditus, small Indian civet, Viverricula indica, ruddy mongoose, Herpestes smithii, grey mongoose, Herpestes edwardsii, rusty spotted cat, Prionailurus rubiginosus, strip necked mongoose, Herpestes vitticollis and pangolin, Manis crassicaudata. Among the birds, the most captured were peafowl, Pavo cristatus and grey junglefowl, Gallus sonneratii. Of these species, more than five wildlife species were captured in the majority of villages (81%) of Dodamarg taluka, whereas it was 71% in the studied villages of Sawantwadi Taluka.

The Relative Abundance Index (RAI) (independent capture/100 trap nights) of mammal species in the study area ranged from 0.03 to 10.0. Among large to medium-sized carnivores, RAI was in the order of leopard (0.93) > wild dog (0.53) > tiger (0.24). These species captured in a number of villages were leopard (69) > wild dog (19) > tiger (6) of the studied villages in both the talukas. Mouse deer and barking deer are of low density and good forest indicators species. The highest RAI was for sambar (10.0) and was reported from 64 studied villages. Smaller body-seized mammals, such as civets and mongoose species, were captured across the landscape. However, elephants were not photographed as the placement of camera traps were planned to maximize the capture of maximum mammals' but not of megaherbivore like elephant.

Despite extensive camera trapping during summer and winter, the team detected tiger movement in Sawantwadi-Dodamarg Wildlife Corridor in six villages *viz*. Mangeli, Bhekurli, Bambarde, Shirange, Ker and Khadpade between 15.01.22 and 10.03.22. Overall, 22 independent tiger captures were recorded, and of these, Mangeli and Bhekurli villages have the largest captures (5 to 7). The examination of 756 incidences of elephant crop depredation data indicated that 81% of these were only in three villages. Bambarde, Ghatiwade, and Hewale, whereas the remaining 19% were in 10 villages. Of these

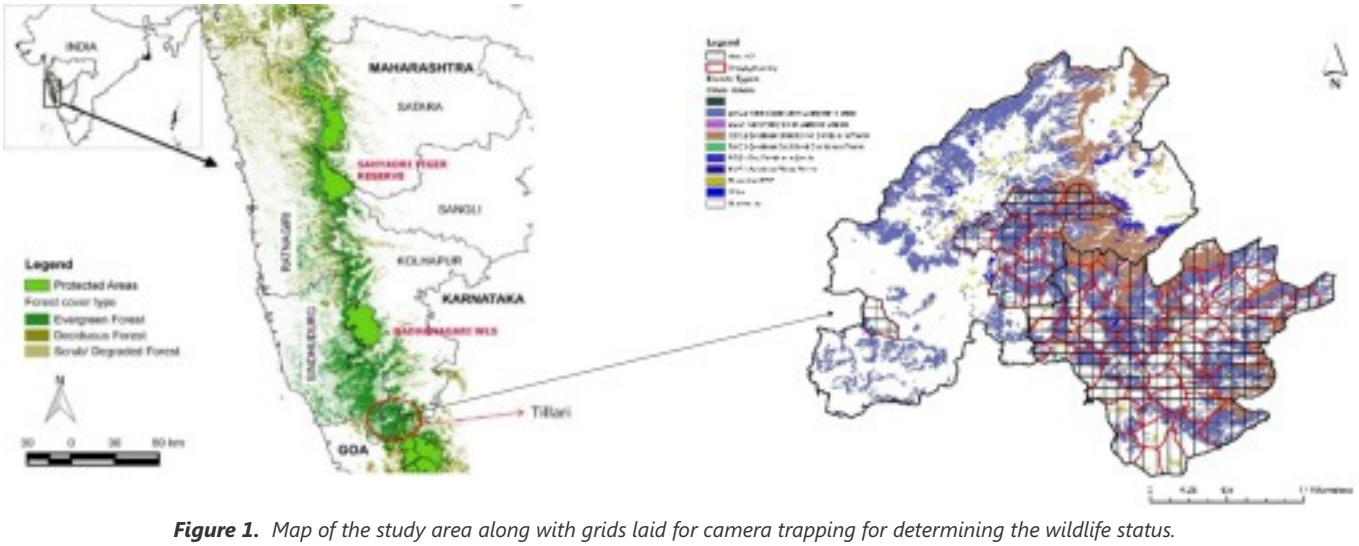

Figure 1. *Map of the study area along with grids laid for camera trapping for determining the wildlife status.*

13 villages, ten villages are already either part of Tillari or Amboli-Dodamarg Conservation Reserves. All 13 villages have also been suggested for inclusion in ESA.

The team characterized habitat by quantifying vegetation (tree, shrub, ground cover, canopy cover), terrain characteristics using remote sensing data and human disturbance around the camera trap site and online transects in each village. The majority of Dodamarg taluka villages still retain good density (number/ha) of trees (244 to 1,130) and shrubs (923 to 2,547). All the habitat characteristics analysis suggest that the landscape is still conducive to supporting wildlife diversity.

Based on the analysis of wildlife status, habitat use, terrain heterogeneity, and habitat connectivity landscapes, the recommendations are as follows: (a) Species richness, Relative abundance Index of different mammal species and habitat characterization suggest that Sawantwadi-Dodamarg region of Sindhudurg District of Maharashtra has wildlife corridor value; (b) The team observed the presence of tigers, leopard and elephant use along with other wildlife species in Sawantwadi-Dodamarg Wildlife Corridor (SDWC). Movement of tigers was also reported earlier between Sahyadari Tiger Reserve, Maharashtra and Kail Tiger Reserve, Karnataka through SDWC. Hence, all these observations clearly indicate the significance of the habitat connectivity landscape between the northern and central Western Ghats.

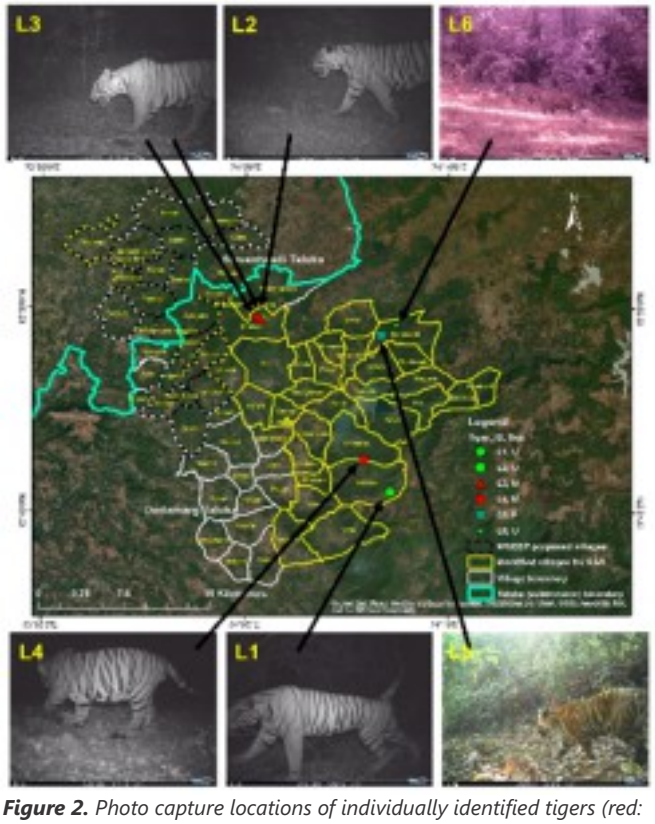

Figure 2. *Photo capture locations of individually identified tigers (red: male, blue: female, green: unknown) based on left flank photographs across the Dodamarg taluka, Sindhudurg, Maharashtra, during winter camera trapping.*

Figure 3: *A leopard was caught at one of the camera trap locations in the study area.*

*Sawantwadi Taluka***:** The team conducted the fieldwork in 15 villages of Sawantwadi taluka for inclusion as ESA. (i) All these villages recommended by WGEEP have already been included as ESA except two villages *viz*. Bhalawal and Otavane vide draft notification S.O. 5135 (E) dated 03.10.2018 issued by the Ministry of Environment, Forest and Climate Change, Govt. of India. (ii) Therefore, it is suggested that Bhalawal and Otavane villages of Sawantwadi taluka, as suggested by WGEEP, should also be included in ESA for retaining the habitat connectivity within Sawantwadi and Dodamarg talukas as SDWC. (iii) Based on the landscape connectivity configuration of Sawantwadi taluka as SDWC, the team noticed that two villages *viz*. Kalambist and Satuli are not included as ESA but are within the declared ESA villages. The team suggested the inclusion of the Kalambist and Satuli villages of Sawantwadi taluka as ESA because of their strategic location within the declared ESA villages of Sawantwadi taluka.

Dodamarg Taluka: (i) Dodamarg taluka of 500.10 sq km has 62 villages (www. https://www.censusindia2011.com/maharashtra/sindhudurg/dodamarg-population. html). (ii) Ten villages were suggested for ESA by the WGEEP committee and are not part of the Tillari Conservation Area (TCA) and Amboli-Dodamarg Conservation Reserve (ADCA). (iii) Based on the analysis of habitat suitable for wildlife use and retaining the connectivity, the researchers recommended the inclusion of 35 villages as ESA *viz*. Awade, Aynode, Bambarde, Bhekurli, Bodade, Fukeri, Ghatiwade, Ghotge, Ghotgewadi, Hewale, Kendre Bk., Kendre Kh., Ker, Khadpade Tarf Banda, Khanyale, Khokaral, Kolzar, Konal, Mangeli, Morle, Pal, Palye, Parme, Patye, Sargave, Shirange, Shirwal, Sonawal, Talekhol, Talkat, Terwan, Terwanmedhe, Usap, Virdi, Zolambe. (iv) Whereas Kumbhavade of Dodamarg taluka has already been declared as ESA under Sawantwadi taluka vide draft notification S.O. 5135 (E) dated 03.10.2018 issued by the Ministry of Environment, Forest and Climate Change, Govt. of India. (v) These villages (n=36) cover an area of approximately 338 sq km where most of the

forest habitats are still intact, connecting the adjoining conservation landscape of the states of Goa and Karnataka.

Measures to conserve the biodiversity of the landscape: (i) Projects and activities which are prohibited or regulated in the ESA as per the draft notification S.O. 5135 (E) dated 03.10.2018 issued by the Ministry of Environment, Forest and Climate Change, Govt. of India shall also be applicable for the villages recommended for inclusion in ESA of Sawantwadi and Dodamarg talukas, (ii) Restrict the sale of "Private Forest" in the recommended villages for ESA, (iii) Develop mechanism for "Land sparing" for diversity conservation among "Private Forest" owners of the recommended villages for ESA, (iv) Undertake habitat restoration by planting Katang or thorny bamboo, Bambusa bambos within 100 m on both sides of significant drainages within ESA villages as this species does not have any commercial value. This will provide additional corridor areas for moving from one habitat to another by wildlife, (iv) Conservation measures suggested by earlier studies through community participation may be attempted, (v) Identified villages as ESA of Sawantwadi and Dodamarg talukas are a bottleneck and critical corridor for connecting northern to central Western Ghats. Therefore, to ensure long-term conservation goals all along the Western Ghats for the wellbeing of humans, it is suggested to initiate the process for acquisition of a "Private Forest" of recommended villages as ESA of Sawantwadi and Dodamarg talukas as per the provisions available of Section 4 and 5 of "The Maharashtra Private Forests (Acquisition) Act, 1975.

RESEARCH COMPLETED

STATUS OF THREATENED MEDICINAL AND AROMATIC PLANTS AND THEIR USE BY THE LOCAL COMMUNITY IN NITI VALLEY, NANDA DEVI BIOSPHERE RESERVE, UTTARAKHAND

Funding Source
IUCN-India

Date of Initiation
April 2022

Investigators
Dr Amit Kumar and Dr B.S. Adhikari

Date of Completion
March 2023

Researcher
Arun Pratap Mishra

Objectives: The objectives of the project are to (i) access existing knowledge on the status, abundance, and use of Medicinal and Aromatic Plants (MAPs) in the study site; and (ii) suggest sustainable harvesting protocols of selected threatened MAP species.

Progress: The report has been submitted to IUCN-India. Nested in the Western Himalaya, the state of Uttarakhand, also known as the 'herbal state of India,' harbors more than 5000 species of vascular plants, of which one-third species have medicinal uses. The state abounds in a rich and varied flora and fauna, constituting the most species-rich part of the whole of the Western Himalaya. The extreme north of the state contributes approximately 1% (*ca*. >1,000 sq km) of the total Trans-Himalayan region (*ca*. 98,660 sq km) of India. However, in spite of rich floral diversity, the cold-arid regions of Nilang, Niti, Mana, Johar, Darma and Byans valleys of Uttarakhand along the northern frontiers that falls under Trans-Himalayan Biogeographic Province (1C) are underexplored in terms of the current levels of pressure and patterns of biodiversity. These areas have also been facing tremendous pressure due to over-exploitation of forest resources including the unscientific and illegal harvesting of MAPs from the wild.

The current study was conducted to study selected threatened and high use value MAPs in Niti valley, a cold-arid region of Nanda Devi Biosphere Reserve with a focus to (i) assess the status, abundance, and use of MAPs, and (ii) suggest their sustainable harvesting and cultivation framework. The information on the focal species was gathered through primary *viz*., semi-structured open-ended and closed-ended questions including individual interactions and group discussions in selected villages (7) and secondary information through offline and online sources. After reconnaissance and stratification of habitats, population status of focal species was assessed using stratified random sampling. Based on extensive interactions with younger generation, elder people including local healers, plant collectors and local traders, a total of five high value (with significant economic end usage) MAPs namely *Allium stracheyi, Carum carvi, Dactylorhiza hatagirea, Picrorhiza kurroa* and *Sinopodophyllum hexandrum* were selected in Niti valley, NDBR. The selection of MAPs was based mainly on

highest quantum of collection and high threat due to removal and usages.

Outputs and Outcomes: The researchers developed sustainable harvesting protocols for five threatened plant species. The current study highlights that the population of the focal species (except *Carum carvi*) are sparse albeit rapidly declining due to excessive exploitation, unscientific, illegal and premature harvesting. Therefore, keeping their current population status in view, preparation of micro-plans, assessment of available growing stock and sustainable management and utilization of dwindling populations is recommended.

Besides over-exploitation of MAPs, knowledge on their available stock, lack of information on end users and middlemen and inadequate information on quantity of raw material traded due to secretive nature of the markets were reported. In Niti valley, the market trend, price *vis* a *vis* trade route is indiscernible for highly traded medicinal species such as *Gucchi*, *Morchella esculenta* and *Keedajadi, Ophiocordyceps* sinensis which sells in the market like a hot cake, and therefore has created hue and cry state among the locals. Hence, these issues need to be addressed to ensure long-term conservation of the MAPs in a way that livelihood needs of the locals depending on such resources are not compromised.

The focal species are one of the highly traded MAPs from the Western Himalaya, in general and Niti valley, particularly. Therefore, considering the existing threats, habitat specificity, population size and pressure level, the focus of conservation and regulated harvest is particularly needed for (i) restricted distribution heavy pressure (RDHP) species such as *Picrorhiza kurroa* and *Dactylorhiza hatagirea*, and (ii) locally common heavy pressure (LCHP) species such as *Allium stracheyi*, *Sinopodophyllum hexandrum* and *Carum carvi* in Niti valley, NDBR.

Bhotiyas, ethnic community of Indo-Mongoloid origin mailny depend on natural resources from the adjacent forests and alpine pastures or meadows (locally known as payar) for their livelihood. Therefore, considering the high use value, market opportunities, price of the produce, and ease of cultivation or harvesting processes, the current study proposes *Allium stracheyi, Carum carvi* and *Saussurea costus* as the potential species that can be encouraged for their cultivation in Niti valley. It will not only provide livelihood opportunites to the local inhabitants but also check ruthless exploitation of the wild MAPs.

The local inhabitants are dependent on the wild MAPs for their traditional health care system. They are knowledgeable of about 72 MAPs that are locally utilized for consumption and for curing at least 24 different human ailments. However, the practice of utilising MAPs in their local healthcare system is sharply declining due to lack of education facility and market, which has led to lack of knowledge as well as transfer of knowledge to younger generations.

The payar such as Bamplas, Lang, Goting, Rekhana (base of Mount Kamet) and Geldung in Ganesh Ganga; Timersain and Thali enroute Kalajowar, and Daman towards Sagar glacier in Amrit Ganga are rich in medicinal plant diversity. Thus, considering the unique medicinal diversity and traditional ways of their conservation in view, rotation grazing in the forested areas including heavily grazed payars such as Daman, Thali, Timsersain and Goting in a cycle of 2-3 years is proposed.

Owing to excessive human population, it is evident that the demand vis-a-vis harvesting pressure on wild populations of several MAPs is increasing every year. Thus, in order to meet the accelerating demand of high use value MAPs, there is an urgent need to develop farm scale agro-techniques for priority MAP species in the absence of such efforts on lab to land tested techniques.

Milestone: In the current study, sustainable harvesting and cultivation framework have been designed for the selected five MAPs, although appropriate demonstration sites showcasing such agro-techniques in the cold-arid landscapes such as Niti valley in Uttarakhand be set up to build confidence of the plant growers or locals in adoption of such medicinal crops in their agricultural practices.

RESEARCH COMPLETED

DEVELOPMENT OF CITY BIODIVERSITY INDEX OF BHOPAL AND INDORE CITIES OF MADHYA PRADESH

Funding Source
Madhya Pradesh State Biodiversity Board

Investigator
Dr Gautam Talukdar

Researcher
Avantika Adhruj

Date of Initiation
September 2021

Date of Completion
March 2023

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Objectives: The project has the objective of documenting the status of native biodiversity in the city and computing the City Biodiversity Index of Bhopal and Indore cities of Madhya Pradesh.

Progress: A natural asset map has been developed for Bhopal and Indore. City Biodiversity Index (CBI) has been calculated for Bhopal and Indore. Final reports are being prepared for City Biodiversity Index of Bhopal and Indore. A final consultation and dissemination workshop has been conducted.

Outputs and Outcomes: Natural Asset maps have been developed for Bhopal and Indore, comprising 12 classes for Bhopal and 11 classes for Indore. These maps were utilized to determine the connectivity patches in both cities to calculate Indicator 2. A list of native species for five different taxa in both cities has been prepared. The taxa include - plants, birds, butterflies, fishes and herpetofauna for Bhopal and spiders for Indore. The final City Biodiversity Index (CBI) has been calculated for Bhopal and Indore as per the guidelines and methodology provided in the user manual of Singapore Index on City Biodiversity, endorsed by Convention on Biological Diversity. There are 23 indicators grouped across three main components- Native biodiversity, Ecosystem Services provided by Biodiversity and Governance and management of BBiodiversity. Each indicator is scored out of 4, thereby the maximum score for CBI is 72. Bhopal has a City Biodiversity Index score of 44 out of 72, while Indore city's score is 34.

Milestone: Final Consultation with the Madhya Pradesh State Biodiversity Board has been conducted, and the city Biodiversity Index been qualified.

RESEARCH COMPLETED

DEVELOPMENT OF A GENETIC DATABASE OF CAPTIVE ELEPHANTS ACROSS INDIA FOR WELFARE AND MANAGEMENT

Funding Source
Project Elephant Division, MoEFCC

Collaborating Agency
Ministry of Environment, Forest and Climate

Investigator
Dr Samrat Mondol

Researcher
Ankit Pacha

Date of Initiation
November 2021

Date of Completion
March 2023

Objectives: The objectives of the project are to (i) establish a set methodology for undertaking captive elephant genetic studies and generate a DNA data archive on Indian elephants. This was planned to be achieved through a set of critical goals: (a) Develop standard operating protocols (SOP) for the collection of DNA samples from various sources from elephants; (b) Develop a tamper-proof sampling kit for biological sampling for database development and maintenance of 'Chain of Custody (CoC)' for legal procedures; (c) Develop a manual for directing the collection of blood samples from captive elephants; (d) Standardize and test

a set of microsatellite markers for elephant individual identification and forensic use pan India; (ii) to conduct a training program for veterinarians under the Forest Department in sample collection, data collection, and other necessary procedures to achieve EGDB goals; and (iii) generation of genetic data from the pilot states focused on the first part of the EGDB project.

Progress: Sampling kits were distributed to sixteen states - Rajasthan (130), Uttar Pradesh (130), Andhra Pradesh (8), Bihar (76), Goa (12), Jharkhand (11), Madhya Pradesh (110), Maharashtra (17), Odisha (25), Punjab (18) and Puducherry (5). The researchers received blood samples from 7 states, namely Rajasthan (n=77), Bihar (n=35), West Bengal (n=26), Tripura (n=77), Odisha (n=2), Punjab (n=11), Uttar Pradesh (n=26). A total of n=224 samples and physiological and pictorial data were collected from seven captive elephant states.

Out of all the individuals, 56% of the individual's origin was unknown, about 27% of the animals were captive-born, and 16.5% were wild-caught. The percentage of male and female elephants was 29% and 71%, respectively.

The researchers of the Institute finalized 15 primers from a set of 30 already published sets of primers used for Asian elephants. These primers were used to generate data for all the elephants whose samples were collected. A total of 300 sample data have been developed.

Milestones: The resolution power of correctly assigning an elephant to an individual genotype via this primer set (n=13) was decided by the PID(sibs) score (1 x 10-4). This means that approximately one would get assigned the wrong genotype in a population of twenty-five thousand elephants. Pertaining to the recent population of Asian elephants in India, around 30,000, the primer set provides an excellent individual assignment power subject to more samples from southern and northeast India added to the dataset.

The Bayesian clustering analysis of the genetic data broadly segregated into two populations, mainly northern and southern, with few individuals showing signatures of populations different from their location, probably because of the history of transfer of captive elephants between various forest departments. Further, a non-Bayesian clustering analysis also identified two genetic clusters (K=2), a combination of five different centroids suggesting a mixed signature, again pointing towards inter-state translocation.

The Android application is one of its kind, collecting physical and pictorial data of all the captive elephants along with the official information of the elephant and the authority in charge helping in accreting the data in a centralized data at the Wildlife Institute of India.

RESEARCH COMPLETED

FEASIBILITY STUDY OF WILD BUFFALO REINTRODUCTION IN KANHA TIGER RESERVE

Funding Source
Madhya Pradesh Tiger Foundation Society and Madhya Pradesh Forest Department

Date of Initiation
August 2020

Date of Completion
March 2023

Investigators
Dr Y.V. Jhala and Shri Qamar Qureshi

Objectives: The objectives of the project were to (i) identify the source population of wild buffalo for reintroduction in Kanha; (ii) identify potential reintroduction sites in Kanha; and (iii) develop management strategies required to establish and recover the wild buffalo population in Kanha.

Progress: The species distribution model (MaxEnt) was used to identify suitable habitats. Vegetation composition and biomass were assessed using line point intercept and quadrate harvest method. Genetic analysis was done using 3207bp of the mitochondrial DNA to assess genetic differentiation between the northeast and central Indian wild water buffalo populations for choosing founders.

Outcomes: Low-lying grasslands with higher productivity, lower grazing, human pressure, and availability of perennial water sources were suitable for reintroducing wild water buffalo. The low genetic differentiation between northeast and central India suggested wild water buffaloes from the northeast Indian population could be reintroduced in Kanha.

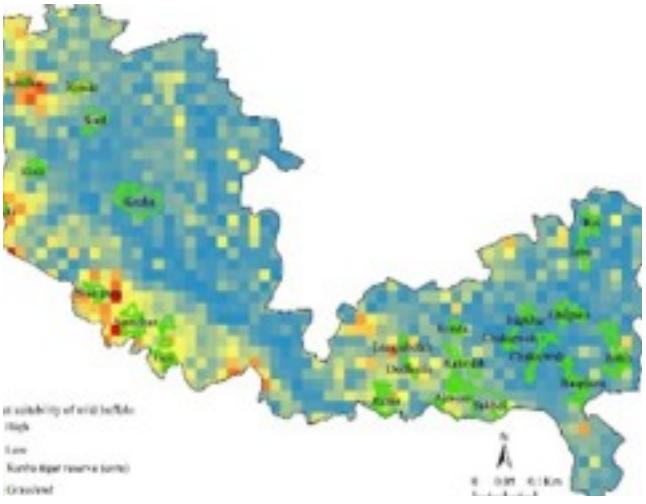


Figure 1: *Habitat suitability map for wild buffalo in Kanha Tiger Reserve*

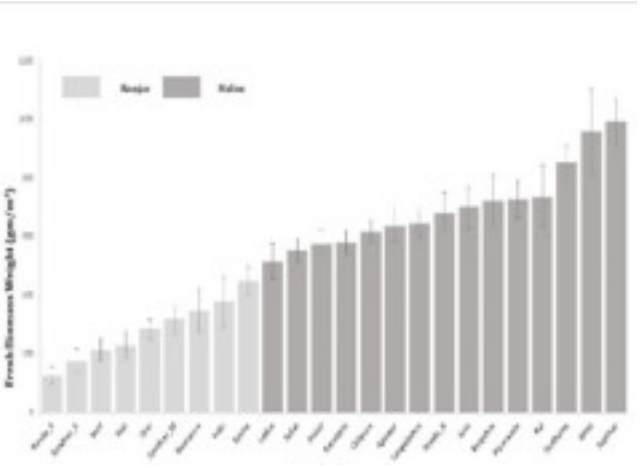


Figure 2: *Above-ground fresh biomass weight (gm/m²) of grasslands in Kanha Tiger Reserve*

Milestone: An action plan was made following the IUCN/SSC (2013) guidelines for reintroduction and conservation translocations and suggested management strategies that would be required to establish and recover the wild buffalo population in Kanha Tiger Reserve.

RESEARCH COMPLETED

GENDER ADVANCEMENT FOR TRANSFORMING INSTITUTIONS (GATI)

Funding Source
Department of Science and Technology

Date of Initiation
August 2021

Investigator
Dr Ruchi Badola

Date of Completion
March 2023

Researcher
Ritu Chauhan

Objectives: The project has the following objectives (i) the GATI pilot project aims to develop and introduce the first gender equality frameworks within India's academic domain; (ii) GATI seeks to bring about institutional reforms to facilitate the intake, advancement and retention of women in STEM at all levels; (iii) committing to the key principles of the GATI charter; (iv) achieving gender equality and empowering women in the institutional climate; (v) creating pathways to bring out transformative change; (vi) institutionalise equity and inclusion through policies; and (vii) strengthen the National STI ecosystem.

Progress: The institution organised capacity-building workshops, seminars, and summit conferences under GATI to provide participants with a deeper understanding of the current issues related to gender equality and empowerment and to enhance their knowledge and skills in promoting gender equality within the institution.

The establishment of Creche/ Day-Care will help attract and retain employees who are parents, and it can also help create a more inclusive and family-friendly environment. This will help to promote financial stability and independence for the families.

On the spot drawing competition was organised for 31 students to sensitise their young minds on the importance of women and their contribution to today's society, emphasising the significance of gender equality. The theme of the on-the-spot Drawing and painting competition was 'Draw your women role model', and students from various schools participated.

For better outreach, WII-GATI's presence is on various social media platforms, including Twitter, Facebook and YouTube.

Outputs and Outcomes: According to the current available data of 206 Researchers, the female percentage stands at 42.23% in WII. 53% of the research staff recruited in various projects of the institute in the year 2020-2022 are women. Currently, WII has 47.86% female students enrolled in the PhD program.

Milestone: The Wildlife Institute of India has been recognised as a Level 1- GATI Institution by the Department of Science and Technology (Women in Science and Engineering (WISE)- KIRAN). An Institute recognized to work to achieve Gender Equality in STEMM, Acceptance of the GATI Charter, High level of commitment to promote Gender Advancement with evidence, etc. Establishment of a Creche/Day-Care centre for working parents in the institute complex.

RESEARCH COMPLETED

MOVEMENT ECOLOGY OF TIGERS, PANTHERA TIGRIS FOR CONFLICT PREDICTION AND LANDSCAPE MANAGEMENT IN SATHYAMANGALAM–NILGIRI BIOSPHERE RESERVE COMPLEX, SOUTHERN INDIA

Funding Source
National Tiger Conservation Authority (NTCA)

Investigators
Dr. K. Ramesh, Dr. Vaibhav Mathur (NTCA) and Mr. Rajendra Garawad (NTCA)

Researchers
Meera Makwana and Alljo A. Paul

Date of Initiation
March 2018

Date of Completion
March 2023

Objectives: The objectives of the project are to: (i) study the spatio-temporal movement pattern of tigers between the population clusters; (ii) predict the human-tiger conflict probabilities in the current and future context based on actual and simulated movement and landscape analyses; and (iii) develop landscape management strategy integrating the emerging knowledge and existing tiger conservation plans.

Table 1: Details of spatial layers maintained as database.

Spatial Layer	Layer Format	Source	Year	Resolution (Meter)
Elevation	Raster	ASTER DEM	-	30
Slope	Raster	ASTER DEM		30
NDVI	Raster	Landsat-8 SR	Annual mean- 2021	30
NDWI	Raster	Landsat-8 SR	Annual mean- 2021	30
Forest Cover	Raster	Forest Survey of India	2017	100
Human Footprint Index	Raster	Last of Wild- HFP Asia v.3	2009	1000
Land Use/ Land Cover	Raster	Copernicus Space Agency	2017	100
River Streams/ Watershed	Vector	Digital Charts of World	-	-
Roadways	Vector	DIVA GIS	-	-
Major Railways	Vector	DIVA GIS	-	-
Administrative Boundaries	Vector	Survey of India	2016	-
Protected Area Boundary	Vector	GIS Cell, WII	-	-

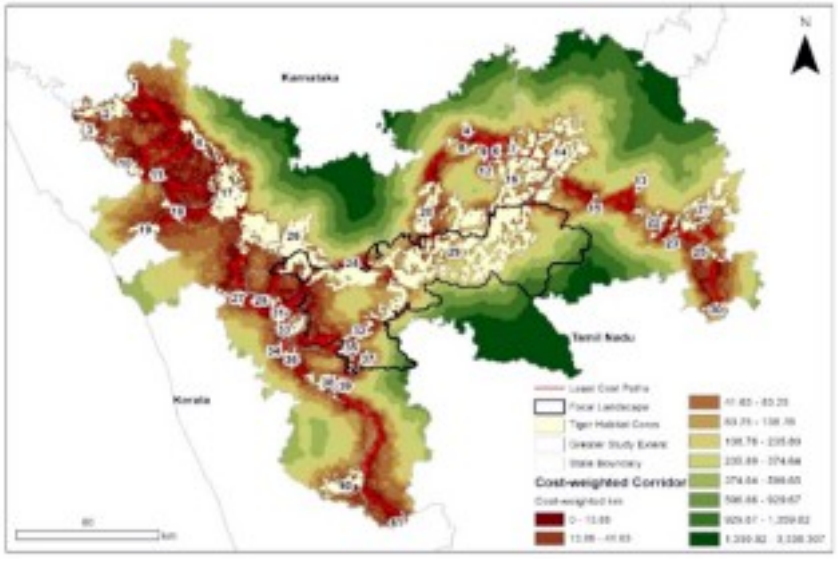


Figure 1. Predicted cost-weighted corridors across 41 habitat cores (labelled for reference)

Progress: Developed spatial database for the landscape.

Modelled Corridor Connectivity: Linkage Mapper predicted eighty-four connectivity links across 41 tiger habitat cores, among which sixty-seven were potential corridor links. Among the predicted Least Cost Paths (LCPs), a shortest distance of 1 km. was represented by that connecting habitat core 5–9, while LCP connecting habitat core 38-40 was the longest (79.254 km). Overall, the habitat cores lying in the central part of the landscape between Western and Eastern Ghats appeared clustered closer, with smaller link distances predictions.

Biodiversity Richness Potential: The biodiversity richness potential analysis was done using multiple thematic layers, and the resultant values varied across the landscape. The richness potential was further described into three classes low, medium and high. The estimated values ranged from 0.21 to 0.58 with a mean score of 0.39. The results indicate that Nilgiri south (86%) has the largest percentage of area falling under the high biodiversity potential class, followed by Nilgiri north (80%) while the division contributing least area were Erode (17%) and Mudumalai (22%). Results of the analysis depict western part of the landscape as a high biodiversity richness potential area and most of the areas falling near the edges of the landscape as low biodiversity richness potential. The model however needs to be validated and strengthened using field data, which is planned to be generated in later phase of the study.

Outputs and Outcomes: While other spatial data generated will serve as baseline in selecting regions to focus research efforts on modelled connectivity. It will provide crucial management inputs in mitigation of human-tiger conflict in the landscape. The predicted corridors can be verified on ground and can potentially inform identification and prioritisation of crucial conservation areas for tigers.

The results generated can serve key role in bringing about a landscape-oriented management approach, which not only is imperative to current conservation need, but will simultaneously benefit both biodiversity and management initiatives. Additionally, the results and methodology have potential of involving inputs from the landscape managers, further aiding in scientifically informed management in the landscape.

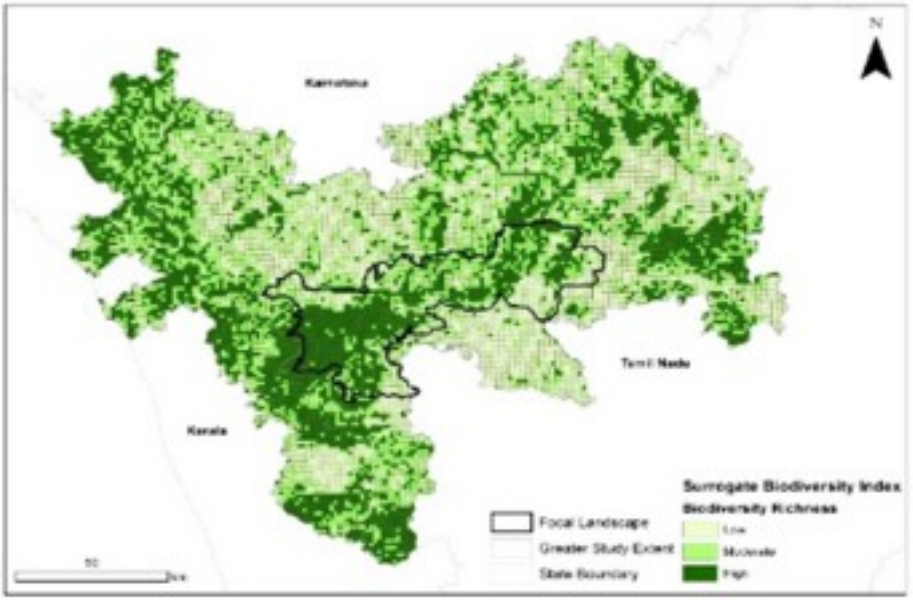


Figure 2. Predicted surrogate biodiversity richness map

Milestone: The progress reports were submitted to the state forest department and NTCA. The management inputs were provided to the state forest department during the release of rescued tiger cub from the landscape into a bigger enclosure to facilitate rewilding.

SECURING HABITATS FOR THREATENED MOUNTAIN UNGULATES THROUGH ROBUST POPULATION ASSESSMENT AND CONSERVATION PLANNING

RESEARCH ONGOING

Funding Source
Ministry of Environment, Forest and Climate Change

Investigators
Dr Vishnupriya Kolipakam, Shri Qamar Qureshi, Dr S. Sathyakumar, Dr Sutirtha Dutta, Dr Lallianpuii Kawlni and Dr Amit Kumar

Researchers
Himanshu Matta, Surojit Moitra, Tarun Singh, Taku Sai, Pallabi Majhi, Sooraj Murali, Nandita Barman and Ritika Tripathi

Date of Initiation
December 2019

Proposed Date of Completion
June 2023

Objectives: The objectives of the project were to (i) assess the population status of ungulate community in representative sub-tropical and temperate Himalaya of Arunachal Pradesh using a robust and conveniently replicable method; and (ii) understand the abundance, habitat relationship, genetic and health status of threatened mountain ungulates serow and goral.

Progress: Analysis of data collected during January 2021 to May 2022 was done. Density estimate of four ungulate species and elephant were obtained at the study site using the camera trap distance sampling method (using independent photo captures recorded by 79 camera traps). Relative Abundance Index (RAI) and species activity pattern estimation of several ungulate species was done. Distance estimation from animal images of images captured using camera traps at field session was completed. Microsatellite primers and DNA Extraction protocol for genetics were standardized. Extraction and quantification of DNA from fecal and blood samples for metagenomics analysis was also completed.

Outputs and Outcomes: Herbivore fauna captured in camera traps or encountered in visual surveys include Elephant, Elephas maximus, Gaur, *Bos gaurus*, Himalayan Goral, *Naemorhedus goral*, Himalayan Serow, *Capricornis sumatraensis thar*, Sambar Deer, *Cervus unicolor*, Barking Deer, *Muntiacus muntjac*, Hog Deer, *Hyelaphus porcinus* and Wild Pig, Sus scrofa. The carnivore fauna photographed by camera traps include Bengal tiger, *Panthera tigris*, Common Leopard, *Panthera pardus*, Clouded Leopard, *Neofelis nebulosa*, Dhole, Cuon alpinus, Golden cat, *Catopuma temminckii*, Leopard cat, *Prionailurus bengalensis*, Marbled Cat, *Pardofelis marmorata*, Asiatic Black Bear, Ursus thibetanus, Yellow Throated Marten, *Martes flavigula* and several civet species.

Three primate species *viz*. Rhesus macaque, Macaca mulatta, Assamese Macaque, Macaca assamensis and Capped langur, Trachypithecus pileatus, and two species of squirrel, the Malayan Giant Squirrel, Ratufa bicolor and the Hoary-bellied Himalayan Squirrel, Callosciurus pygerythrus were recoreded. A total of 79 species of birds belonging to 17 orders and 42 families were recorded.

Camera Trap Distance Sampling: The abundance of ungulates and Elephants were estimated through distance sampling using 79 camera traps with a total effort of 39854495 possible photo capture events. The data from the camera trap was collected for Elephants and seven ungulate species which are Sambar, Barking Deer, Gaur, Wild Pig, Hog Deer, Himalayan Serow and Himalayan Goral. The detections of all the species were good enough to fit the detection function and obtain the reliable density estimate except for hog deer (n = 27), Himalayan Serow (n = 10) and Himalayan Goral (n = 7). Sambar was found to be the most abundant ungulate in Pakke Tiger Reserve, followed by Barking Deer. The density of Sambar and Barking Deer was estimated to be 6.85 ± 1.59 individuals /sq km and 2.52 ± 0.79 individuals / sq km respectively. Density of Elephant was estimated to be 2.88 ± 0.57 individuals/sq km.

Relative Abundance Index (RAI): The relative abundance index was calculated for all the seven species of ungulates and Elephant. The RAI was calculated as the number of individuals captured for a species per 100 trap nights. The RAI for sambar was the highest at 122.29±3.62 followed by Elephant with 55.15±1.93 image captures per 100 trap nights. Himalayan Goral had the lowest RAI 0.19±0.87.

Activity Pattern: All the ungulate species showed activity either during the crepuscular or diurnal periods.

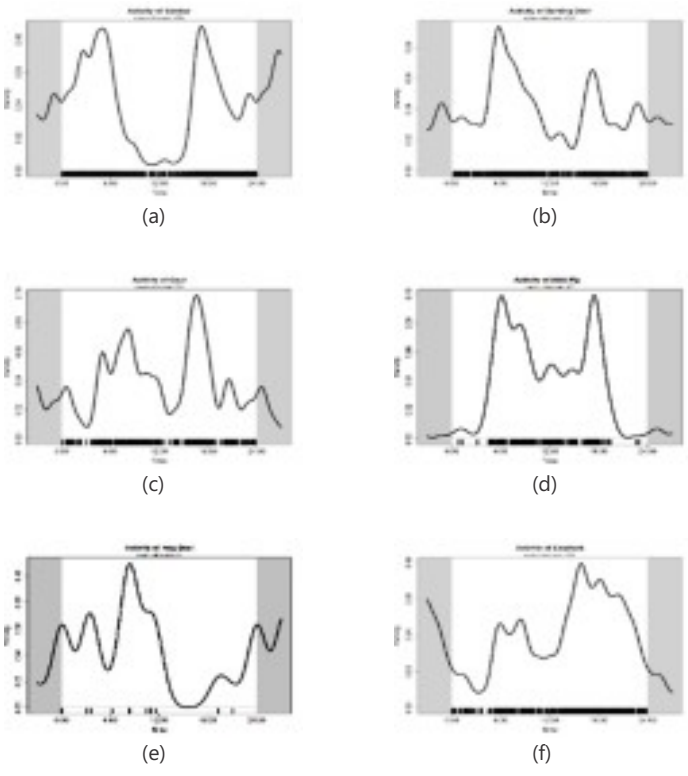


Figure 1: Activity pattern of five species of ungulates, (a)Sambar, (b)Barking Deer, (c) Gaur, (d) Wild Pig, (e) Hog Deer and (f) Elephant in Pakke Tiger Reserve, generated using data retrieved from 79 camera traps.

Independent photo capture events collected from the deployed camera traps were used to examine the activity pattern of ungulates and elephants. Sambar and Barking Deer exhibited two peaks in activity, at 6:00 am in the morning and 6:00 pm in the evening. Gaur activity starts rising in the morning but decreases during noon before peaking late at afternoon. Wild Pig activity was similar to the Sambar and Barking deer; two peaks can be observed one after sunrise another during sunset at the onset of evening. Elephant activity rises during sunrise and gradually decreases late in the morning while reaching its peak during afternoon.

Milestones: A paper on 'Density estimation of ungulates in Pakke Tiger Reserve, Arunachal Pradesh using camera trap-based distance sampling' was presented in the 50 years of Project Tiger and 1st Indian Conservation Conference held during 9-11 April 2023 at Mysuru, Karnataka.

RESEARCH ONGOING

SPATIAL MAPPING OF IMPORTANT MARINE HABITATS OF MALVAN COAST FOR REORGANIZATION OF BOUNDARY OF THE MALVAN MARINE SANCTUARY

Funding Source
Mangrove Foundation, Maharashtra

Date of Initiation
March 2021

Investigators
Dr Gautam Talukdar, Dr K Sivakumar and Dr Anant Pande

Proposed Date of Completion
April 2023

Researcher
Noah Shinde

Objectives: The objectives of the project are to (i) conduct a rapid assessment of the current status of marine biodiversity of MMS through a multi-seasonal survey; (ii) identify and demarcate high priority habitats within and around the sanctuary to advise management interventions; and (iii) build capacity of the frontline forest personnel and local communities to monitor marine biodiversity and generate conservation awareness.

Progress: Scuba diving training workshop was organized. Discussion meeting with local communities were held during the reporting period.

Outputs and Outcomes: Finalization of zones according to priority biodiversity and threats hereby proposed for protection. Scuba diving workshop was conducted for frontline staff of Mangrove Foundation and Maharashtra Forest Department. A discussion was conducted with the local community regarding the reorganization of the boundary of the Malvan Marine Sanctuary. The Project report was completed and submitted to the Mangrove Foundation. The report was finalized and submitted to the concerned agency.

Milestone: PADI SCUBA Diving certification conducted for frontline staff of Mangrove Foundation and Maharashtra Forest Department.

RESEARCH
ONGOING

POPULATION MANAGEMENT OF SPECIES INVOLVED IN HUMAN – WILDLIFE CONFLICT

Funding Source
Ministry of Environment, Forest and Climate Change

Investigators
Shri Qamar Qureshi, Dr Lallianpuii Kawlni and Dr Vishnupriya Kolipakam

Project Personnel :
Project Coordinator: Dr Kafil Hussain,
Project Scientists: Dr Sanath Muliya, Dr Priya Gusain Dr Thammaiah Anu
Project Fellow: Uddalak T Bindani, Prashanth Mahajan, Souritra Sharma, Mariyam Nazir and Bhavna Sahu
Project Assistants: Harshita Prakash, Aditi Karanjkar, Amritesh Dubey, Priyanka Dutta, Deepika Bora and Kalpana Roy

Date of Initiation
July 2018

Proposed Date of Completion
April 2023

Objectives: The objectives of the project are to (i) understand the ecological aspects of conflict management; (ii) develop appropriate reproductive control techniques to manage the population of certain species causing human-wildlife conflict, namely Rhesus macaque, *Macaca mulatta*, Nilgai, *Boselaphus tragocamelus*, Wild pig, Sus scrofa, and Elephant, *Elephas maximus* have been identified as the focal species.

Progress: Analysis of data collected during July 2018 to April 2023.

Ecology (Field Work): Transect walks were conducted to obtain density estimates within the study area. Extensive behavioural sampling sessions conducted to gather information on troop/herds in the given area; troop/herd composition, socio-economic ratios, inter and intra troop/herd dynamics, mating characteristics. Representative individuals, preferably females were GPS collared in each identified study group; ranging patterns, movement characteristics and habitat utilization data being generated.

Rhesus Macaque: 16 sq. km study area was covered for ~97 individuals/sq km (combined effort of 325.5 km). GPS-VHF collar were deployed in each of the four socially distinct study troops (A, B, C and D). The home ranges varied from 19.21-39.64 ha, (KDE LSCV,2018-2020). The team deployed 2 GPS-GSM collars, and obtained data for approximately four months for each. Home ranges varied from 26-47 ha, (KDE LSCV, 2022). The preference for anthropogenic habitat types observed for Rhesus macaques in study site.

Asian Elephant: Nine conflict-causing elephant herds (≈ 98 individuals) were identified. The team radio-collared 22 elephants (9 females, 4 resident males, 9 translocated males) home range resident females - 70.58 sq km (±11.19), resident males-51.2 sq km (±5.94); translocated males home range- 133.40 sq km (±30.72). Genetic mark recapture method standardized for elephants.

Nilgai: Pilot questionnaire survey with farmers was carried out during 13-23 July 2022 to identify ungulate-human conflict around Panna Tiger Reserve, Madhya Pradesh. List of villages situated at the 0-5 Km distance intervals from the Panna tiger reserve buffer were obtained from the forest department office. 127 villages were found to be situated in Panna Range; 37 villages were identified, situated all around the reserve. 310 households within 19 villages have been surveyed till date.

Population Viability Analysis (PVA): Empirical data on population of Rhesus macaque and Asian elephant was used to perform PVA.

Rhesus macaque: 70% non- breeding adult females population will decline to half in ~35yrs; at 80% the population becomes half in ~14 yrs.

Asian Elephant: 90% non- breeding adult females population will decline to half in ~34yrs; at 95% the population becomes half in ~18 yrs.

Nutritional Ecology: Rhesus Macaque: Percentage time spent on anthropogenic food was observed to be higher in Rhesus macaques. Over 70 plant species including fungi were recorded as part of their natural diet, 36 plant samples analysed for dietary proximate principles. Faecal samples collected from all four study troops and performed fibre analysis for 159 samples.

Laboratory Work: Physiology/Reproductive Biology: (i) Blood biochemistry (14 parameters including liver & kidney function) performed for 40 of blood/serum samples of Rhesus macaques; for elephants 18 blood/serum samples analysed for haematology and blood biochemistry. (ii) Standardization of reproductive hormone estimation from fecal/dung & serum samples of Rhesus macaque and Asian elephant (n=56). (iii) Gestational staging in Rhesus macaques (n=10) using portable sonography instrumentation.

Disease Ecology (Asian Elephant): (i) Higher prevalence and parasite load observed in dung samples of wild elephants (n=31) as compared to semi-captive elephants (n=25). (ii) Successful Elephant Endotheliotropic Herpes Virus detection in elephant samples. (iii) Anti-microbial resistance studies in zoonotic bacterial pathogens in elephants.

Rhesus macaque: (i) Higher parasite prevalence and load observed in fecal samples of Rhesus macaques inhabiting anthropogenic areas as compared to the Rhesus macaques dwelling in forest areas (n=52). (ii) Anti-microbial resistance studies in zoonotic bacterial pathogens in Rhesus macaques inhabiting in high human use areas.

Wildlife Physiology & Disease Ecology Laboratory, Veterinary clinic & Animal enclosure: (i) Development of in-house facility for conducting reproductive control trials in Rhesus macaques and wild pig/ small ungulates. (ii) Monitoring, sampling and administration of reproductive control modalities can be performed efficiently within the animal facility. (iii) The collected samples (pre- post and during the reproductive control studies) can be analysed in the WPDE laboratory for determination of reproductive cycles of target animals and titre estimation post application of immunocontraceptive vaccine. (iv) The titre values and reproductive hormone levels thus obtained will enable us to correlate these values with dosages of vaccine administered subsequently allowing to assess the efficiency of reproductive control modality used. (v) Inbuilt BSL-2 facility for culture and processing of pathogens. (vi) Veterinary clinic is equipped with instruments to perform serum biochemistry for liver-kidney function and other important parameters, leading to assessment of safety of the applied reproductive control method. (vii) Portable sonography facility is available at the clinic for gestation monitoring.

Outputs and Outcomes: Extensive demographic data for Rhesus macaques in Chandrabani, Dehradun, a mosaic of forest, urban and rural habitats have been collected. Additionally, based on radio telemetry in four females (one each from study troop), information on ranging patterns, resource use, social organization and behavioral aspects were also established. Further, laboratory studies for gender identification, reproductive endocrinology and diet nutritional estimation have been initiated with help of existing facilities at the institute.

A study to evaluate zoonotic threat from macaques, an under emphasized subset of HWC was initiated. As a beginning, the role of macaques in enterobacterial zoonoses by examining the microflora obtained from freshly collected faeces and their role in maintenance and transmission antimicrobial resistance, a global emerging health concern is being carried out by the laboratory team.

Extensive demographic data for elephants in study sites of Kodagu and Hassan, Karnataka, a mosaic of Protected area, plantations and urban habitats has been collected. Additionally, based on radio telemetry in 22 elephants, information on ranging patterns, resource use, social organization and behavioral aspects are being established. Further, laboratory studies for gender identification, and reproductive endocrinology have been initiated with help of existing facilities at the institute. Data on socio-economics of human elephant conflict since 1992 in Kodagu landscape has been collated in order to understand trends of HEC in the landscape.

Milestone: Compilation of extensive demographic and ecological data for Rhesus macaques in study sites of Uttarakhand, which will enable initiation of the second phase of actual vaccine trials in the species. Extensive demographic and ecological data was compiled for elephants in Karnataka study sites and establishment of several physiological and hormonal reference intervals for elephants based on extensive biological sampling, which will enable initiation of the second phase of actual vaccine trials in the species. Wildlife Physiology and Disease Ecology Laboratory was constructed in WII under the project, which will enable in-house assessment of efficacy and effectiveness of immune-contraceptive vaccines, with built in BSL-2 facilities.

The following paper was presented with published abstract at IPS-MPS Congress Malaysia 2023: Ranging patterns and movement strategy of the synanthropic Rhesus macaque, Macaca mulatta in a mosaic landscape in northern India. Bindhani UT, Muliya SK, Boora D, Kawlni L, Hussain K, Kolipakam V, Qureshi Q.

RESEARCH ONGOING

TRACKING THE NEARSHORE AND MIGRATORY MOVEMENT OF OLIVE RIDLEY TURTLES OCCURRING IN THE COASTAL WATERS OF MAHARASHTRA

Funding Source
Mangrove Foundation

Investigator
Dr R. Suresh Kumar

Researcher
Mohit Mudaliar

Date of Initiation
January 2021

Proposed Date of Completion
May 2023

Objectives: The objectives of the project are to (i) track the nearshore movement of Olive Ridley turtles and understand habitat use during the breeding season along the Maharashtra coast; and (ii) track the post-nesting movement of turtles nesting on the Maharashtra coast and explore details of Diving behavior.

Progress: Five Olive Ridley sea turtles were tagged along the Maharashtra coast in January and February of 2022 which were tracked till August 2022. These tags had premature seization due to technical issues with tags, and two replacement tags were deployed during February 2023 which continue to provide locations of the turtle.

Outputs and Outcomes: Four of the turtles from 2022 were tracked for more than 4 months, and information on their migration and diving behaviour was collected during this period. The turtles were found to use the continental shelf area for most of the tracking period and did not venture into the open-ocean habitat. An interim report of the project was submitted to the Mangrove Foundation relating to the project progress. The two turtles tagged in February 2023 are on move with one turtle moving into waters near Lakshadweep islands and another reaching waters south of Sri Lanka. The final destination of these turtles are still not known as they are still in their migratory phase.

Milestone: This is the first tracking effort for any sea turtle along the western coast of India and the first study to look at their diving behaviour of the species in the Indian waters.

RESEARCH ONGOING

ECONOMIC LOSS ASSESSMENT OF FAUNAL DIVERSITY DUE TO FOREST FIRE ON PER HECTARE BASIS IN UTTARAKHAND AND MADHYA PRADESH

Funding Source
MoEFCC, New Delhi through ICFRE, Dehradun

Investigators
Dr B.S. Adhikari and Dr Salvador Lyngdoh

Researcher
Debaleena Chatterjee

Date of Initiation
January 2020

Proposed Date of Completion
June 2023

Objectives: The project has the objective of economic loss assessment of faunal diversity due to forest fire on per hectare basis for Uttarakhand and Madhya Pradesh.

Progress: The field surveys indicated the presence of threatened species such as the leopard, goral, tiger and Asiatic black bear in Uttarakhand, while four-horned

antelope, sloth bear, leopard, tiger and sambar were spotted in Madhya Pradesh. The areas with low and moderate forest fire severity deteriorated by 16.3 sq km and 5.8 sq km, respectively in Binsar WLS with subtropical pine forests suffering the most damage. Similarly, the highest degradation is seen in tropical moist deciduous forest, where 137.7 sq km and 29.3 sq km areas have been impacted due to low and moderate fire intensities, respectively in Nandhaur WLS. The low forest fire intensity in tropical dry deciduous forest of Ratapani and Nauradehi WLS caused the degradation of 106 sq km and 165 sq km, respectively. Leopard has lost 1.5 sq km from its high habitat zone in Binsar WS, 8.3 sq km from its medium habitat zone, 8.1 sq km from its low habitat zone and 3.4 sq km from its very low habitat zone. Similarly, habitat damages were also observed for goral, porcupine, wild pig, Galliformes etc. Forest fires in Nandhaur WLS also significantly destroyed the natural habitat zones of carnivorous, herbivorous and omnivorous species. The habitat of the four-horned antelope in Ratapani deteriorated to various degrees in its high, medium, low and extremely low habitat zones, reaching 11.6, 32.5, 40.7 and 20.8 sq km, respectively. Wildfires caused habitat destruction for tigers as well, primarily in their low habitat zone, where 47.9 sq km of land was lost.

Outputs and Outcomes: An average economic loss from wildfires is Rs. 3028/- in Binsar WLS, while Rs. 5226/- in Nandhaur WLS. However, it is Rs. 1581/- and Rs. 6729/- for Ratapani WLS and Nauradehi WLS, respectively. Due to low fire intensity, tropical moist deciduous forests and subtropical pine forests experienced the highest economic losses ranging from Rs. 1774/- to Rs. 6330/- and Rs. 1490/- to Rs. 5412/-, respectively in Uttarakhand. The tropical dry deciduous forest in Madhya Pradesh suffered the greatest economic loss ranging from Rs. 6706/- to Rs. 11517/-, as a result of low forest fires.

Milestone: This pilot investigation in India seeks to estimate the financial damage that a forest fire will cause to wildlife with respect to low, moderate and high severities. This research work will eventually open the door for precise financial evaluation studies that take into account wildlife that is affected by any disaster or cause, regardless of whether it occurs inside or outside of protected and non-protected areas. Additionally, the findings would be beneficial to evaluate the economic value of the ecosystem services that any species provides and compute the comparable loss in the environment in the event of species extinction. For each type of fire intensity, the forest department can design effective and preventive fire management techniques to ensure the long-term survival, protection and conservation of species in the wild.

Camera trap installed under Fire Project

RESEARCH ONGOING

UTTARAKHAND STATE WILDLIFE POPULATION ESTIMATION FOR THE HIMALAYAN ZONE

Funding Source
Uttarakhand Forest Department

Investigator
Dr S. Sathyakumar

Researchers
Dr. Ranjana Pal, Shagun Thakur, Shiv Narayan Yadav, Gaurav Sonker, Sayli Sawant, Pooja Chaudhary, Manisha Mathela, Pooja Pant, Raagini Muddaiah, Shivangi Bendre, Tuheina Thakur, Ayushi Khanduri, Himangshu Bora, Syed Mohammad Muzammil, Ankita Das, Janamjai Sehgal, Subhechha Tapaswini, Amritesh Ranjan Dubey

Date of Initiation
April 2021

Proposed Date of Completion
July 2023

Objectives: The goal of this state-wide study is to produce a spatially explicit abundance estimation of key animals in the mid-Himalayan zone of Uttarakhand. Such information will be valuable in understanding the status of several endangered fauna in the state as well as the species-habitat relationship, and impacts of humans on their natural environment.

Progress: The UWPE project was designed to generate spatially explicit abundance estimates of large mammals in the middle Himalayan Zone, specifically in the elevation range of 1,000 – 3,500m. The project consists of two phases: Phase I focuses on collecting baseline information on species through sign surveys in the occupancy framework, while Phase II involves density estimation for target species through subsampling Phase I areas.

The combined efforts of Phase I sign surveys and Phase II camera trap sampling yielded data on large mammal populations in the mid-Himalayan zone of Uttarakhand. During the sign surveys, the project team covered a total distance of 5,930 km in 909 beats of 20 divisions, resulting in the collection of 3,525 sign records for 10 large mammal species. The most frequently encountered large mammals were the common leopard, wild pig, and barking deer.

Outputs and Outcomes: Camera trap sampling efforts during Phase II involved a total of 31,582 trap nights and resulted in 22,873 images of wild species. Among them, 694 images were of common leopards, out of which 516 photographs were identifiable based on right and left flanks. To prevent overestimation, 265 identifiable common leopard photographs were used to create a capture history of 119 individuals (25 males, 13 females, 81 unknown) for the spatial capture-recapture (SCR) analysis.

In addition to the UWPE project activities, the researchers supported forest officials in analyzing the State Macaque and Langur Census, as well as the Snow Leopard Population Assessment of India (SPAI) project for Uttarakhand. The analysis of has been completed, and preliminary results have been communicated to the state forest department.

Milestone: The UWPE project generated spatially explicit abundance estimates of large mammals in the middle Himalayan zone (1,000-3,500m). The estimated Common leopard population in the mid-Himalayan zone of Uttarakhand was 2,276 (SE2,018-2,534) at a density of 17±2 individuals/100 sq km. Additionally, population size for species such as barking deer, goral, sambar and wild pig were also estimated.

ASSESSMENT OF DISEASE PREVALENCE IN UNGULATES IN MIZORAM

Funding Source
Ministry of Environment, Forest and Climate Change (MoEFCC)

Researcher
Akangkshya Priya Gogoi

Investigators
Dr Lallianpuii Kawlni,
Dr S. Sathyakumar, Shri Qamar Qureshi and Dr Vishnupriya Kolipakkam

Date of Initiation
December 2019

Proposed Date of Completion
June 2023

Objectives: The objectives of the project are to (i) assess the prevalence of infectious diseases in selected PAs of NE India with special reference to pathogens that caused mortality of wild ungulates in the recent past; (ii) assess the prevalence of transmissible diseases in domestic counterparts in and around the PAs; and (iii) understand the distribution and dynamics of diseases that has been documented in the selected areas both in domestic and wild animals.

Progress: Analysis of data collected during January 2021 to March 2023. Assessed density estimate of ungulate species at the study site using the camera trap distance sampling method. The researchers deployed total 69 camera-traps in Dampa Tiger Reserve (DTR), 18 camera-traps in Ngengpui Wildlife Sanctuary (NWLS) and 18 camera-traps in Murlen National Park (MNP) to study (i) Relative Abundance Index (RAI) of the species; (ii) Relationship of relative abundance of ungulates with site covariates; (iii) Analysis of fecal samples for infectious parasites; (iv) Relationship of wild animal parasite richness, EPG (parasite load) and prevalence with habitat covariates; (v) Anti microbial resistance studies in zoonotic pathogens Salmonella and E.coli; (vi) Extraction and quantification of DNA from fecal and blood samples for metagenomics analysis; and (vii) Sero- surveillance of important viral pathogens in domestic and wild ungulates.

Outputs and Outcomes: A total of 27 species of mammal (belonging to 5 order and 13 families) were recorded in the study areas across Mizoram. In DTR, the team recorded 26 species of mammals belonging to 11

families. In NWLS, the researchers recorded 17 species of mammals belonging to 10 families and in MNP and 14 species of mammals belonging to 8 families. The result showed that among all ungulates, barking deer was the most abundant followed by sambar and wild pig.

Barking deer density was highest in DTR S2 followed by MNP S1 and DTR S1. Sambar had the highest density in DTR S1 followed by DTR S2 and NWLS S1. Wild pig density was found to be highest in DTR S1 followed by DTR S2.

Relationship of relative abundance of ungulates with site covariates (Barking deer): relative abundance of barking deer in DTR showed significant negative correlation to the number of trees. The presence of the species is positively correlated to the log ground cover. In NWLS relative abundance of barking deer showed significant positive correlation to the distance from villages, elevation, log ground cover and terrain ruggedness and significant negative correlation to the distance from stream.

The presence and relative abundance of sambar is positively correlated to the distance from villages in DTR and NWLS respectively and relative abundance of sambar showed a significant positive correlation to the ground cover. The relative abundance of wild pig in DTR is positively correlated to the human movement. The relative abundance of red serow in DTR is positively correlated to the terrain ruggedness and presence of the species is influenced by elevation.

A total of 14 species of parasite were detected in 143 wild samples all over Mizoram. Among them 8 species from DTR (ungulates-7, carnivore-4), 6 species from MNP (ungulates-2, carnivore-6) and 8 species from NWLS (ungulates-0, carnivore-8). A total of 10 species of parasite were detected in total 467 domestic samples all over Mizoram. Among them 9 species from DTR villages, 6 species from MNP villages and 4 species from NWLS villages. Strongyle is the most common species of parasite among the wild animals of Mizoram followed by Trichuris spp. and Toxocara spp.

In ungulates, DTR has the highest number of parasite species followed by MNP. In NWLS no ungulate sample was found positive for parasite. In carnivores, NWLS has the highest number of parasite species followed by MNP and DTR. *Ascarid spp.* and *Balantidium spp.* are the most common species of parasite among the domestic animals of Mizoram.

Among the domestic animals *Coccidia spp.*, *Ascarid spp.* and *Balantidium spp.* are the most prevalent parasite in DTR villages, MNP villages and NWLS villages respectively. Among the wild animals *Teania spp.* in DTR *Toxocara cati* in MNP ungulates *Teania spp.* in MNP carnivores and *Toxocara cati* in NGP carnivores are the most prevalent parasite.

In ungulates of DTR, parasite richness showed a significant negative correlation with distance from village. Likewise, carnivores of MNP, parasite richness and EPG showed a significant negative correlation with distance from village. But in carnivores of DTR, parasite richness, EPG and prevalence showed a significant positive correlation with distance from village. In MNP, EPG showed a significant positive correlation with human disturbance and human disturbance showed a significant negative correlation with distance from village.

Throughout Mizoram elevation showed a significant negative correlation with aridity. In carnivores of DTR, prevalence showed a significant positive correlation with Aridity. In NWLS, parasite richness showed a significant positive correlation with elevation. No positive samples of ungulates were detected in NWLS for parasites and none of the covariates are significantly correlated to the parasite richness, EPG and prevalence of ungulates in Murlen.

A total of 39 samples from wild and 239 samples were collected from ungulates and domestic animal in swabs from Mizoram. Total 68 samples are suspected to be E.coli positive based on culture results, 52 samples are suspected to be Salmonella positive. Total positive isolates are 339 for both Salmonella and E.coli. Detection of resistant genes: For Genotypic characterization of AMR, DNA was extracted from 80 phenotypically resistant isolates.

Total 197 blood samples were collected from domestic animals of Mizoram. Out of the total 140 are positive for presence of DNA. Blood DNA extraction of 16 samples are repeated out of which 10 are positive. Hence, a total of 150 samples are positive.

Milestone: The following two papers were presented in the conferences during the reporting period: (i) Perspective of Human-Wildlife Coexistence and its Drivers in Villages of Dampa Tiger Reserve, Mizoram; and (ii) Fading fast: The urgent need to conserve dwindling prey species of Dampa Tiger Reserve, Mizoram.

RESEARCH
ONGOING

RESPONSE TO ANTHROPOCENE AND CLIMATE CHANGE: MOVEMENT ECOLOGY OF SELECTED MAMMAL SPECIES ACROSS THE INDIAN HIMALAYAN REGION

Funding Source
National Mission on Himalayan Studies (NMHS)

Investigator
Dr Bilal Habib

Researcher
Prasad Tonde

Date of Initiation
July 2020

Proposed Date of Completion
July 2023

Objectives: The objectives of the project are to (i) study the movement patterns of Pallas's cat, Himalayan wolf and Himalayan Marmot with respect to Anthropocene and climate change in the Indian Himalayan Region (IHR); (ii) study the spatio-temporal habitat utilization, feeding ecology and life history traits of the selected mammal species in the IHR; and (iii) predict fine scale distribution pattern of the selected mammal species in the IHR based on telemetry data for predicting change under anthropogenic and climate scenarios.

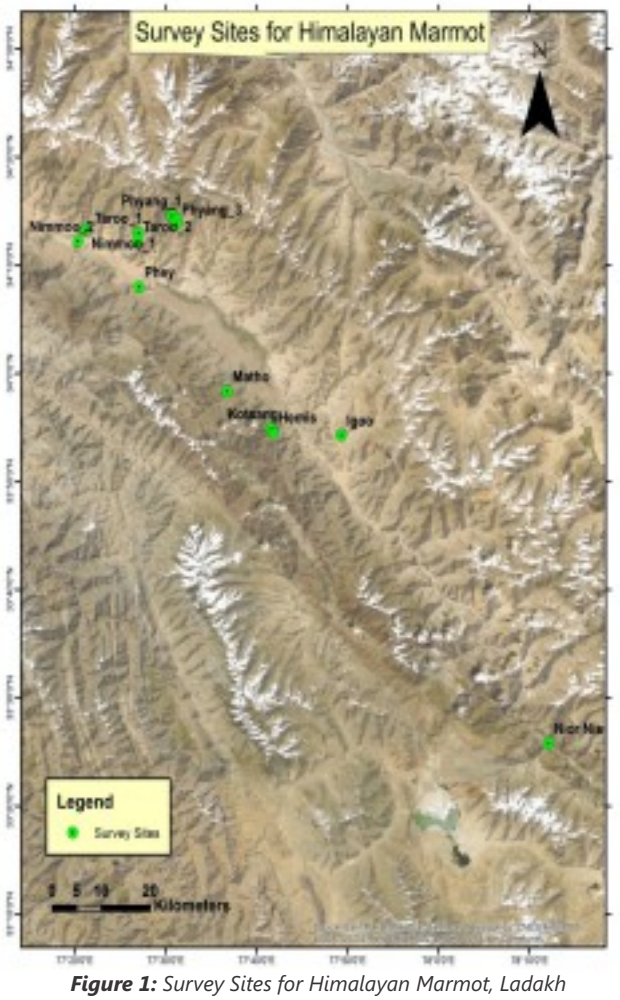


Figure 1: *Survey Sites for Himalayan Marmot, Ladakh*

Figure 2. *A typical marmot burrow with mounds of earth near the entrance, Khaspang, Ladakh.*

Progress: The permissions for radio collaring Himalayan marmot were obtained on 12 October 2022. Following the permission letter, a meeting with the Wildlife Warden, Leh, was held with regards to informing the wildlife department regarding further activities of the project. The meeting concluded with detailing about the reconnaissance survey for Himalayan marmot and reporting to the Wildlife warden before any trapping exercise was done. Reconnaissance survey was carried out to locate Himalayan marmot in and around Leh based on informal interviews with local individuals from neighboring villages.

During this survey, although suitable habitats were scanned, marmot presence was not observed. A major factor contributing to this could be early onset of winter in Ladakh. Literature suggests that Himalayan marmots start hibernating from mid-September to October end. Other animals observed during the survey were Red Fox

and Bharal along with birds *viz*; Brown Dipper, Chukar Partridge, Yellow-billed Chough, Lammergeier, Great Rosefinch, Blue Whistling thrush, Horned lark, Black redstart, White-winged Redstart and Common Merganser.

Outputs and Outcomes: Permissions for Himalayan marmot were updated and received and all necessary documentation was completed. Local community members were involved in field observations and project objectives were described encouraging their active participation.

Milestones: Progress report of work done up to date was submitted to the Wildlife Warden, Leh. Survey for Himalayan marmot was carried out in various regions of Changthang WLS, Hemis NP and neighbouring areas.

RESEARCH ONGOING

ASSESSMENT OF WILDLIFE VALUES AND LAND TENURE FOR PLANNING RATIONALIZATION OF BOUNDARIES FOR CHANGTHANG AND KARAKORAM WILDLIFE SANCTUARY, LADAKH

Funding Source
Forest Department, Union Territory of Ladakh

Investigator
Dr S. Sathyakumar

Researchers
Dr Upma Manral, Dr Ajaz Hussain, Ankit Singh, Abhipsha Ghosh, Apoorva Thapa, Arif Ahmad, Himanshi Sharma, Prateek Savita, Priyadarshan Pandey, Priyadarshini Mitra, Prativa Bomzon, Rameshwar Ghade, Shivani Parmar and Tribhuwan Singh

Date of Initiation
January 2021

Proposed Date of Completion
July 2023

Objectives: The objectives of the project were to (i) Identify areas within Changthang and Karakoram WLS in High Conservation Value (HCV) categories; (ii) Delineate and map HCV Areas in and around Changthang WLS and Karakoram WLS; (iii) Conduct a stakeholder analysis through local consultations and ascertain wildlife values and natural resource dependencies; and (iv) Devise strategies and actions for future conservation of HCV Areas in the Karakoram and Changthang WLS.

Progress and Outcomes: This study focuses on the biodiversity and conservation challenges in the Ladakh region of the Indian Himalayan Region (IHR). Ladakh, characterized by a cold, arid landscape with unique biodiversity, has faced increased developmental activities and conflicting interests in protected areas like the Changthang and Karakoram Wildlife Sanctuaries. The Wildlife Institute of India (WII) was requested to provide technical support for boundary rationalization and identification of High Conservation Value Areas (HCVAs) in these sanctuaries to address these challenges. The study involved analyzing data from various government departments, conducting field surveys, and using remote sensing and GIS data for mapping and change detection.

The biodiversity values and potential categorization of HCVAs were assessed, considering species diversity, landscape ecosystems, rare ecosystems, water provision, livelihood needs of local communities, and cultural sites. Seventeen Priority HCVAs were identified, such as Phobrang-Marsamik La-Changchenmo and Pangong area, which require protection measures for wildlife conservation. Sites were ranked for conservation, wildlife, ecosystem services, local needs, cultural values, and stakeholders' interests. HCVAs crucial for biodiversity and local livelihoods were proposed and integrated into three protection scenarios. The report recommended specific land allocations, emphasized settlement rights, and aligned with wildlife and forest protection acts for indigenous communities in the Changthang and Karakoram regions.

Milestone: Development of Comprehensive High Conservation Value Area (HCVAs) Framework and Prioritized Conservation Scenarios for the Changthang and Karakoram WLS.

RESEARCH
ONGOING

HIMALAYAN ALPINE BIODIVERSITY CHARACTERISATION AND INFORMATION SYSTEM-NETWORK

Funding Source
National Mission on Himalayan Studies (NMHS), MoEFCC, Govt. of India

Investigators
Dr Gautam Talukdar and Dr G.S. Rawat

Researchers
Aimon Bushra and Jikmat Stanzin

Date of Initiation
January 2022

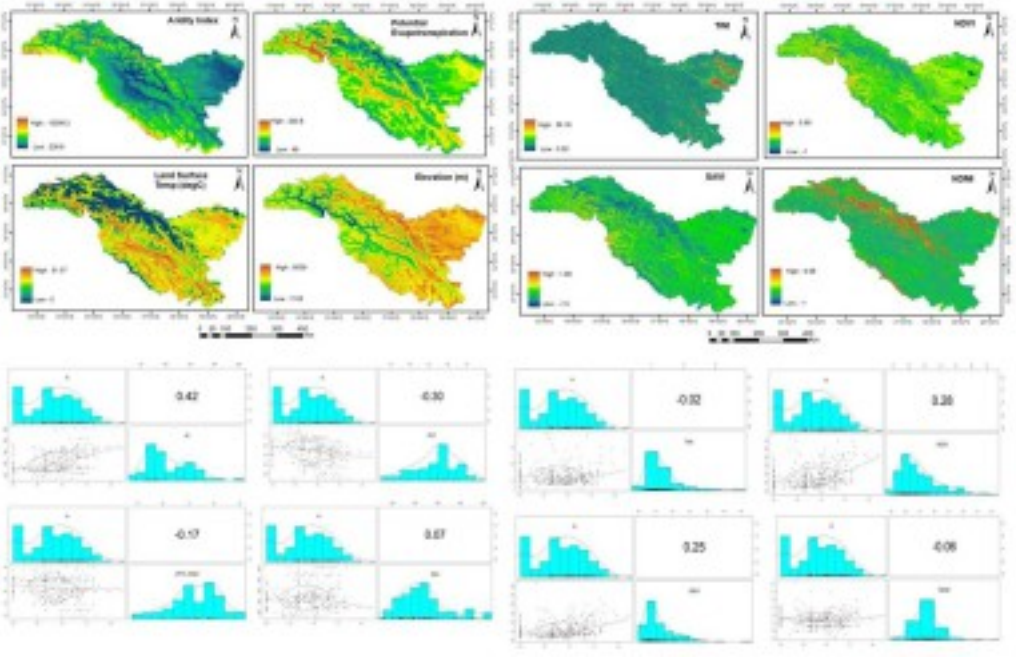
Proposed Date of Completion
September 2023

Objectives: The objectives of the project are to (i) characterise spatial extent and patterns of alpine plant communities in Western Himalaya (J&K, Himachal Pradesh and Uttarakhand) using multi-scale EO data; (ii) assess alpine vegetation composition and diversity following a unified systematic and multistage sampling protocol; (iii) determine EO based environmental proxies of alpine biodiversity and ecosystem dynamics; and (iv) develop predictive models for multi-scale prediction of alpine plant diversity patterns linking environmental proxies and habitat variables.

Progress: Plant species identification and data entry completed for all years. Analysis for soil pH, N, OC, Na and K completed for all samples. Sentinel-2 satellite data of recent years (2020-2022) for Ladakh was downloaded and processed for the vegetation growing season *i.e.* August and September 2022. Normalized difference Vegetation index (NDMI) and Normalized difference moisture index (NDMI) were estimated using Sentinel-2 bands. ALOS-PALSAR Digital Elevation Model (DEM) was downloaded at 12m spatial resolution from Google Earth Engine. DEM was used to derive topographic variables such as Topographic Wetness Index (TWI), Slope and Aspect.

Other environmental layers such as Land Surface Temperature (MODIS LST), Aridity Index and Potential Evapotranspiration were also downloaded and processed for Ladakh.

Outputs and Outcomes: The total number of plant species recorded was 242. The mean species richness across all sites was 3 per plot (±1.57). The mean Shannon diversity index was 0.80 (±0.51) while mean Simpson index was 0.45 (±0.26). The soil analysis results suggest that soils of Ladakh are mostly alkaline and low in nutrient content.



The values of soil parameters that were analysed are presented in Table below:

Parameter	MIN	MAX	MEAN	SD (±)
pH	2.49	8.85	6.872242991	1.512956189
O.C%	0.019	6.747	1.451049089	1.357284877
Nitrogen%	0.002	0.878	0.142480519	0.158740488
Na%	0.024	1.4184	0.278485294	0.296019638
K%	0.1597	2.3986	1.294718627	0.645765013

EO-based environmental variables and their relationships with plant species diversity (H) in Ladakh

RESEARCH ONGOING

ASSESSING FINE-SCALE DISTRIBUTION PATTERN, POPULATION AND HABITAT STATUS OF NORTHERN SWAMP DEER, *RUCERVUS DUVAUCELII DUVAUCELII* ACROSS UPPER GANGETIC PLAINS OF NORTH INDIA

Funding Source
Ministry of Environment, Forest and Climate Change

Investigator
Dr. Samrat Mondol

Researcher
Sohini Saha

Date of Initiation
November 2019

Proposed Date of Completion
September 2023

Objectives: The project has the objectives of (i) assessing the fine-scale distribution of swamp deer across its habitat in Uttarakhand and Uttar Pradesh through intensive ecological surveys; (ii) mapping the distribution of grassland patches with swamp deer evidence along the upper Ganga and its tributaries, along with evaluation of the extent of grassland usage by wildlife and identifying suitable sites for grassland restoration; and (iii) understanding swamp deer movement patterns by radio collaring selected male and female animals in upper Gangetic plains.

Progress: With the continuation of the ongoing grassland survey in the Sharda habitat block of upper Gangetic plains, the researchers surveyed all the grassland and wetland habitats of 7 ranges in Dudhwa National Park (Dudhwa, South Sonaripur, North Sonaripur, Belraya, Bankati, Gauriphata, and Sathiyana) and 6 ranges in Katarniaghat Wildlife Sanctuary (Katarniaghat, Nishangadha, Murtiha, Dharmapur, Kakraha, and Motipur) during May and November 2022.

The researchers have also surveyed four southern ranges of North Kheri Forest Division which are part of Dudhwa National Park's buffer area. The map of grassland habitats was obtained by using visual interpretation of the Google Earth Pro images based on the collected track log and GPS points. Pure grassland patches and grassland patches with sparsely present underdeveloped plantations were taken for habitat mapping. Patches that are densely covered with plantations (mostly trees in their mature state, ~20-30 years old) are not considered grassland patches. The grasslands were digitized in Google Earth Pro using a polygon tool. Biological samples (antlers and tissues) were also collected during May 2022 survey from the Sharda habitat block as swamp deer presence evidence and genetic analysis. Disturbances and threats to the grassland habitats were also assessed.

Outputs and Outcomes: The digitization and map generation are in progress. Using microsatellite markers, the researchers has identified 154 unique swamp deer individuals from the Sharda habitat block which will further use in analyzing genetic variation between the Ganga and Sharda block of upper Gangetic plains.

Milestone: First-ever scientific grassland mapping for all the protected core area (Dudhwa National Park, Pilibhit Tiger Reserve, Kishanpur Wildlife Sanctuary, and Katarniaghat Wildlife Sanctuary), protected buffer area (North Kheri Forest Division) and the non-protected area were conducted. The Haiderpur wetland near Bijnor Barrage is identified as the "Ramsar site".

RESEARCH ONGOING

BASIC STUDY DESIGN FOR BIODIVERSITY ASSESSMENT OF HIMACHAL PRADESH

Funding Source
JICA Assisted Project IHPFEM & L

Investigators
Dr Salvador Lyngdoh, Dr Monali Sen, Dr B.S. Adhikari, Dr J A Johnson, Dr V P Uniyal, Dr Abhijit Das and Dr S Sathyakumar

Researchers
Saurav Chaudhary, Arnab Chattopadhyay, Priyanka Sharma and Tushar Parab

Date of Initiation
January 2021

Proposed Date of Completion
October 2023

Objectives: The objectives of the project are to (i) undertake a detailed assessment of the state's biodiversity in select areas to improve scientific conservation and management of biodiversity; (ii) do threat assessment and ranking for the biodiversity (both flora and fauna); and (iii) develop biodiversity assessment design/methodology for HP through establishing baseline and monitoring indicators for long-term monitoring.

Progress: The baseline component-wise biodiversity assessment survey was conducted in Col. Sher Jung National Park (28 sq km), Churdhar Wildlife Sanctuary (54 sq km), Pin Valley National Park (675 sq km) and Chandratal Wildlife Sanctuary (38 sq km). Preliminary reports submitted to the Forest Department, Himachal Pradesh for the mentioned protected areas. Scat analysis for carnivores in the area under process. The plants herbarium for the species under process.

Outputs and Outcomes: Sixteen mammalian species belonging to 6 orders, 9 families and 19 genera were captured and identified across all the study sites. The relative abundance index (RAI1) was calculated for each species. RAIs were found to be lowest for Jungle Cat and highest for Red Fox in carnivores, and Himalayan Goral to highest for Himalayan Langur for herbivores. Spatial interactions of Leopard Cat and Red Fox were studied using occupancy modelling Pianka's indices.

The researchers conducted Vegetation sampling following standard sampling methods, resulting in 16 sites for Col. Sher Jung National Park, 230 sites for Churdhar Wildlife Sanctuary, 25 for Chandratal Wildlife Sanctuary, and 29 for Pin Valley National Park. The researchers assessed the floristic diversity, community composition, and regeneration status of different forests in the selected protected areas. The study revealed the presence of 658 species of plants belonging to 384 genera and 86 families. The researchers identified distinct plant communities using Twinspan analysis and estimated species richness and diversity for each community in the selected protected areas. Land cover classification results revealed the highest proportion of Shorea community, Himalayan Moist Temperate Forest, *Anaphalis* community, and *Cicer* community in Col. Sher Jung National Park, Churdhar Wildlife Sanctuary, Chandratal Wildlife Sanctuary, and Pin Valley National Park, respectively.

A total of 50 species were encountered from the different protected areas of Himachal Pradesh. The researchers prepared a checklist for the two protected areas of Himachal Pradesh namely Col. Sher Jung National Park, Churdhar Wildlife Sanctuary and Spiti Valley. Some of the new and rare encounters included *Eurelypis, Cyrtopodian, Daboia russelli, Boiga fosternii*. Population estimation, Encounter rate and distribution of the herpetofauna in the selected areas have been done. The researchers implemented different survey methodologies for different habitats from belt transect, patch sampling, visual encounter survey, nocturnal surveys and opportunistic encounters to know about the importance of different methodologies. The researchers collected around 40 samples from the protected areas for future genetic and morphology studies. The researchers implemented the first-ever spatial explicit capture-recapture technique for the endemic anuran *Amolops formosus* in Churdhar Wildlife Sanctuary.

The researchers prepared a checklist from each site and habitat-wise species inventory of avifauna in the selected areas of Himachal Pradesh. The researchers assessed birds' population dynamics and distribution in the Col. Sher Jung National Park, Churdhar Wildlife Sanctuary and Pin Valley National Park. Avian feeding guilds were identified and grouped for different seasons in different sites. Familywise avian species composition along elevational gradient were studied in each selected study site. Estimation of bird density, detection probability, encounter rate and cluster size of each species from selected protected areas was done. Seasonal bird-community assemblages were generated in different study sites.

Milestones: First photographic evidence of Indian Pangolin Manis crassicaudata Geoffroy, 1803 (Mammalia: Pholidota: Manidae), in Colonel Sher Jung National Park,

Himachal Pradesh, India. Species distribution maps for 18 mammal species belonging to the families *Bovidae, Canidae, Felidae, Mustelidae* and *Ursidae*. First Record of *Neophron percnopterus* (Linnaeus, 1758) from Lidang village near Pin Valley National Park, in Himachal Pradesh, India accepted in JBNHS. First Record of *Plegadis falcinellus* (Linnaeus, 1758) from high altitude region (Chandratal Wildlife Sanctuary) of Himachal Pradesh, India accepted in JBNHS. First photographic evidence of Indian Pangolin Manis crassicaudata Geoffroy, 1803 (Mammalia: Pholidota: Manidae), in Colonel Sher Jung National Park, Himachal Pradesh India published in JOTT.

RESEARCH ONGOING

ECOLOGY AND RECOVERY OF CRITICALLY ENDANGERED VULTURE SPECIES IN PONG DAM PROTECTED AREA (PA) AND ITS ECO SENSITIVE ZONE (ESZ) IN DISTRICT KANGRA, HIMACHAL PRADESH

Funding Source
Ministry of Environment, Forest and Climate Change, Research and Development Division

Researchers
Malyasri Bhattacharya and Ankit Zode

Date of Initiation
November 2020

Investigators
Dr. Gautam Talukdar and Dr R. Suresh Kumar

Proposed Date of Completion
November 2023

Objectives: The objectives of the project are to (i) study movement ecology using satellite telemetry; (ii) Niche modelling of selected species of vulture to study their distribution pattern; (iii) Prevalence of Diclofenac and their effects in the study area; and (iv) Capacity building of Himachal Pradesh State Forest Department.

Progress: Five wild White-rumped vultures, Gyps bengalensis have been tagged with E-Obs Solar GPS-GSM tags weighing 55g between August- October 2021. The present climatic niche of nine species of vultures has been modelled using GBIF (2000-2020) dataset and bioclimatic variables. Taking SSP scenarios from 2041-2060 and 2061-80, modelled potential distribution for the future. The questionnaire surveys have been carried out in the multiple household and veterinary clinics for Diclofenac prevalence in part of the study area. Two capacity-building workshops have been arranged with the Himachal Forest department to sensitize the importance of vultures and their nesting and feeding sites in the study area.

Outputs and Outcomes: A total of 26 new feeding stations governed by local authorities have been identified, and three new nesting sites and three roosting sites were also located from the movement tracking data. More than 400 White-rumped vulture nests were located. Nests of tagged wild White-rumped vultures have been monitored and shown nest success for the year 2022-23. Threats to the vulture population have been identified in the study area. Collision due to the

powerline near the feeding station and loss of nesting trees due to forest fire is of significant concern. The capacity building workshops identified the importance of vultures and the methodology for population census in the study area.

Milestone: More than 60 Forest guards and Range Forest Officers of each beats from Kangra district were trained for future vulture surveys in the area. Climatic niche modelling of nine species of vulture shown most of the climatic niche of vultures are reducing in 2041-60 and 2061-80. Fourteen nesting colonies were identified from the study area. From undercover pharmacy searches, it is found that the use of similar kinds of drugs which are equally toxic to vultures like *Aceclofenac, Nimesulide* and *Ketoprofen* are being widely used in the area.

RESEARCH
ONGOING

ECOLOGICAL IMPACTS OF MAJOR INVASIVE ALIEN PLANTS ON NATIVE FLORA IN RAJAJI TIGER RESERVE, UTTARAKHAND

Funding Source
DST-Science and Engineering Research Board

Investigators
Dr Amit Kumar, Dr Navendu Page and Shri Qamar Qureshi

Researcher
Sipu Kumar and Himanshu

Date of Initiation
July 2020

Proposed Date of Completion
November 2023

Objectives: The objectives of the project are to (i) study the invasion patterns of alien plants in Rajaji Tiger Reserve (RTR); (ii) assess the ecological impacts of invasive alien plant species on native flora; (iii) suggest ecological restoration measures; and (iv) assess the efficacy of various management practices in controlling the invasion of alien species.

Progress: Phase I of the project (collection of data & lab work) has been completed.

In western RTR, Uttarakhand, Lantana camara, Ageratum houstonianum, Sida cordifolia, Senna tora, Parthenium hysterophorus, Bidens pilosa, Mesosphaerum suaveolens, Ageratina adenophora and Cassia occidentalis were recorded as the common invasive plant species. The maximum density was observed for Lantana camara (4018.75±3.60/ha) followed by Ageratum houstonianum (475±2.51/ha), Sida cordifolia (200±1.56) and Senna tora (87.5±0.56) in the selected invaded sites across different forest ranges.

Across the different forest ranges in western RTR, the density of Lantana camara was observed highest in Dhoulkhand followed by Beribada, Chillawali and Ranipur in the selected invaded sites, whereas Ageratum houstonianum was observed highest in Chillawali followed by Beribada and Dhoulkhand. Further, the density of Senna tora was observed highest in Chillawali followed by Beribada and Dhoulkhand, whereas Sida cordifolia was observed highest in Chillawali followed by Beribada and Dhoulkhand. Notably, saplings of species such as Ziziphus mauritiana, Tectona grandis, Naringi crenulata and Mallotus philippensis were also recorded in the L. camara invaded sites. Interestingly, based on the field observations present study revealed that the tree saplings of one year were suppressed in the subsequent years due to the overgrowth of *L. camara*.

Based on the selected sites, the present study showed 'contiguous' distribution of Lantana camara in Chillawali, Dhoulkhand, Beribada and Ranipur ranges of RTR. Senna tora and Sida cordifolia showed 'random' distribution in Dhoulkhand, whereas 'contiguous' distribution was observed in Chillawali and Beribada. Ageratum houstonianum showed 'contiguous' distribution in Dhoulkhand, Beribada and Chillawali.

Outputs and Outcomes: A total of 15 plant species comprising eight, four, and three species of tree, shrubs, and herbs, respectively were recorded in the *L. camara* invaded sites. Maximum density was recorded for *Lantana camara* followed by *Justicia adhatoda*, *Ageratum conyzoides*, and *Murraya koenigii*, whereas saplings of species such as *Ziziphus mauritiana*, *Tectona grandis*, *Naringi crenulata* and *Mallotus philippensis* were observed in the *L. camara* invaded sites. Notably, it has been observed that the tree saplings of one year were suppressed in the subsequent years due to the overgrowth of *L. camara*.

A total of 20 species comprising eleven trees, five shrubs and four herb species were recorded in uninvaded sites. *Clerodendrum infortunatum* followed by *Ageratum houstonianum* and *Justicia adhatoda* were the dominant plant species. The low density was recorded for *Syzygium cumini, Aegle marmelos, Naringi crenulata* and *Shorea robusta*. Based on the comparative analysis of invaded and uninvaded sites, the current study revealed that the *L. camara* suppresses seedlings and saplings of trees, shrubs and herbs due to high *Lantana camara* cover.

Milestone: The present study revealed a substantial variation in the diversity and densities of species, excluding Lantana, between invaded and uninvaded areas. For example, species such as *Parthenium hysterophorus, Clerodendrum infortunatum, Saccharum spontaneum, Datura stramonium,* and *Passiflora suberosa* dominated in uninvaded sites whereas these species were not recorded in invaded sites. Notably, the density of shrubs species is also higher in uninvaded sites as compared to invaded sites.

HABITAT IMPROVEMENT AND CONSERVATION BREEDING OF GREAT INDIAN BUSTARD

RESEARCH ONGOING

Funding Source
National CAMPA Authority

Investigators
Dr Yadvendradev Jhala, Dr Sutirtha Dutta, Shri Qamar Qureshi and Dr Vishnupriya Kolipakam

Researchers
Dr Shravan Singh Rathore, Dr Tushna Karkaria, Bipin CM, Mohib Uddin, Dr Vipul Bishnoi, Pravesh Sakhlani, Sourav Supakar, Tanya Gupta, Vishal Varma, Hrishika Sharma, Hemlata Joshi, Indranil Paul, Anjali Nagar, Varun Kher, Anshuman Pati, Shimontika Gupta, Nikhila Purohit, Sweta Bhattacharya, Mayuri Moitra, Swapna Lawrence and Mahesh Gujjar

Date of Initiation
March 2016

Proposed Date of Completion
December 2023 (first phase)

Objectives: The objectives of the project are (i) conservation breeding: to secure *ex-situ* populations of Great Indian Bustard (GIB) and (if needed) Lesser Florican (LF); (ii) applied research: (a) prioritise areas for conservation, (b) threat characterisation, (c) population and habitat monitoring for assessment of management effectiveness, (d) understand livelihood issues; and (e) understand population genetics to inform conservation management; (iii) capacity building: creating awareness and advocacy to (a) improve protection, (b) sensitise stakeholders and decision-makers on bustard conservation, (c) raise public awareness, and (d) incentivise bustard-friendly land uses; and (iv) pilot habitat management: to demonstrate good practices through experimental interventions that can be replicated by the State Forest Department and other conservation agencies.

Progress and Outcomes: *Conservation breeding:* The project is implementing conservation breeding of great Indian bustard (GIB) and lesser florican (LF). The project presently runs conservation breeding centres (CBC) at Sam & Ramdevra, Jaisalmer for GIB and at Bijainagar, Ajmer for LF.

The Sam Conservation Breeding facility, operational since June 2019 houses a founder population of 13 GIB that were collected as eggs from the wild and hatched artificially in this facility. The Ramdevra CBC has been under construction since 2019 and was made operational from August 2022. The 9 eggs that were collected from the wild in 2022 and hatched at Sam CBC were shifted to the Ramdevra CBC. There are currently 7 males and 15 females and 1 chick as a founder population at these conservation breeding facilities. The project team attempted a novel jump-start technique where an egg collected from a wild female's nest was artificially incubated in Sam CBC and returned to the nest immediately prior to hatching. This first attempt was successful and the chick continues to survive to this day. This technique was conceptualized to combat the high predation rates faced by GIB eggs in the wild.

At the temporary centre at Bijainagar, Ajmer 8 LF from wild collected artificially hatched eggs, are being reared out of which seven were born during 2022-23.

Additional works towards completing Ramdevra center were carried out, including upgradation of transformers to make the existing solar plant functional, borewell and Reverse Osmosis (RO) plant installation by CPWD, construction of additional bird cage, erection of inner predator proof fence around bird cages, and upgradation of outer fence of the center. Veterinary equipment for the centers (x-ray, gas anaesthesia, surgical instruments etc.) were procured.

Four project personnel were trained in semen collection and insemination of poultry in Anand Agriculture University, Anand and three project personnel were trained in artificial breeding techniques at National Avian Research Centre (NARC), Abu Dhabi.

Applied Research: To assess the current status of GIB and habitat in/around Desert National Park (DNP) Wildlife Sanctuary (western Thar landscape), three seasonal surveys were conducted in April 2022, September 2022 and February 2023. The study area was divided into two sampling blocks - protected and non-protected (with renewable energy infrastructure). A total of 44 grids of 36 sq.km (6×6 km) were sampled to obtain information on GIB, its habitat and other co-occurring species following a pre-established vehicle transect based survey protocol. The surveys yielded an abundance estimate of 31.13 ± 10.58SE adult GIB, and additional recruits (juveniles) of the current year, yielding a total population size of about 40 individuals for the western Thar population.

The rapid assessment showed that suitable habitat ground vegetation for GIB exists in both protected (DNP) and non-protected (north of DNP) areas. Both areas- are dominated by grasslands (0.64 ± 0.04SE) with vegetation of height 30-100cm (30.32 ± 2.57SE). The total cover of agricultural land (active and fallow) was also lower in the non-protected block (~43%) as compared to the protected block (~58%). However, despite suitable habitat, the density of GIB in this block was much lower than the density in protected areas. This could be largely explained by the widespread renewable energy infrastructure (particularly power lines) in the unprotected northern block, which has been found to be a direct threat to the survival of the species as a result of collisions with power lines.

Routine field research on GIB ecology in DNP including ground tracking of birds tagged in 2019-21, GIB demographic surveys to monitor nest and chick survival, behavioral observations of GIB in wild and captivity, habitat use vs availability of GIB to inform habitat management, and arthropod assessment inside and outside enclosures and across land-uses to understand GIB space use with respect to food resources continued. These activities have greatly refined our understanding of the species' biology. It is now known that female GIB lays 3-4 eggs/year and the hatching success is about 25-35%, based on 84 eggs, whereas, chick survival rate is about 50-60%.

Collecting the initial egg of a female is an efficient way of sourcing founders without impacting the wild population as it induces birds to re-lay. Telemetry data has shown intensive use of fenced grasslands during breeding season (summer and monsoon) validating the effectiveness of this *in-situ* measure, whereas, extensive movements in adjoining agro-grass mosaics in non-breeding season (winter) shows compatibility of some forms of low-intensity human land-uses with GIB conservation. Use of these grasslands for breeding was correlated with high grasshopper abundance (key food) in these habitats relative to other land-uses. Information on GIB space use has been disseminated to Rajasthan Forest Department to guide breeding enclosure establishment in strategic areas.

Preliminary results from information obtained from accelerometers sensors fitted on PTTs showed that, across different seasons the total time allocation between behaviours is similar but diel activity patterns change, with clear restriction of activity due to heat in dry summers. Further, the researchers found that female GIBs take 6.5 flights per day on an average and most flights are taken during the early morning hours.

The Project team tagged four LF comprising of two males and two females during August - September 2022 in Ajmer. One female reached Jangaon area in Andhra Pradesh towards the end of September 2022 and spent all winter within 30 km of this area. Her tag is functional and transmitting till date and has travelled about 1400 km since tagging. Another female reached Bidar area of Karnataka towards the end of September 2022. Ground tracking and habitat sampling of her locations is being carried out. One male after tagging travelled for 220 km and lived for 89 days before natural death due to predation. Another male reached Neemuch district of Madhya Pradesh and the tag last transmitted in October 2022. The ongoing tracking and monitoring of LF are improving our understanding of the species' non-breeding ecology, threats, and behaviour.

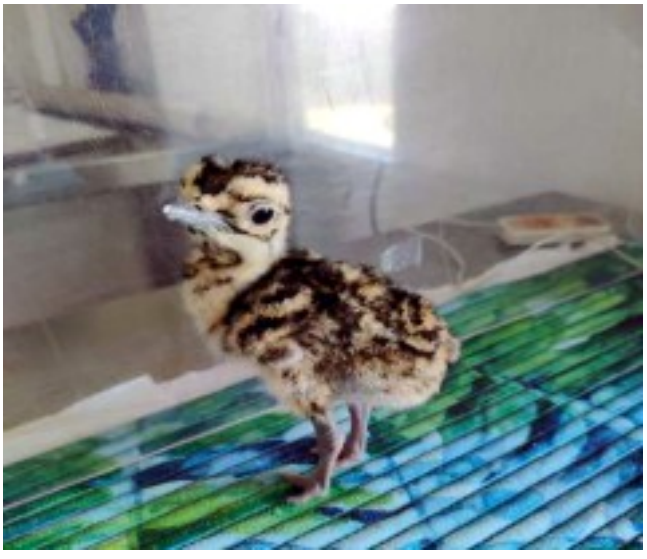
Carcass surveys were conducted to assess mortalities due to power lines which is the critical current threat for GIB. Results show that the majority of deaths were within 5m of the power line pylons. All carcasses were large bodied birds (size class > 1000 g) and primarily raptors (eagle and vulture sp). The mortality rate was estimated at 0.29 (95% CI 0.097 - 0.486) carcasses per km per day. It is likely that smaller birds were missed during the survey, and the method will be refined, by incorporating imperfect detection, and continued for large-scale monitoring of bird mortalities and effectiveness of power line marking.

Project team developed a species classification tool based on image features of animal photo-captures using Convolutional Neural Networks and Transfer Learning techniques. Our multi-class species classification model has a macro-averaged F1 score of 0.95. and has an overall accuracy of 94% and a precision score of 99% for GIB.

Capacity Building and Outreach: Nature education programmes for school children in Rajasthan were conducted. Information on GIB, threats, conservation issues and institutions working for nature conservation was disseminated with the help of a documentary film and sensitized over 4,197 students in 15 schools across 13 villages. Awareness programs on LF conservation in several schools of Shokaliya landscape, Rajasthan - the prime breeding habitat of LF, and in Bidar, Karnataka, that were attended by ~1000 students from four schools during February-March 2023. Posters with information on LF and other outreach materials (bags, caps, notebooks, bookmarks and badges) were distributed in these schools.

Phase 2 of nature education programmes was carried out. Over 822 students in 3 schools across 3 villages in Jaisalmer District participated in these interactive events. Interactive sessions were conducted during Environment Day in the schools around DNP, Jaisalmer and Bidar, Karnataka to sensitize the students and provided various narratives about the significance of grassland's biodiversity.

A high-quality video documentary on Critically Endangered bustards and project activities is being



World's first GIB chick born from captive raised birds at Sam Conservation Breeding Centre, Jaisalmer

developed, as mandated by MoEFCC, in technical collaboration with The Grasslands Trust. Awareness on GIB conservation and project activities through display stalls in Desert Festival at Jaisalmer, and LF and ongoing conservation efforts jointly with RFD and Bombay Natural History Society (BNHS) at Pushkar festival, Ajmer was undertaken.

Pilot habitat management: Three GIB mortalities have been recorded due to power-lines in Thar during 2022-23. The Hon. Supreme Court of India (2021) has directed power line agencies to install bird flight diverters until the same are not laid underground inside the Priority GIB Areas, or are ratified for overhead laying by a Court constituted committee. An assessment of the power lines in important sections of the Prioritized GIB was carried out. A total of 1,676 km of power lines out of a total of 2,112 km in Salkha, Khetolai and Rasla-Degrai areas were sampled. Information such as the tower height, number of wires, voltage capacity of the lines and number of diverters installed and the number of diverters which have become dysfunctional have also been noted. About 10% (~165 km) of power lines were marked with diverters while the rest was not. Out of this, 12% of the total diverters installed were broken or non-functional.

The Thar landscape houses a large population of free-ranging dogs. Besides hunting native wildlife, these free-ranging dogs are also predators of GIB nests. The high incidences of nest predation necessitate immediate action which includes trapping and relocation of the nest predators. Nets, leg hold traps or darting is used to capture nest predators, which are translocated at a safe distance from breeding enclosures of GIB. In the year 2022-23, 71 free ranging dogs have been captured and relocated in this manner.

Milestones: Establishment of specialised bustard conservation breeding centres- two in Jaisalmer and one in Ajmer, Rajasthan that house founder populations of 23 GIB and 8 LF, secured from wild-collected artificially-hatched and hand-raised chicks since 2019. In an important milestone for the Program, two females copulated with a male in Sam facility, and laid eggs. A chick was hatched through artificial incubation of one of these eggs in March 2023. This is the first instance in the world wherein GIB have bred in captivity. Successful long distance transportation of GIB chicks between breeding centers without casualties. Memorandum of Agreement between the WII and International Fund for Houbara Conservation (IFHC) to undertake collaborative work aimed at the conservation of GIB and LF was signed in September 2022. Telemetry of GIB and LF providing crucial ecological and conservation insights that are helping in refining conservation plans for these species since 2017.

RESEARCH ONGOING

METAPOPULATION DYNAMICS OF TIGERS ACROSS THE TERAI-ARC LANDSCAPE, INDIA

Funding Source
Wildlife Conservation Trust - Panthera Global Cat Alliance

Investigator
Dr Samrat Mondol

Researcher
Supriya Bhatt

Date of Initiation
December 2014

Proposed Date of Completion
December 2023

Objectives: The objectives of the project are to (i) investigate the dynamics of the tiger metapopulation across the Terai-arc landscape by determining (a) the Spatial distribution of tigers in each of the eight protected areas, managed forests, and the corridors connecting them in this landscape, and assessing the source-sink dynamics among these habitats by estimating abundance, population density, sex ratio and

dispersal directions among tiger populations; (b) connectivity and dispersal rates among different tiger populations across the corridors, and what landscape features facilitate/hinder such movements; (c) estimate genetic relatedness and population structure among the tiger populations, and their relationship to the habitat connectivity; (d) conduct tiger population viability analysis at the metapopulation level integrating ecological, genetic and landscape level information collected over the study period. (ii)(a) assess the food habit of tigers in different habitat types, i.e., Shivalik-Bhabar and Terai of the Terai-Arc Landscape of India using non-invasive sampling; (b) evaluate ecological variables that influence such patterns; and (c) explore the patterns of livestock depredation by tiger across Terai-Arc Landscape, India. (iii) (a) to understand the genetic variation in the mitochondrial DNA of the Indian leopard; and (b) to assess population structure and demographic analysis of the Indian leopard, Panthera pardus fusca.

Progress: Leopard samples were utilised from different biogeographic zones where their distribution is known to understand mitochondrial DNA variation and past population history. Mitochondrial data for partial fragments of NADH5, NADH4, and Cytochrome b for 112 individual leopards and concatenated the data has been generated. Further, analyses were done for various genetic diversity indices such as the number of haplotypes, haplotype diversity (h), nucleotide diversity (p), number of polymorphic sites (s) etc.

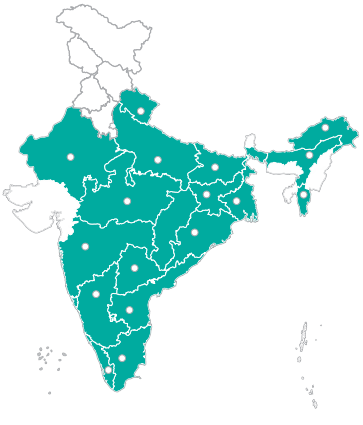
Population structure was then assessed using the Bayesian approach-based method implemented in the program BAPS version 6.0. A median-joining network using PopART version 1.7 for assessing phylogeographic structure was constructed. Further, this was followed by demographic analysis. Tajima's D and Fu's Fs as appropriate statistics of neutrality implemented in DnaSP 5.0 was used. Historical population size change signatures using a coalescent-based Bayesian Skyline plot (BSP) implemented in BEAST v.2.3.6 was also investigated.

Outputs and Outcomes: A total of 46 haplotypes were identified. The highest number of unique haplotypes were found in the Himalayas, Shivalik Hills, and Gangetic plains, followed by the Central India landscape and Eastern Ghats, Western Ghats and North Eastern Hills and Brahmaputra flood plains, respectively. A total of 46 haplotypes with high haplotype diversity and low nucleotide diversity in Indian leopards were found.

BAPS analyses showed four genetically intermixed clusters suggesting no genetic structure in leopard mtDNA across India. The network analyses indicate no strong phylogeographic structure among different leopard haplotypes across India.

The qualitative and quantitative approaches showed contrasting patterns of population demographic patterns. The leopard samples showed negative values for Tajima's D (-0.30895, $p<0.05$), indicating population expansion or selection. On the other hand, Fu's F showed a negative value (-0.2335, $p<0.05$) indicating population expansion. The quantitative BSP approach showed an increase in female effective population size ~3000-4000 years ago (during mid-Holocene period) followed by a steep decline ~200 years ago (223-448 years).

Milestone: This study is the first of its kind that looked into the mitochondrial diversity of the Indian leopard. This study suggested a high genetic variation in the extant subspecies of the Indian leopard. This study also provides a declining trend in leopard maternal effective population size during the colonial era.



RESEARCH ONGOING

COUNTRYWIDE MONITORING OF TIGER, CO-PREDATOR PREY AND HABITAT

Funding Source
National Tiger Conservation Authority

Date of Initiation
October 2021

Investigators
Shri Qamar Qureshi, Dr Y.V. Jhala, Dr Vishnupriya Kolipakam and Tiger Cell

Proposed Date of Completion
December 2023

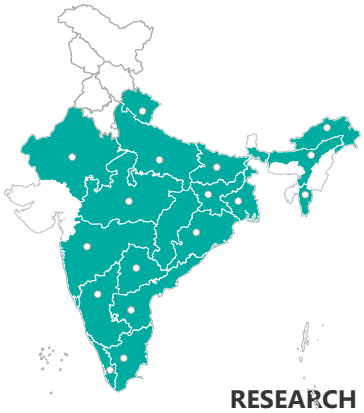
Researchers
A team of 100 research fellows & technical assistant from WII and over 30,000 forest staff of tiger range states

Objectives: The objective of the All India Tiger Monitoring Program is to systematically and comprehensively monitor the population and distribution of tigers across India. This program aims to assess the status of tiger populations, their habitats, and the threats they face, with the ultimate goal of ensuring the conservation and sustainable management of this endangered species. By collecting reliable data on tiger numbers and their habitats, the program helps inform conservation efforts, policy decisions, and strategies to protect these apex predators and their ecosystems, thereby contributing to the long-term survival of tigers in India

Progress: At the beginning of the first tiger monitoring exercise in 2006, India was divided into 100 sq km grid, and since then, this sampling space has remained constant. Each grid was uniquely coded so that subsequent inferences can be compared on the same spatial scale and extent. The overall sampled space for Phase I remains constant; what changes within that is camera-trapped space vs. model-predicted space for the tiger population. The estimation exercise is carried out in three phases, Phase I entails data collection at beat scale by forest department staff across the country covering 10,146 grids (of 100 sq km) followed by Phase III where the sampling is done at 174 sites encompassing 32,588 locations which resulted in 4,70,81,881 Status of Tigers 2022, Phase I photographs having 97,399 tiger pictures. Phase II is done at Wildlife Institute of India, which involves generating landscape-level data using remote sensing and secondary data sources. Total man-days in data collection and collation was 6,41,102. This is the largest survey done so far. The tiger occupancy has increased from 1,758 cells of 100 sq km in 2018 to 1,792 in the year 2022. The unique tigers photographed in 2022 is 3,080, while in 2018 there were 2,461 unique tigers captured. The minimum estimated population is 3,167. Population increase is substantial in Shivalik & Gangetic flood plain which is followed by Central India, North Eastern Hills and Brahmaputra flood plains and Sundarbans while Western Ghats population showed decline with major populations being stable

Outputs and Outcomes: After successfully completing the identification of Camera trapped data of tigers and subsequently prepared the summary report of All India tiger estimation, the biologists at Wildlife Institute of India are currently working on state and tiger reserve wise population estimation of tigers and leopards.

Milestone: The Hon'ble Prime Minister released the Tiger assessment report 2022 on 8th April 2023. This now marks the only country in the world to have 5 consecutive 4-year cycles of country-wide population assessment of tigers in a scientifically robust framework.



RESEARCH ONGOING

MSTRIPES: MONITORING SYSTEM FOR TIGERS: INTENSIVE PROTECTION AND ECOLOGICAL STATUS (PHASE III)

Funding Source
National Tiger Conservation Authority

Investigators
Shri Qamar Qureshi and Dr Y.V. Jhala

Researchers
Anup Kumar Pradhan, Ashish Prasad, Deb Ranjan Laha, Krishna Mishra, Kainat Latafat, Dhruv Jain, Rutu Prajapati, Manish Singanjude and Nanka Lakra

Date of Initiation
February 2021

Proposed Date of Completion
February 2024

Objectives: The objectives of the project are to (i) update MSTrIPES mobile applications with changing android environment and google security policies and desktop software and web-analytics using advance database to accommodate multi-scale data; (ii) implement MSTrIPES and orient frontline staff by modern field techniques on law enforcement monitoring and ecological data collection; and (iii) develop cloud-based

Figure 1: *Spatial coverage of sign survey trails in AITE 2022-23*

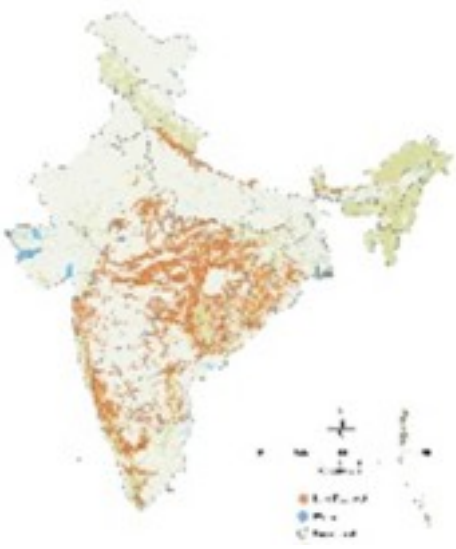


Figure 2: *Spatial coverage of line transect in AITE 2022-23*

camera trap image recognition software to assist phase IV and country-wide monitoring.

Progress: After successfully completing the phase II (2016-2021) of the program, Phase III of MSTrIPES was developed and initiated with continued support from NTCA; wherein the program is being transferred to a faster and smarter programming environment of PostgreSQL, PostGIS and participatory GIS cloud.

Desktop and mobile application: In last one year, several (~20) versions of the mobile apps were released to accommodate the changing android and google environment, as well as field requirements. Desktop application of MSTrIPES was updated with user friendly features and analysis tools for different modules *viz*. Patrol, Ecology and Polygon.

Training and Implementation: A total 12 site-specific training along with online handholding, and assistance was provided to MSTrIPES users for Patrol and Ecology module across the country since October 2022. Other than tiger reserves, offline training of Ecology and Patrol module and scientific and technical inputs regarding ecological sampling have been provided to the frontline staff and officers of potential tiger habitat areas of tiger range states such as Kaimur WLS and Rohtas forest division of Bihar, Intanki NP of Nagaland, Kumbhalgarh WLS of Rajastahn and forest divisions of Goa. As per Action Plan of Reintroduction of Cheetah in India, implementation of MSTrIPES program and training of Patrol module was conducted for the frontline staff and officers of Kuno NP of Madhya Pradesh.

Online training of MSTrIPES desktop software has been provided to ~110 participants from all the tiger range states through video conferencing and remote desktop access.

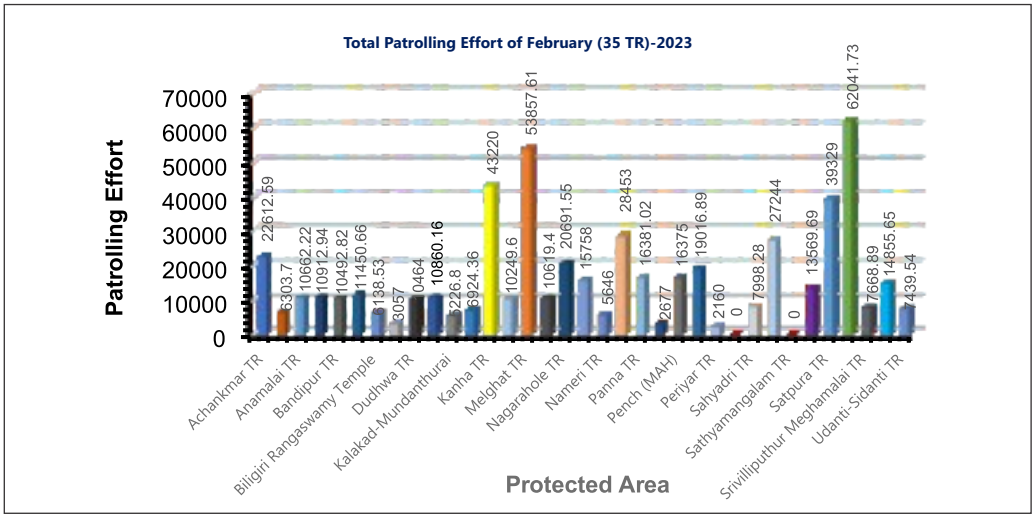


Figure 3: *Monthly patrol effort in tiger reserves. (Source: https://docs.google.com/spreadsheets/d/19kAH0nxxSkxGnQnloNHLTk9jwibs4ocAIjY1InaTAic/edit#gid=0)*

Outputs and Outcomes: As a part of digital literacy and to minimize human errors, frontline staff of state forest department of all potential tiger range states were trained to collect the Phase I data (Figure 1 and Figure 2) of All India Tiger Estimation exercise 2022-23 through the MSTrIPES android application. A total of 6,41,449 km of foot surveys were executed during the data collection procedure. Apart from this, MSTrIPES monthly reports of daily patrolling by frontline staff and officers from 35 tiger reserves were obtained during this period. An average, 540,357 (±15,439) km of patrols/ month were recorded across the tiger reserves. Many tiger reserves (e.g., Similipal, Melghat, Satpura, Kanha, Achanakmar, Dudhwa) had more than 70% patrol coverage of the reserve; and many tiger reserves had patrolling hours spread across the day and night period (e.g., Similipal Tiger Reserve had around 2,500 km patrolling every month between 9:00 pm to 5:00 am).

Milestone: MSTrIPES provided a comprehensive graph of the conservation-related investment at a national scale during the monthly patrolling. As a result of user-friendly apps, the program has been absorbed by many other states and researchers for a landscape survey and patrolling (e.g., Union Territory of Ladakh used MSTrIPES for landscape scale snow-leopard assessment, to record ~6000 km foot surveys). MSTrIPES program has also been customized and implemented for monitoring law enforcement in Great Himalayan National Park, Himachal Pradesh. For the very first time, MSTrIPES program has been extended beyond peninsular India and the program has been customized and developed for the union territories of Andaman and Nicobar Islands for information based decision making.

RESEARCH ONGOING

NICHE SELECTION AND MESOPREDATOR RELEASE IN HIGH ALTITUDE ECOSYSTEMS

Funding Source
Science and Engineering Research Board, Department of Science Technology

Investigator
Dr. Salvador Lyngdoh

Researcher
Priyanka Justa

Date of Initiation
February 2021

Proposed Date of Completion
February 2024

Objectives: The objectives of the project are to (i) determine resource utilization by high altitude carnivores like snow leopards, Himalayan wolves, foxes and free-ranging dogs in the trans-Himalayan region; (ii) investigate levels of overlap and influence by high altitude carnivores in terms of mesopredator release or suppression (a) How do interactions amongst intra-guild predators influence top-down effects in terms of mesopredator relative abundance and distribution? (b) How do bottom-up processes such as resource availability influence mesopredator release among the carnivore guild?

Progress: A comprehensive investigation of spatio-temporal interactions among carnivores has been conducted using camera trapping in five different study areas across a gradient of anthropogenic impacts. Three sites were covered in summer season with 50 cameras in Kibber, 21 in Mane and 22 in Gue. Further two more sites were covered in winters with 48 camera traps in Pin and 36 in Tabo. To study dietary habits of carnivores in the study area, a total of 645 scat samples have been collected in 2022-23. Out of these 402 are of red fox, 46 for dog, 72 for snow leopard and 25 for Himalayan wolf.

Data collection for density estimation of dogs using a polygon search-based SECR framework has been completed across the intensive study sites to take into account the effect of an introduced predator i.e., dogs, on native predators in the region.

To study the fine scale space-use by the red fox, three individuals were fitted with collars at one of the intensive study sites i.e., Mane. Among the collared individuals, an adult female and a subadult male were equipped with Lotek advanced LiteTrack GPS Iridium Collars, while an adult female was equipped with a VHF collar.

Outputs and Outcomes: Camera trapping has resulted in a total sampling effort of 2,186 days in Kibber, 945 days in Mane, 990 days in Gue, 1440 days in Pin and 1152 days in Tabo. Spatial interactions using multispecies occupancy modelling was studied. The findings demonstrate that occupancy probabilities of individual species were related both to environmental variables and the presence or absence of other interacting species. However, the extent to which environmental variables versus interspecific interactions contribute to shaping occupancy probabilities varies across the sampled sites.

The temporal activity of the two mesopredators i.e., red fox and dog differed significantly (Δ=0.3). Regarding the interaction of the mesopredator with the top predator, red fox had high temporal overlap with wolf (Δ=0.8) and moderate overlap with snow leopard (Δ=0.6). The dog had distinct activity peaks and moderate (Δ=0.5) to low (Δ=0.4) overlaps with snow leopard. Based on the analysis of the scat data analyzed till now, which also incorporates published data from the same region to enhance the sample size, it is evident that cattle comprised a significant portion of the diet for all the predators. Specifically, they account for approximately 54% of the Himalayan wolf's diet, and contribute 41%, 23%, and 20% to the diets of dogs, snow leopards, and red foxes, respectively. Himalayan wolves primarily rely on domestic animals as a significant part of their diet, with goats making up 11% and sheep contributing 10%. In contrast, wild prey such as ibex (15%) and blue sheep (10%) form the predominant portion of the snow leopard's diet. The diet of red fox, mesopredator in the region consisted mostly of rodents-pika and vole (14%) along with a considerable proportion of lagomorphs (13%) and insects (12%).

Dietary overlap was computed for all combinations of predator pairs by combining data from all the study sites. The highest degree of diet overlap was observed between domestic dogs and wolves (0.82). This was followed by a diet overlap of 0.77 between domestic dogs and snow leopards, while the lowest overlap was observed between wolves and red foxes, with a value of 0.65. For the remaining predator pairs, the diet overlap ranged from 0.75 for snow leopards and wolves, 0.71 for red foxes and domestic dogs, to 0.67 between red foxes and snow leopards.

Density estimates for domestic dogs were determined for three different study sites and yielded the following results: 0.95 ± 0.36 SE in Mane, 0.96 ± 0.23 SE in Pin, and 1.19 ± 0.07 in Kibber. The study provides insights into understudied carnivore intra-guild interactions in the resource scarce trans-Himalayan landscape of Spiti. High dietary overlap among most of the predator pairs indicates competition for limited resources.

As anthropogenic impacts increase, the researchers find that these predators coexist in this resource-scarce landscape through dietary or spatiotemporal segregation. The research adds to the scant ecological knowledge of the predators in the region and improves our understanding of community dynamics in human-altered ecosystems.

Milestones: This study is the pioneering research effort within the landscape that explores interaction patterns among predators in the region across multiple niche dimensions. Crucial information on diet, activity patterns, and space use of an introduced mesopredator i.e., free-ranging dog and the native predators has been collected which will help in their management. It can be especially helpful in advancing feral dog management in these areas.

The research findings were presented at the first Indian Conservation Conference, which took place in Mysore from 9-11 April 2023. The presentation was titled "Carnivore Intra-Guild Interactions in a Cold Arid Trans-Himalayan Landscape."

RESEARCH ONGOING

ADDRESSING MANAGEMENT ISSUES OF KAZIRANGA TIGER RESERVE AND PRIORITY APPLIED RESEARCH (COMPONENT 1: PROMOTING COMMUNITY PARTICIPATION IN CONSERVATION AND CONFLICT RESOLUTION IN THE FRINGE VILLAGES OF KAZIRANGA TIGER RESERVE, ASSAM)

Funding Source
National Tiger Conservation Authority

Investigators
Dr Ruchi Badola and
Dr Syed Ainul Hussain

Researcher
Manisha Ashraf

Date of Initiation
October 2019

Proposed Date of Completion
March 2024

Objectives: The objectives of the project are to (i) Examine the patterns of interaction between local communities and Protected Area with reference to resource dependency and Human Wildlife Conflict (HWC); (ii) Develop site-specific strategies for aligning local people' livelihoods with conservation priorities of Kaziranga TR by examining their perception, attitudes and aspirations; (iii) Identify and revive the existing formal and informal community level institutions or create new institutions to elicit the participation of local community; and (iv) Initiate and institutionalize the process of micro planning for conflict resolution and development of alternate livelihoods in select villages.

Progress: To understand the pattern of resource dependency, human wildlife interaction and its conflict resolution techniques, 111 households across 24 villages under Eastern Assam Wildlife Division and 40 households across 10 villages under Biswanath Wildlife Division were surveyed. Ground truthing of 584 households through GPS coordinates of conflict occurrence location done. Focus group discussions with line departments/ agencies to navigate the policies and establish linkages for livelihood enhancement. 110 individual's skill assessment and scoping study across 6 villages (including PRA exercise) was done to strengthen human and financial capital. Key informant interviews with heads of local institutions like Eco-Development Committee (EDC) of 21 villages, Village Defense Party (VDP) of 31 villages and village headman of 22 villages was done to understand the role, aspirations and perception of local communities in conservation.

Focus group discussions with local communities and relevant committees in 7 villages under Biswanath Wildlife Division to document the human wildlife interaction pattern and livelihood assets, opportunities and its vulnerabilities.

Outputs and Outcomes: A total of 79% households are dependent on firewood for domestic purpose. No collection of NTFPs for commercial purpose has been recorded in 34 study villages. 5% households extract NTFP for domestic purpose. Such as *Zanthoxylum* sp., *Centella Asiatica, Tetrastigma* sp., *Colocasia esculenta*, *Musa splendida, Diplazium esculentum, Ziziphus* sp., *Dillenia indica, Paederia foetida* and *Phlogacanthus thyrsiformis* etc.

Significant population (63%) households reported cases of crop depredation as a type of human wildlife conflict, followed by property damage (22%), livestock depredation (8%), both property damage and crop depredation (6%) and human causality (1%). The survey recorded 20% households to have received compensation for the loss.

While solar run electric fencing around crop fields is the most preferred coping strategy against any advanced measures such as acoustic & visual technology, 34% households possess solar run electric fencing. Traditional strategies like machans, scare crow, surrounding with discarded sarees or mosquito net etc. is deployed by less than 40% households.

Despite the prevalence of human wildlife conflict in various forms; the positive response to conserve wildlife is high and no sign of retaliatory killing was recorded. Here, sense of belongingness towards Kaziranga, religious beliefs towards rhino and elephant and cultural sanctions towards wildlife play an important role to maintain this relationship.

Established marketing platforms through e-commerce (https://www.pashoopakshee.com/product-page/indian-rhino-stole) and navigated opportunistic sales for traditional handloom weaving products based on animal motifs. A total of 7000 INR earned by four SHG members through sale of handloom apparels.

Robust insurance scheme, improved disbursement of honorarium and frequent capacity building training/ awareness workshop to Village Defense Party noted as significant steps to promote participation in conservation. Proper guidance in budget allocation for Eco Development Committee is necessary to effective functioning of the institution.

In collaboration with Rural Self-Employment Training

Resource mapping in a river island village near Kaziranga Tiger Reserve

Institute, Ministry of Rural Development, GOI; WII conducted ten-day training programme on 'Travel and Tourist Guide' for 33 participants. Intellectual and material support provided to existing institutions like SHGs, Xomonnoy and Rashtriya Grameen Vikas Nidhi (RGVN) for strengthening community-based tourism in Kohora range through training on making wildlife themed souvenirs, building space for serving ethnic food, issuing FSSAI license through proper channel etc.

Milestone: Establishment of Ajon Ukum- a community-based tourism model in Panbari village, belonging to the Mising tribe. The Centre offers ethnic food, guided village walk, folk performances, traditional dress photoshoot and exhibition of traditional fishing gears etc. The model has not only attracted Indian and foreign tourists but also hosted the 15 Indian Information Service trainees (UPSC batch 2021 and 2022).

Kaziranga-WII team received appreciation letter on 19 September 2023 from the Department of Panchayat and Rural Development, Government of Assam for establishing market linkages based on existing skill sets for weavers near Kaziranga National Park, Assam.

RESEARCH
ONGOING

ADDRESSING MANAGEMENT ISSUES OF KAZIRANGA TIGER RESERVE AND PRIORITY APPLIED RESEARCH (COMPONENT 2: MANAGEMENT OF INVASIVE SPECIES IN WET GRASSLANDS OF KAZIRANGA TIGER RESERVE, ASSAM)

Funding Source
National Tiger Conservation Authority

Researcher
Umar Saeed and Rashmi Das

Investigators
Dr Ruchi Badola, Dr S.A. Hussain and Dr B.S. Adhikari

Date of Initiation
November 2018

Proposed Date of Completion
March 2024

Objectives: The objectives of the project are to (i) examine the extent of wet grassland areas affected by the exotic as well as the native invasive plant species in Kaziranga Tiger Reserve; (ii) develop strategies to eradicate the invasive species in the Reserve by developing innovative tools and techniques; (iii) demonstrate restoration of the degraded grassland habitats by adopting pilot restoration sites; and (iv) conduct training and capacity building programmes for the frontline staff of the Forest Department to promote scientific management of invasive species.

Progress: During the ongoing year, the knowledge of the frontline staffs of Kaziranga Tiger Reserve (KTR) about the invasive species were documented as they are key observers of the change in invasion pattern every year in Kaziranga. The four ranges of the Eastern wildlife division of KTR, i.e. Agoratoli, Kohora, Bagori, and Burapahar were surveyed thoroughly.

Each camp member associated to different posts in the Reserve, have been asked through questionnaire survey about their field-based knowledge and if they practice manual removing of invasive plants or not. Total 100 camps were surveyed where the researchers found total 309 respondents having different posts and job roles with different age classes which shows the significant difference of knowledge among them about how invasive species has grown these years and how to manage them.

Based on the years of experiences of the staffs, the effect of flood on invasion were identified. The presence of invasive species surrounding the respective camps of the respondents were documented to understand the high-risk species that is mostly distributed in Kaziranga. The emerging threat i.e., Bombax ceiba has been found the most adjacent to the camps of KTR. Depending on the field-based understanding of the frontline staffs, the researchers conducted green-house experiments to understand the Germination pattern of Bombax ceiba, and to understand the water regime requirement for its growth. It was also aimed to understand the

(a) Survey in core area camps

environmental parameters that enhance the invasion of Bombax ceiba in KTR.

Outputs and Outcomes: The 309 respondents were categorized into 11 different posts, where the mostly found one was Home Guard (29.45%) post and the least were Game watcher (1.71%). The researchers have observed that the post for Grass-cutter (2.40%) was also very less in comparison to the other posts within the Tiger Reserve. 34% of the frontline staff belong between the age group of 31-40 years. Most of the staff (near about 62%) have experience range working in KTR is less than 10 years, but it was also found that 8.37% of people having an experience of working 31-40 years, which impacted the data collection immensely through their knowledge on invasion.

Three classifications were made to understand the impact of flood on invasion: (i) it increases invasion; (ii) it decreases the invasion; or (iii) flood causes no significant effect on invasion. Most of the respondents (48.39%) specified that flood is a crucial factor to reduce invasion.

53% respondents agreed that the practice of cutting the invasive species if seen to enhance profusely, rest of the respondents do not practice any removal methods.

Though Bombax ceiba is considered as native to KTR, but it is the most problematic plant in KTR nowadays which causes grassland degradation. The staffs also mentioned (32% staff) this species to be the maximum harm causing to the fodder of the herbivores. According to the survey, among the 11 different invasive plant species found in KTR, *Mimosa diplotricha* is also profusely harmful (19.23%) and Lantana camara is thought to be the least to be concerned as harmful.

Through experimental setup in the greenhouse, it was evident that Bombax grows the most in Moist soil conditions (60% viable growth). The germination is most during the Phalguna time, i.e. the month of February and March. In standing water condition, only hypocotyl growth is observed (18%) and no germination is observed in dry condition.

Milestone: Understanding the invasion and effect on native species as well as on the herbivores is the key milestone achieved throughout the year long survey. Simultaneously, awareness spread amongst the frontline staffs to make them understand the impact of invasion in Kaziranga Tiger Reserve. The Forest Guards actively participated to protect the native grass species such as Lokosa, *Paspalum longifolium* Roxb.), Ekora, *Saccharum ravennae* etc.

RESEARCH ONGOING

A COMPREHENSIVE STUDY ON THE ECOLOGY AND POPULATION STATUS OF A HUMAN COMMENSAL – THE HOUSE SPARROW, PASSER DOMESTICUS IN THE UTTARAKHAND STATE

Funding Source
Uttarakhand State Forest Department

Researcher
Renu Bala

Investigators
Dr R Suresh Kumar and Dr Dhananjai Mohan

Date of Initiation
April 2021

Proposed Date of Completion
March 2024

Objectives: The objectives of the project are to (i) understand the population and nesting ecology of house sparrows at select sites along an elevational gradient across the State; (ii) study the genetic structure of house sparrow populations so as to identify presence of subpopulations if any and their evolutionary history in the Uttarakhand Himalaya; and (iii) investigate the presence of pesticides in house sparrows and possible correlation on the decline of house sparrow populations in the Uttarakhand State.

Progress: During the breeding season from May to July 2022, active nest count was performed at various field sites across three different elevations. A total area of 1798 hectare was surveyed. Currently, point counts in Uttarakhand State is being carried out to gather information about the presence/absence and relative abundance of House Sparrows at multiple sites. Data on habitat variables is also being collected. As part of the research on nesting ecology, a total of 350 nest boxes have been deployed this year at various field sites, including Malari, Dehradun, Haridwar, Rudrapur, and Purola. Active monitoring of these nest boxes to determine nest box occupancy and breeding parameters is being carried out. For population genetic assessment, morphometric measurements and blood samples were collected across an elevational gradient along Alaknanda river watershed. In addition to this, feather samples were also taken from each individual to study the variations in insulation capacity at different elevations. Besides this, egg samples were collected for ecotoxicological analysis work, to examine the presence of pesticides in house sparrows and their potential contribution to the population decline.

Outputs and Outcomes: These surveys showed that House Sparrows do occur widely associating with human habitations, from the Himalayan foothills to as high as 3,600 m and also in parts of the Trans-Himalayan region.

During the nest count survey, a total of 1895 active nests were recorded from all the study sites. There were 1.13 breeding pairs per hectare across the sites surveyed. In term of site location, maximum numbers of nests were located in traditional structures (87.33%). The places where traditional houses are present, a greater number of sparrows are seen and they prefer to nest in traditional roofs such as thatched and pathal.

From the point count data (507 points) that is being collected this year, it is found that the mean count is 3.18 individuals per point across the state. The mean count was the highest (4.87) in rural habitats (n=161) followed by semi-urban (n=152) with mean count (3.36). The urban habitat (n=192) had the lowest mean count (1.45). It was observed that rural habitats have a higher number of house sparrows due to the availability of more nesting, feeding and roosting spaces.

The nest monitoring results have shown that the nest box occupancy rates were lower in urban sites having poor occupancy (9%) compared to rural (90%). These findings suggest sparrow populations to have declined in

the cities possibly as a result of urbanization. The nest boxes deployed in the Gujjar settlements were not occupied by sparrows while in the relatively concretized built-up villages, the occupancy rate was 90%. It is influenced by the housing architecture, be they of concrete as in developed villages or traditional thatched roof houses as in Gujjar settlements.

Nesting data was obtained from low elevation site Peeli Padav where breeding season started from February and ended in August. On average, the clutch size was 4.15 eggs, with the first clutch averaging 3.55 eggs per clutch. The overall nesting success was 54%, which was relatively low due to nest abandonment and failure caused by predators such as domestic cats, snakes, and competition with Common Mynas.

The findings from the analysis of morphometrics and feather structure have revealed significant variations in the morphology and feather structure of house sparrows. These variations suggest adaptations to cope with progressively colder temperatures.

Milestone: This study is being counducted in many parts of the Uttarakhand State where it is helping creating mass awareness among locals. The locals are effectively engaged in House Sparrow conservation and the nest boxes deployed at their homes make them actively take part in nest monitoring work. Overall, this study has raised awareness among local people about the importance of conserving sparrows and the need for providing adequate nesting space for them. This initiative here in the Uttarakhand Himalayas having provided information on the population status of house sparrows has also begun to provide deeper insights into these once commonly occurring birds. This ongoing research is expected to understand other potential causes that have led to the decline of house sparrows in the region.

RESEARCH
ONGOING

IMPLEMENTING RHINO DNA INDEXING SYSTEM (RHODIS) TO COUNTER RHINO POACHING THREAT AND AID RHINO POPULATION MANAGEMENT IN INDIA – SECOND PHASE

Funding Source
Ministry of Environment, Forest and Climate Change

Investigator
Dr Samrat Mondol

Researcher
Shrewshree Kumar

Date of Initiation
April 2021

Proposed Date of Completion
April 2024

Objectives: The objectives of the project are (i) expansion of the RhoDIS-India database; (ii) assessment of mitogenome variations to understand the evolutionary history of Indian rhino populations; (iii) development of a molecular sexing approach for one-horned rhinoceros; (iv) development of crime investigation kit for rhino crime scene investigations; (v) whole genome sequencing of Indian rhinos to develop a panel of global rhino markers for forensic use.

Progress: After the first phase of the project, re-sampling in Dudhwa National Park of Uttar Pradesh was done in March 2022 to expand the RhoDIS-India database. The whole mitogenome data was generated for all Indian rhino populations followed by identification of polymorphic sites to assess the mitochondrial genetic variation in Indian rhinos. A concatenated sequence of 2,531bp covering all the polymorphic sites was generated using eight primers for 111 samples to investigate the phylogeography patterns. This was done to identify the maternal clades using three different approaches implemented in the Haplotype network, BAPS (Bayesian), and phylogenetic tree construction. Further, the researchers estimated the divergence time among the clades to understand the evolutionary history of Indian rhinos.

A robust molecular sexing approach was developed to identify the sex of the rhino individuals through non-invasive and invasive samples. At the initiation of the RhoDIS-India program it was envisioned that significant effort is required in terms of training and building infrastructure towards wildlife crime scene investigation (particularly focusing on rhinos). In this regard, five crime investigation kits were provided to the Assam forest department as it harbors the largest Indian rhino population. The kit contents were finalized through multiple discussions with MoEFCC, WCCB, and other forensic experts from the Government of India. To achieve expansion of the RhoDIS program to a global scale this phase of the project had planned to conduct genome sequencing of Indian rhinos for designing more robust primers that can be tested in other labs. In this regard, multiple samples from each park have been selected and sent for genome sequencing to our collaborating agency Nucleome Informatics, Hyderabad. The data generation for genome sequencing is underway.

Outputs and Outcomes: The data processing for the samples from Dudhwa National Park, UP is ongoing. The whole mitogenome data screening resulted in the identification of 21 polymorphic sites across Indian rhino populations. Further, the phylogeography analysis shows that Indian rhinos are genetically structured into three maternal clades corresponding to Assam, West Bengal, and Uttar Pradesh. Among the three, Assam is the most diverse one consisting of 28 haplotypes whereas the other two clades are monomorphic. By comparing our data with the existing literature it was confirmed that the reintroduced population of Uttar Pradesh showed maternal signatures of Chitwan National Park, Nepal. Further, the divergence date estimation analysis suggests that the one-horned rhino diverged from its recent common ancestors ~950 Kya (thousand years ago), and different populations (Assam, West Bengal, and Uttar Pradesh/Nepal) coalesce at ~190-50 Kya, corroborating with the paleobiogeography history of the Indian subcontinent.

Based on the molecular sexing approach, 118 males and 49 females from 188 tissue samples, 3 males and 4 females from 7 horn samples, and 57 males and 14 females from 96 dung samples were identified till now. The identification of the sex of all the samples in the RhoDIS-India database is ongoing which will give us an idea of the sex ratio in each of the parks. All the kits have been prepared and distributed across different parks of Assam and UP.

Milestone: To the best of the knowledge, this is the first report of wild Indian one-horned rhino mitogenome from all the extant populations. The phylogeography and phylogenomic outcomes suggest the recognition of three 'Evolutionary Significant Units (ESUs)' in Indian rhinos. Given that multiple reintroduction programs are planned as per the 'National Conservation Strategy for the Indian One-horned rhinoceros, Rhinoceros unicornis, Government of India, Ministry of Environment Forest and Climate Change, 2021' objectives (in the states of Uttar Pradesh, Bihar, West Bengal, and Assam) in near future, the genetic signatures described in this study would be very helpful in selecting appropriate areas to identify founder animals.

RESEARCH ONGOING

UNDERSTANDING POPULATION DYNAMICS, SPACE USE, MOVEMENT AND DIET OF LEOPARDS IN JUNNAR TALUKA, MAHARASHTRA FOR HUMAN LEOPARD CONFLICT MITIGATION

Funding Source
Maharashtra Forest Department

Researcher
Kumar Ankit

Investigators
Dr Bilal Habib, Dr Parag Nigam and Dr Samrat Mondal

Date of Initiation
April 2019

Proposed Date of Completion
April 2024

Objectives: The project has the following objectives (i) Population estimation: to estimate the density, abundance and demographic structure of leopards in Junnar Forest Division; (ii) Food habits of leopards: to assess the food habits of the leopard through Scat analysis; (iii) Genetic database of the leopards: (a) to identify their family lineage of the serial offenders in the conflict cases; (b) to identify the population dynamics and sex ratio; (iv) Spatio-temporal use and movement pattern: (a) to estimate the home-range, space use, and territorial behavior of individuals; (b) to study the dispersal pattern and habitat use of leopards dwelling in the human-dominated landscape of Junnar Forest Division; (v) Characterizing conflict sites: to characterize the conflict sites based on the conflict scenario; (vi) Socio-economic survey: (a) to evaluate the dependency of local people on forest resources; (b) to evaluate the magnitude of the conflict.

Map showing spatial use of all collared leopards in Junnar Forest Division, Pune, Maharashtra, India, 2021-2023

Progress: *Camera trapping exercise for population estimation of leopards:* One more block of camera trapping exercise were added in the study area (Joint Block of Khed and Ghodegaon Range, Yellow Square Block); Camera trap exercise was replicated second time in January 2023 to understand the persistence of the carnivore in the landscape. All the data is in the process of sorting and analysis. Till date, six blocks of camera trapping and three replicate of one camera trap block have been completed. The opportunistic camera trap exercise (n=6) was done to track leopards amidst human death because of leopard in different part of forest division. Additionally, opportunistic camera trapping exercise (n=7) for forest department to fulfil their objective such as cub reunion and conflict scenarios was done.

Spatio-temporal use and movement pattern: One female leopard captured and fitted with satellite drop-off collars from the Junnar Forest Division in November 2022. Total

of 11 Leopards (Five male and Six Female) were radio collared, in which seven collars have been dropped-off. Data analysis is in progress. Collared leopards are being tracked on field. GIS based data is used to analyze home range, space use, and understand microhabitats needs- infrastructure development, crop cover height, crop area of crops/plantation taken refuge by leopards in the landscape.

Training & awareness in Junnar Forest Division, Maharashtra, India, 2022-23.

Scat collection: Opportunistic scats collections are done across talukas and ranges under Junnar Forest Division for diet analysis and genetic component.

Training of forest department and Awareness Program: Periodic training (n=9) of forest officer/field staff members across ranges about camera trap exercise, scat collection, ground level observations, and leopard-rescue data collection. More than 120 staffs of different ranges were trained in these training the targeted Officer/staffs were Ranger, Forester, Forest Guard and Beat Guards.

More than 600 hundred students attended awareness program regarding mitigating human-leopard negative interaction in Junnar Forest Division (awareness program, n=6).

Output and Outcomes: A paper titled "Spotting the spots" - Understanding ecology of Leopards in Human-dominating landscape of Maharashtra, India for mitigating human-leopard negative interactions" was presented in a conference at the ICCON, Mysuru in April, 2023.

Milestone: First kind of study with maximum radio-collaring of leopard in human dominated landscape in India. First kind of study with intensive camera trapping exercise and replication of the exercise in human-dominated landscape in India.

RESEARCH ONGOING

PAN INDIA ASSESSMENT AND MONITORING OF ENDANGERED SPECIES COVERED UNDER THE "INTEGRATED DEVELOPMENT OF WILDLIFE HABITATS (IDWH)"– ARABIAN SEA HUMPBACK WHALE, *MEGAPTERA NOVAEANGLIAE*

Funding Source
Ministry of Environment, Forest and Climate Change – National Compensatory Afforestation Fund Management and Planning Authority (MoEFCC-CAMPA)

Researchers
Dr Selva Bharath, Sreelekha Suresh PC, Joshua Dharmaraj and Hanok Stephen

Date of Initiation
January 2023

Investigators
Dr J.A. Johnson and Dr Nehru Prabhakaran

Proposed Date of Completion
June 2024

Objectives: The objectives of the project are to (i) understand the population status of Arabian Sea Humpback Whales (ASHW) and identify Humpback Whales hotspots along the West Coast of India; (ii) record different population of ASHW present in Arabian Sea based on the acoustic record; and (iii) develop comprehensive long-term monitoring protocols for ASHW populations in the Arabian Sea.

Map showing the study area and sampling sites

Progress: Fisher folk knowledge play crucial role in understanding the interactions between local coastal communities and marine mammals, particularly the Arabian Sea Humpback Whales (ASHW). Thus, an interview based questionnaire survey covering different aspects of fisherman-marine mammal habitat interactions such as fishing areas and activities, specific observations of marine mammal sightings and entanglements, focused inquiries on ASHW-related details, and the local threats impacting ASHW were recorded from 31 major fishing area spread across the west coast of India. The study area encompassed the west coast of India, stretching from Gujarat to Tamil Nadu, including the Lakshadweep Islands. To cover a wide geographical area and identify regions with high marine mammal activity, a unique grid-based sampling approach was employed, using a grid size of 20 x 20km and covering a distance of 200 km seaward from the coastline. The selection of hotspots was based on factors such as whale sightings and prevailing oceanographic conditions. The analysis of data collected from the field are under progress and shortly the hotspot area of ASHW distribution will be identified.

Outputs and Outcomes: Since the project was initiated 3 months ago, it is too early to come up with outcomes, however based on the preliminary analysis, the following outputs and outcomes were derived.

The preliminary data analysis revealed that, Dolphins were the most frequently observed marine mammal in the Arabian Sea, followed by porpoises and whale sharks. Among the fishermen surveyed, more than 65% reported that the Arabian Sea Humpback Whale (ASHW) sighting is the most commonly sighted whale.

The information retrieved from the Gujarat and Maharashtra area revealed that there is clear pattern in the movement of ASHWS across different seasons (winter, summer and monsoon).

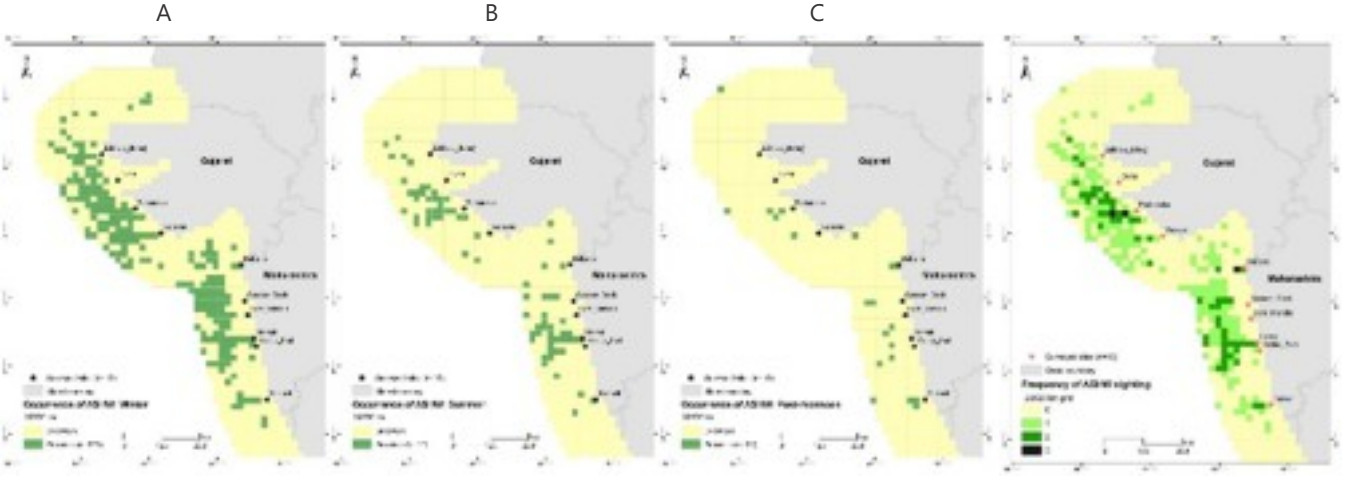
Milestone: Expert consultations: Expert consultations were conducted on January 17, 2023, to gather input from relevant stakeholders on existing information on population status of ASHW in India.

Study area selection: Based on a comprehensive literature survey, the entire west coast of India, survey locations across the west coast was selected.

Completion of site surveys: Between January 2023 and June 2023, 27 out of the 31 selected sites were successfully surveyed. A total of 2,407 samples were collected from the sighted vessels.

Analysis of survey findings: The survey revealed that dolphins were the most frequently observed marine mammal, followed by porpoises and whale sharks. Over 65% of the fishermen reported sightings of baleen whales, with the Arabian Sea Humpback Whale (ASHW) being the most commonly sighted species.

Identification of key sighting locations: Analysis of the data highlighted Porbandar and Dahanu as the areas with the highest frequencies of ASHW sightings across all three seasons. Other notable sighting locations included the Okha to Veraval stretch in Gujarat and the Sasson dock to Harnai stretch in Maharashtra.



Showing seasonal sightings of ASHW along the coasts of Gujarat and Maharashtra (A- Monsoon, B – Summer and C – Winter).

RESEARCH
ONGOING

ECOLOGY AND CONSERVATION OF MAJOR CARNIVORES & UNGULATES OF SEMI-ARID GRASSLAND-SCRUB-AGRO-SYSTEMS OF KARNATAKA

Funding Source
Karnataka Forest Department, Government of Karnataka

Investigators
Shri Qamar Qureshi and Dr Vishnupriya Kolipakam

Researchers
Dr Manjari Roy and Basavaraj Mulage

Date of Initiation
December 2020

Proposed Date of Completion
December 2024

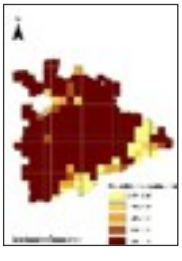
Objectives: The objectives of the project are to (i) develop monitoring System with modern technology to assist effective patrolling, assess ecological status and mitigate human-wildlife conflict in semi-arid grassland-scrub-agro-systems of Karnataka; (ii) determine the status and distribution of major fauna of semi-arid grassland-scrub-agro-systems of Karnataka; (iii) determine the home range, dispersal, denning behaviour and feeding ecology of the major carnivores & ungulates of semi-arid grassland-scrub-agro-systems of Karnataka at select study site(s); (iv) determine the prevalence of certain infectious diseases in major carnivores at select study sites and compare the circulating strains/lineages of these pathogens to understand the transmission pathways; (v) build capacity of forest staff in species identification and monitoring, modern tools and technology (MSTrIPES, Telemetry) and capture & restraint.

Progress: Data was collected from interview based occupancy survey to determine species distribution in the district of Koppal, Karnataka. Interview based sampling data analysed in a single season occupancy framework and report submitted to the Karnataka Forest Department. Camera trapping in selected blocks of Koppal for abundance estimation of various species started. New research assistants being recruited for continuing the field work further.

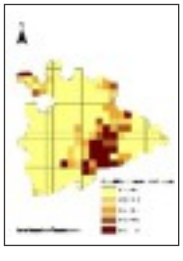
Outputs and Outcomes: The interview based occupancy survey allowed us to determine individual species *viz.* wolf, leopard, hyena, sloth bear, fox, jackal and blackbuck occupancy and distribution across the district of Koppal. The maps of the said distributions are shown below:

The above has helped us in then identifying hotspots of animal occurrence to deploy cameras in smaller intensive units for estimating the populations of the study species.

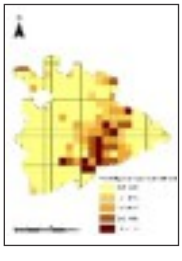
Milestone: 15,000 sq km of the study area (approx. 67000 sq km) have been covered using interview-based occupancy survey to understand the distribution of the study species.



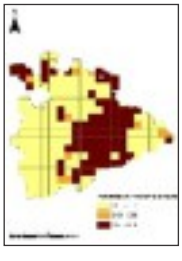
Wolf occupancy



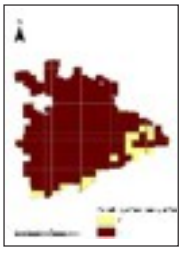
Leopard occupancy



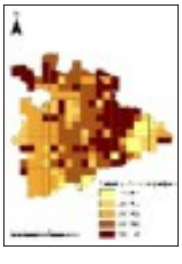
Sloth bear occupancy



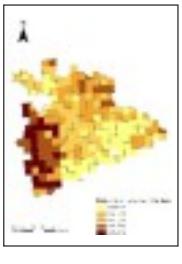
Hyena occupancy



Fox occupancy



Jackal occupancy



Blackbuck occupancy

RESEARCH
ONGOING

ASSESSING THE ECOSYSTEM SERVICES PROVIDED BY COLONIAL NESTING WATERBIRDS IN AND AROUND SELECT WETLANDS OF TAMIL NADU

Funding Source
DST-SERB

Date of Initiation
March 2022

Investigator
Dr G.V. Gopi

Proposed Date of Completion
March 2025

Researcher
Alex Jacob S.S.

Objectives: The objectives of the project are to (i) establish ecological baselines on identified wetlands with and without heronries; (ii) ascertain the influence of nutrient inputs in water and sediment quality of the wetlands; (iii) determine the fertiliser usage and productivity in agriculture fields drawing water from wetlands with and without heronries; and (iv) assess the attitude and perception of farmers on colonial nesting waterbirds

Progress and Outcomes: For this study 11 bird sanctuaries in Tamil Nadu that have both heronries and are closely situated near agricultural fields have been selected. Necessary permission to conduct the study from the Principal Chief Conservator of Forests and Chief Wildlife Warden of Tamil Nadu State Forest Department was received. Before starting the fieldwork, a thorough literature survey was conducted to carry out the fieldwork. Field work was initiated with visits to the forest officials at each selected site to explain the importance of the project and the study. A reconnaissance survey was conducted during these visits, and control sites for the study were selected. However, for the 2022-2023 season, Kanjirankulam Birds Sanctuary, Chitrangudi Birds Sanctuary, Koonthankulam-Kadankulam Birds Sanctuary, Melaselvanur-Kelaselavanur Birds Sanctuary, and Therthangal Birds Sanctuary were excluded, as no colonial nesting waterbirds nested in these areas during the season.

Intensive data collection was initiated in the first week of January 2023, conducting regular visits to each selected site every 21 days. During each visit, various data, including information on species nesting, identification of different species nesting, and the number of individuals of each species nesting in the colony was collected. Additionally, water samples to assess the nutrient levels in the wetland were also collected. Furthermore, questionnaire surveys with farmers in the selected wetlands throughout this period were undertaken.

A group of Asian Openbills in Vedanthangal Bird Sanctuary patiently awaiting parental food provisioning

RESEARCH
ONGOING

INTEGRATED DEVELOPMENT OF WILDLIFE HABITATS (IDWH)– RED PANDA

Funding Source
Ministry of Environment, Forest and Climate Change (MoEFCC)

Investigators
Dr G.V. Gopi and Dr Bilal Habib

Researchers
Dr Tamali Mondal, Pujan Kumar Pradhan, Roshme Borgohain, Pooja Kumari and Chingrisoror Rumthao

Date of Initiation
December 2022

Proposed Date of Completion
December 2024

Objectives: The objectives of the project are to (i) Assess the current status of Red Panda Ailurus fulgens; and (ii) Development of long-term monitoring protocol for population estimation and habitats of Red Panda.

Progress: Recruitment of researchers and designed the study- divided the potential red panda habitat areas into grids of 2x2 km. The field work started in three different field sites, i.e., Arunachal Pradesh, Sikkim and West Bengal (North).

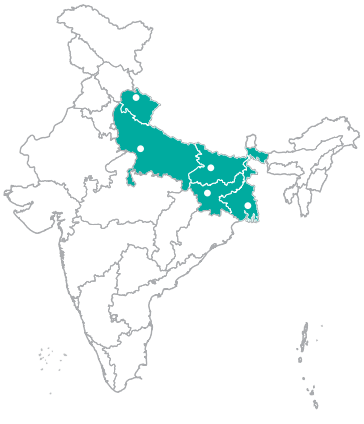
Arunachal Pradesh: (i) Key informant surveys (n=21) in 8 villages around the district in Anjaw district. Six red panda signs were found during the survey. Two scat samples of red panda were collected. 15 camera traps around the potential red panda habitat were deployed. Single capture of red panda in a camera trap was received.

Sikkim: Key informant surveys (n=36) in 4 villages. Eight camera traps were deployed around the potential red panda habitat. (Fambonglho WLS – 8 CT).

West Bengal: Key informant surveys (n= 42) in six villages were done around the Darjeeling district; and six camera traps around the potential red panda habitat were deployed. (Senchel WLS – 6 CT).

Potential red panda habitat at Hoiliang mountain, Anjaw.

Outputs and Outcomes: The population of the red panda would be assessed through appropriate scientific methods. The data generated from the field will be integrated with high-quality remote sensing data using GIS software for accurate habitat mapping and assessment. The frontline forest department staff and other stakeholders would be trained in conducting surveys and monitoring the critical red panda habitats. Also, the local communities will be involved in monitoring programs wherever possible.



RESEARCH ONGOING

PLANNING AND MANAGEMENT FOR AQUATIC SPECIES CONSERVATION AND MAINTENANCE OF ECOSYSTEM SERVICES IN THE GANGA RIVER BASIN FOR A CLEAN GANGA

Funding Source
National Mission for Clean Ganga, Ministry of Jal Shakti

Investigators
Dr Ruchi Badola, Dr Syed Ainul Hussain and Component Project Investigators

Researchers
113 Project Personnel

Date of Initiation
January 2020

Proposed Date of Completion
December 2024

Objectives: The project has the following objectives (i) strengthen the aquatic biodiversity conservation measures at six identified biodiversity hotspots along the Ganga River and monitor status of other areas; (ii) explore the natural and assisted colonization of species of conservation significance to other stretches of mainstream Ganga River; (iii) determine the current state of aquatic environment and biodiversity of the major tributaries and wetlands in Ganga basin; (iv) identify direct and indirect drivers affecting the integrity of the aquatic environment and biodiversity in the Ganga basin; (v) pinpoint problematic areas and identify conservation priority zones; (vi) strengthen/ establish rescue and rehabilitation centres at strategic locations for aquatic species in distress; (vii) involve communities and other stakeholders in the conservation process through capacity building, innovation and strengthening existing institutions; (viii) garner support for aquatic biodiversity and Ganga conservation through education and outreach programs; (ix) identify and analyse the hydro-socio-ecological relations in the river basin for efficient and targeted conservation action; (x) prepare an action plan to minimize the negative impacts of the direct and indirect drivers on the aquatic environment and biodiversity of the select tributaries of the Ganga basin; and (xi) develop a centralized facility of laboratories and resource centre for aiding in science based management of the Ganga River and its tributaries.

Progress: Surveys were carried out in eight major rivers in the Ganga River Basin, namely Ganga, Yamuna, Ghaghra, Gandak, Kosi, Chambal, Son and Rupnarayan, to assess the population status of Gangetic dolphin. A

total of 2,151 visual sightings of surfacing dolphins with mean encounter rate of 0.55 ± 0.09 sightings/km of the river was observed in 4635 km of the surveyed rivers. The survey revealed a 24.37 % decline in the Gangetic dolphin range since 1878. The population estimation was done using two approaches, the N-mixture and correction factor based. The model-based abundance of dolphin was 3330 ± 620 individuals and correction factor-based estimation was 3270, ± 229 individuals in the Ganga River Basin. Two individuals each of the Indian skimmer, *Rynchops albicollis* and Sarus crane, *Grus antigone* were captured and satellite tagged in Bulandshahr, Uttar Pradesh and Etawah, Uttar Pradesh, respectively.

During the survey carried out during June - October 2022, a rare Himalayan wolf snake was recorded from the Tons River. It was recorded from the Tons River for the first time, after being reported from the Mussorie range 112 years ago. Presently this species is restricted to the western Himalayas, from Uttarakhand through Jammu & Kashmir to POK in Pakistan.

The ecotoxicology survey was conducted monsoon season (August- September 2022) for the on-site assessment of water quality parameters and the collection of abiotic and biotic samples from five wetlands in the Ganga basin. Important water quality parameters, including pH, dissolved oxygen, total dissolved solids, nitrate, etc., were assessed on-site and surface water samples were analyzed for heavy metal contamination. In addition to the ecotoxicology survey conducted during the monsoon season, a post-monsoon survey was carried out in December 2022 to assess the pollution load and its impact on aquatic biodiversity in major rivers such as Ganga, Kosi, Ghaghara, and Gandak. The survey involved the collection of water and sediment samples from different sites along the rivers and their analysis for a range of water quality parameters including pH, DO, TDS, Nitrate, Conductivity.

Unmanned aerial vehicle (UAV) surveys were undertaken to study the river islands near the Hastinapur Wildlife Sanctuary. The survey revealed that the conversion of islands into agricultural fields has begun; the river islands in Rampur shows 80% disturbance, and the island of Khijarpur is being transformed, as evidenced by satellite imagery taken five years ago. During the survey Indian grassbird, Graminicola bengalensis (NT), Indian softshell turtle, Nilsonia gangetica (VU) and Indian roofed turtle, Pangshura tecta (LC) were recorded. Seven National level spearhead training workshops were conducted for different stakeholder groups. A total of 404 spearhead team members were trained on different aspects of biodiversity conservation. The spearhead team members comprised of forest officials (from Ranthambore Tiger Reserve, Mukundra Hills Tiger Reserve, National Chambal Sanctuary and Ramgarh Vishdhari Tiger Reserve), National Service Scheme (NSS) volunteers, army personnel (from Ganga Task Force & Eco Task Force), Rescue team (Veterinarians, Zookeepers, Forest officials involved in rescue operations), National Cadet Corps (NCC), Veterinary College students and Bal Ganga Praharis.

Activities under the 'Catch the Rain' campaign were initiated under the NMCG-WII project in June 2022, which continued till February 2023. These activities were organized at 30 locations in the Ganga basin.

To increase the reach of the Ganga Prahari cadre, new individuals were identified. Capacity development workshops were conducted for the Ganga Praharis from 17 major and small tributaries and newly identified Ganga Praharis from the mainstem Ganga River. Subsequently, they were integrated with the previously inducted cadre. A total of 1,796 activities were conducted from April, 2022 to March 2023 in which, 64,583 individuals participated.

Three new Ganga Aqualife Knowledge Centres were established in three schools in Devprayag, Tehri and Bijnor. Jalmala Samvad and eco clubs were established in 14 and 37 schools, respectively, in Uttarakhand, Uttar Pradesh, and Haryana. Ganga Gyan Kosh, a tool box containing relevant teaching aids, including games, and resource material, was provided to each school. Under the Bal Ganga Prahari programme, 27 new schools have been enrolled and more than 2500 students have been sensitised. Two skill development workshops on 'Calligraphy' and 'Handmade Card Making' was also organised for Bal Ganga Praharis and teachers.

During the period of April 2022 to April 2023, a total of impactful events including workshops, and activities were organized with a focus on environmental awareness and community engagement. This included awareness workshops conducted with schools, students and teachers, emphasizing the importance of biodiversity conservation. Additionally, eight awareness workshops were carried out with Gram Panchayats under the Mission Life initiative, promoting sustainable practices at the grassroots levels. Twenty "Jalmala Samwaad" interpretive corners were successfully established along the Yamuna River, fostering dialogue and understanding about the local ecosystem. Two exhibitions in Ganga Darpan Interpretation Center, Varanasi and Anubhuti Interpretation Center, Kanpur showcased the team's commitment to world environment initiatives. Puppet-making workshop with local vendors of Varanasi added a creative touch to the outreach efforts. Capacity- building training sessions were conducted with rickshaw drivers and tourist guides, contributing to a more informed and environmentally conscious community. Furthermore, cleanliness drives were executed under the Mission Life program at various schools in Varanasi and Kanpur. Badges, caps, reusable cotton bags, name slips were distributed as outreach material to the school students and participants containing information about the river's biodiversity.

Tagging sarus crane individual

Exhibitions were organized at various locations across India, which include the following: (i) Rural Science Congress 2023, organised by UCOST, under the aegis of 17th Uttarakhand State Science and Technology Congress 2023, from 10-12 February, 2023, at Dehradun; (ii) Kisan Mela organized by Bihar Agriculture University, from 23-25 February 2023 at Bhagalpur, Bihar; and (iii) Bodoland International Knowledge Festival, from 27 February to 2 March 2023, held at Bodoland University, Kokrajhar, Assam.

Celebrated Yoga Day on 21 June 2022 at 80 locations of four Ganga states, i.e. Uttrakhand, Uttar Pradesh, Jharkhand, and Bihar. To celebrate Azadi Ka Amrit Mahotsav at Ghats, 53 activities were conducted in 20 districts in the five Ganga states. Under the Har Ghar Tiranga campaign, 133 activities were organised in eight states of the Ganga River Basin. In this campaign, 55,814 people participated directly and three lakhs participated indirectly. Under the Har Ghar Tiranga campaign, 46 activities were organised in 16 districts from four Ganga states, i.e. Uttarakhand, Uttar Pradesh, Bihar and Jharkhand. During the campaign, various types of activities such as flag hoisting, slogan reciting, cleanliness drives, cultural programmes, awareness rallies, tiranga river walks, bike rallies were conducted.

Outputs and Outcomes: For effective conservation planning, the flagship species approach was adopted, for which the Gangetic dolphin, Platanista gangetica was chosen as a flagship species. About 40.8% of the river stretches were delineated as conservation priority stretches. Published findings of this study in "Ecological Indicators" https://doi.org/10.1016/j.ecolind.2022.109680.

Published nine scientific papers in high impact factor journals of international repute. Information brochures on 11 tributaries were published in English and Hindi languages. Published 11 reports and two books as the output of the project.

The Ganga Prahari cadre increased to 3,772 individuals in the entire basin, out of which 2,229 are female. Seven Ganga Prahari societies were registered (five in UP & two in Bihar). Reached out actively to 80,000 and passively to four lakh stakeholders in the Ganga basin, during celebration of important days and events.

Milestone: Shri Gajendra Singh Shekhawat, Hon'ble Minister of Jal Shakti, reviewed the progress of the project on 6th April 2022 and also released the publication "Ganga ki Kahani Prahariyon ki Jubani" at New Delhi.

RESEARCH ONGOING

INTENSIVE MONITORING AND STUDY OF TIGER DISPERSAL IN KANHA TIGER RESERVE

Funding Source
National Tiger Conservation Authority

Date of Initiation
January 2015

Investigators
Shri Qamar Qureshi and Dr. Y.V. Jhala

Proposed Date of Completion
December 2024

Researchers
Jayanta Kumar Bora and Shravana Goswami

Objectives: The objectives of the project are to (i) monitor the source population of tigers in Kanha Tiger Reserve; (a) estimate the tiger population within selected areas of the reserve, (b) obtain survival and mortality information through a mark–recapture study; (ii) monitor prey and co-predator populations and the condition of the habitat in the tiger reserve; and (iii) gain an understanding of tiger dispersal patterns.

Progress: Consistent monitoring of the source populations of tigers, Panthera tigris is crucial for their effective conservation, to ensure that conservation measures put in right direction and source populations are secure. This project aims to understand the population dynamics of tigers in Kanha Tiger Reserve (KTR) to provide information to the management to respond with appropriate inputs to mitigate and prevent any drastic undesired alteration of the system.

Remotely triggered cameras, with heat and motion sensors were set up, at the best locations such as dirt road, nullah and fire lines in the KTR, where chances of photo-capture of tiger and leopard were maximum. A total of 394 camera trap stations were deployed in the core zone of KTR. Each camera station was deployed in 2 sq km grid to avoid any major sampling holes. Each camera trap was operational for 25-30 days, which resulted in an effort of ~11,000 camera trap nights. In all, 200 sq km area in high-density landscape within the core zone of KTR was selected for intensive continuous monitoring through camera traps so that the team can get information on land tenure dynamics of tigers. To estimate prey density, the entire reserve was systematically sampled covering all the habitat types, with 200 line transects of 2 km length; 150 in the core zone, 50 in the buffer zone. The total transects survey effort comprised 1,200 kms of walk.

Outcomes: A total of 4,470 images of 142 tigers were obtained, out of which 105 were adults and 37 cubs. 1,762 images of leopards were also obtained, among which 134 unique individual leopards were identified. Tiger and leopard density estimation is in progress. Analysis of the line transect based data revealed chital had the highest density amongst the all-ungulate species, followed by sambar and gaur.

Milestone: Demographic parameters of key prey population in Kanha Tiger Reserve was estimated. Subsequently management recommendations based on these key parameters were included in the Tiger Conservation Plan (2021-2031).

Table 1. *Sex ratio of ungulates in core (Kanha National Park and its catchment wise) of Kanha Tiger Reserve.luka, Sindhudurg, Maharashtra, during winter camera trapping.*

Ungulate species	No. of samples in National Park (n)	National Park (M: F) & SE range	No of samples in Banjar (n)	Banjar (M: F) & SE range	No of samples in Halon (n)	Halon (M: F) & SE range
Chital	678	1:1.20 (SE 0.1)	563	1:1.20 (SE 0.1)	115	1:1.25 (SE 0.25)
Sambar	124	1:1.48 (SE 0.32)	88	1:1.83 (SE 0.55)	36	1:0.89 (SE 0.27)
Gaur	254	1:3.98 (SE 1.19)	146	1:3.70 (SE 1.39)	108	1:4.40 (SE 1.97)

Table 2. *Fawn: adult female ratio of ungulates in core (Kanha National Park and its catchment wise) of Kanha Tiger Reserve*

Species (fawn: female ratio)	National Park summer (SE)	National Park winter (SE)	Banjar summer (SE)	Banjar winter (SE)	Halon summer (SE)	Halon winter (SE)
Chital	1:6 (3.31) [n=1146]	1:12 (10.6) [n=219]	1:4 (0.87) [n=159]	1:13 (7.94) [n=157]	1:6 (1.52) [n=987]	1:9 (3.09) [n=62]
Sambar	1:4 (1.07) [n=322]	1:4 (3.48) [n=64]	1:4 (1.79) [n=25]	1:4 (1.96) [n=42]	1:4 (0.82) [n=434]	1:3 (1.13) [n=26]
Gaur	1:4 (0.82) [n=499]	1:4 (2.07) [n=90]	1:4 (1.94) [n=76]	1:3 (1.17) [n=64]	1:4 (0.91) [n=434]	1:4 (3.63) [n=26]

RESEARCH
ONGOING

CONSERVATION ECOLOGY OF ENDANGERED RETICULATED PYTHON, *MALAYOPYTHON RETICULATUS* SCHNEIDER 1801), IN THE NICOBAR ARCHIPELAGO, INDIA

Funding Source
Science and Engineering Research Board – Department of Science and Technology

Date of Initiation
January 2022

Proposed Date of Completion
January 2025

Investigators
Dr Ramesh Chinnasamy, Dr Nehru Prabakaran and Dr S.K. Gupta

Objectives: The objectives of the project are to (i) study the distribution and population ecology of pythons across the Nicobar archipelago; (ii) generate information on pythons occupied in various forest types, microhabitats and trophic ecology in the Nicobar archipelago; (iii) generate molecular genetic data for its phylogeography, phylogenetics, and population genetics inferences; and (iv) document information on Human-python conflict and people perception towards snakes and outline potential conservation strategies to the pythons.

Progress and Outcomes: The study area was divided into a grid equal to 3X3 sq km. Thus, the total grid area is 3,006 sq km. About 20-30% of the whole grid, the minimum to be surveyed, is calculated and is about 900 sq km. As part of the fieldwork, the researchers visited six islands, i.e. Car Nicobar, Kamorta Island, Katchal Island, Teressa Island, Chowra Island, and Trinket. The grid-based coverage of the islands was approached with opportunism as a guiding factor. A total of about 33 grids were covered. Earlier sightings of reticulated pythons by locals were documented along with other relevant ecological information.

With the cooperation of the residents by requesting their assistance in getting shed skin/ scale, the researchers successfully acquired a diverse assortment of shed skin and scale samples, thus enhancing the breadth and significance of our research involving biological specimens.

A questionnaire survey was carried out in all the above-mentioned islands as part of a Master's dissertation work to understand the Ethnographic Perception of the human-snake Interaction of the Communities in the Nicobar Archipelago. During the survey, 40 villages were visited, and questionnaire surveys were conducted in all those visited villages. A comprehensive study was conducted to gather data on the treatment methods for venomous snake bites. Additionally, inquiries were made regarding reticulated pythons, encompassing their predominant sighting period, seasonal occurrence, meristic characteristics like length, habitat preferences, feeding behaviours, prey species, potential medicinal uses, if applicable, and human conflicts. The study encompassed interviews with 347 individuals, including representatives from indigenous tribes, settlers, government officials, and visitors, among other relevant stakeholders. The research aimed to provide a thorough understanding of these aspects in a straightforward and formal manner.

A Master's dissertation study was carried out to understand the Ethnographic Perception of the Human-snake Interaction of the Communities in the Nicobar Archipelago, India.

Milestones: Reticulated python bite injury and its effects were documented for the first time in the Nicobar Islands. Medicinal uses of python body parts and other snakes were documented for the first time. A constant conflict has been documented between people and the pythons as they prey upon their livestock. Various dietary components have been recorded, including endemic, indigenous birds, domestic and exotic animals. By connecting with people and meeting them in person, the researchers were able to gather digital photos and videos of pythons in its distribution.

RESEARCH
ONGOING

UNDERSTANDING LARGE CARNIVORE CONFLICT ISSUES IN THE STATE OF MAHARASHTRA FOR SUGGESTING CONFLICT REDUCTION MEASURES

Funding Source
State CAMPA, Maharashtra Forest Department

Investigators
Dr Bilal Habib and Dr Parag Nigam

Researcher
Advaita Ravindran

Date of Initiation
March 2019

Proposed Date of Completion
March 2025

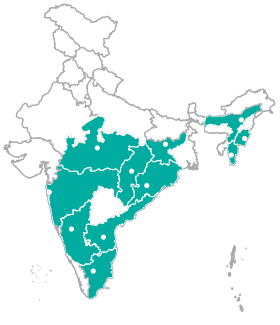
Objectives: The project has the following objectives (i) development of village-level database; (ii) assess the present status of large carnivores and prey in the area; (iii) assess diet of large carnivores; (iv) assess villages' vulnerability to conflict; (v) suggest measures for mitigating conflict; and (vi) develop Early warning systems.

Progress: A project report containing the spatial hotspots of large carnivore conflict incidents from Chandrapur Forest Circle has been submitted to Maharashtra Forest Department. Incident-wise conflict details have been collected from 4 of the Forest Circles of Eastern Vidarbha Landscape including Nagpur, Chandrapur, Yavatmal and Amravati for creation of a baseline database of large carnivore conflict data. These incidents have been analysed and a report is being published to be submitted to the Maharashtra Forest Department.

Outputs and Outcomes: The Central Indian Landscape (CIL) is one of the regions of high tiger populations and density in India with 6 Tiger Reserves featuring heavily as source populations, including Tadoba Andhari, Pench, Kanha, Satpura and Melghat Tiger Reserves. CIL supports a large percentage of the total tiger population in India and has been demarcated as a global priority landscape for tiger conservation. But there is a disproportionate decline in forest cover as well as quality, which means that even though the populations of tigers are thriving, there isn't enough pristine forest to support their growing numbers. This eventually leads to a spill-over of the carnivores into surrounding human-dominated landscapes (HDL). This acts as one of the major reasons for the burgeoning numbers of conflict cases between humans and tigers.

The Vidarbha Landscape (VL) of the state of Maharashtra is facing a similar decline in forest cover leading to increase in conflict cases. Records of conflict incidents collected from Chandrapur Forest Circle, consisting of the divisions of Brahmapuri, Chandrapur & Central Chanda, along with the Tadoba Andhari Tiger Reserve (TATR) were analysed to understand the spatio-temporal patterns of large carnivore conflict in the region. These records were utilised for map hotspots of attacks on humans and livestock by the different species of large carnivores inhabiting the landscape.

Milestone: Conflict data was collected from the four Forest Circles in Vidarbha Landscape viz., Nagpur, Chandrapur, Yavatmal and Amravati. This data set will be analysed and presented in the form of both project reports as well as peer-reviewed scientific papers.



RESEARCH
ONGOING

ASSESSMENT OF THE ECOLOGICAL STATUS OF SELECT INDIAN RIVERS FOR CONSERVATION PLANNING

Funding Source:
National River Conservation Directorate, Ministry of Jal Shakti

Investigators:

Researchers: *Project Coordinator:*
Dr Tanveer Ahmed
Project Associates: Bhawna Pandey, Anshu Pawar, Ravi Sharma, Narendra Mohan, Renu Kumari, Neha Yadav, Subish Sebastian, Suyash Katdare, Ajay Gaikwad, S. Deepan Chackaravarthy, Dinesh V., Eugene Lamare, Arya SiddarthanProject Assistants: Anil Fartiyal, Shuvayu Modak, Baskaran M., Sagar Chawan, Pawan kumar Patel, Fatma Tabassum, Dimpal Deorari, Sachin K, Moamenla Jamir, Piyush Gautam, Shivani Bahukhandi, Priyanka Netam and Shashank Kumar Mamgain

Date of Initiation : October 2020

Proposed Date of Completion: March 2025

Project personnel collecting data on various ecological aspect of river and shoreline habitat

Objectives: The objectives of the project are to (i) Prepare biodiversity profile of the identified rivers to derive the current status; (ii) Identify direct and indirect drivers affecting the integrity of these rivers; (iii) Assess the concentration of key pollutants such as micro- and macro-plastics, pesticides, heavy metals and other endocrine disruptive substances (EDSs) in identified rivers and bioaccumulation in species of conservation concern; (iv) Derive the current trend in genetic variability and gene flow of identified species which might have been disrupted due to river fragmentation; (v) Identify conservation priority zones and prepare conservation action plans for selected stretches to minimize the negative impact of the direct and indirect drivers on river ecosystem processes; (vi) Identify, prioritize and enhance the regional institutions/ organizations capacity for long-term involvement in river conservation; and (vii) Strengthen the existing Ganga Aqua Labs at WII to cater to the requirements of other Indian rivers for conservation planning and information dissemination.

Progress: Several stretches in selected Indian rivers were delineated using the GIS domain for biodiversity sampling and eco-toxicological assessment. Land use - land cover layer has been procured and zonation of these rivers has been completed.

During the reporting period, WII has conducted two Eco toxicological surveys, during monsoon (July 2022 to October 2022) and post monsoon (December 2022 to February 2023) to study the overall quality of water in the rivers and to study its possible connection with the health of river fauna. During monsoon survey the water quality of the Godavari and Barak River were assessed. A total of 26 sites of the river Godavari covering about 1465 km distance and 12 sites of the Barak River covering about 560 km were sampled on the main stretch. During the post monsoon survey, a detailed and comprehensive Eco toxicological survey and sampling in Periyar, Godavari, Narmada, Mahanadi and Barak Rivers to assess the water quality and pollution status of the selected rivers. A total of 12 sites were sampled in Periyar River, 17 sites in Godavari River, 15 sites in Narmada River, 10 sites in Mahanadi River and 7 sites in Barak River.

During the reporting period, WII team has collected biological samples particularly amphibian, reptiles and fishes from Barak and Godavari (Amphibian=53, reptile= 18, fish=249). Team collected 249 fish samples, of which DNA extraction of all the samples has been completed. Amplification of 25 Fish samples has been completed. A total of 71 biological samples of amphibians (n=51) and reptiles (n=20) were gathered from Barak river. DNA extraction and amplification of 31 amphibians and reptile's samples has been completed. Only fish biological samples (n=249) was collected from Godavari River, of which, DNA extraction of 101 samples and amplification of 20 Fish samples has been completed.

Information brochures in English languages for Barak, Narmada, Mahanadi, Godavari, Cauvery and Periyar Rivers were prepared for wider information dissemination including public and other stakeholders.

So far, status report for Barak and Mahanadi have been completed. These reports highlight the profile of Mahanadi and Barak River, their biodiversity, and direct and indirect threats to these rivers and their biodiversity. Barak report has been released and Mahanadi report is awaiting is awaiting release.

A report on the pollution level in six Indian rivers was compiled based on secondary information. This report highlights the current extent of pollutants, particularly heavy metals (carcinogenic and non-carcinogenic), pesticides, and endocrine disruptive compounds (pharmaceuticals and microplastics), along with delineating the polluted stretches of the six selected Indian Rivers. The report is under review.

Two stakeholder workshop was conducted for capacity development of stakeholder during the reporting period. First stakeholders' workshop was organized in collaboration with the Kerala Forest Department (KFD) and Periyar Tiger Conservation Foundation (PTCF) at Thekkady, Kerala on 06th and 07th February 2023. A

total of 53 participants from various departments attended this 2-day workshop. Stakeholder such as Kerala Forest Department, Periyar Tiger Reserve Conservation Foundation (PTCF), KUFOS (Kerala University of Fisheries and Ocean Studies), Kerala Agriculture University (KAU), Kerala Forest Research Institute (KFRI), Aranyakam Nature Foundation, Agriculture Department, Horticulture Department, Irrigation Department, Kerala Tourism Development Corporation (KTDC), Pollution Control Board, different Panchayats and other government bodies participated and pledge for the conservation of Periyar River.

Second workshop was organized on 3 March 2023 at Gandhinagar, Gujarat. Major stakeholders for the workshop were Gujarat Forest Department, Gujarat Ecology Commission, Department of Water Resources, Saurashtra University, Gujarat Institute of Desert Ecology, WALMI, KALPSAR Departments, Sardar Sarovar Narmada Nigam Limited. participated in the workshop.

Outputs and Outcomes: During the reporting period, literature review reports on Cauvery, Godavari, Periyar and Narmada were finalized. These reports, based on secondary literature describe the profile of these rivers, their biodiversity, direct and indirect threats to these rivers and their biodiversity. Hard and soft copies of three river reports *viz*. Periyar, Narmada and Cauvery have been submitted to National River Conservation Directorate, Ministry of Jal Shakti. Literature review report of Godavari is yet to be submitted. Report on genetic status of threatened fauna is under review. All reports are awaiting release.

Monsoon and post monsoon survey was completed in three rivers, viz. Barak, Godavari and Periyar during the reporting period. Teams collected data on invertebrates, fish, amphibians, reptiles, vegetation, aquatic and terrestrial bird and mammals using standard sampling protocols. Additionally, reconnaissance survey of Narmada River is completed.

RESEARCH
ONGOING

DEVELOPMENT OF LANDSCAPE MANAGEMENT PLAN AND MONITORING WITH REFERENCE TO KEN-BETWA RIVER LINK PROJECT IN PANNA TIGER RESERVE, MADHYA PRADESH

Funding Source
National Water Development Agency, Govt of India

Investigators
Dr K Ramesh and Dr JA Johnson

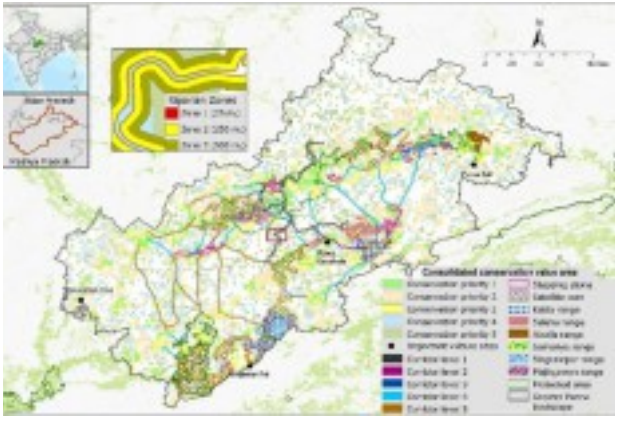
Researchers
Manjari Malviya, R. Rajasekar, Sankarshan Chaudhary, Supratim Dutta, Dibyendu Biswas, Ajay Singh, Kamna Pokhariya, Zainab Khan, Niket Alashi, Srishti Manna, Shri Lak, Vandana Tomar, Manu Mohan K, Rahul Gandhi, Priyanka Kumari, Ashish Kumar

Date of Initiation
April 2018

Proposed Date of Completion
March 2025

Objectives: The objectives of the project are to (i) enable betterment of habitat, protection, and management for flagship species viz. tiger, vultures, and gharial in the landscape; (ii) consolidate the landscape for overall biodiversity conservation through spatial prioritisation and well-being of forest dependent communities; and (iii) provide species-specific and site-specific monitoring strategies under the integrated landscape management context with feedback loop and adaptive management options.

Progress: The project was mostly completed with field data collection, analyses and writing for the plan. Species wise photo capture rate was calculated for PTR from camera trap data of winter 2019-20 and summarized. Occupancy analysis of tigers and co-predators was carried out by using



Map showing all the areas to be protected and restored (satellite cores, stepping stones, corridors, proposed conservation reserve, priority sites for biodiversity conservation) within Greater Panna Landscape

detection/non-detection data obtained from camera traps (winter 2018-2019). An adult male tiger (P243) was radio collared. Prey species encounter rate was calculated from line transect data collected during winter 20-21 and thematic maps were prepared. Twenty-two more vultures were tagged, and utilization density was estimated for vultures from telemetry data of the three earlier tagged vultures. Survey of Gaushalas in the landscape and Population Viability Analyses for vultures were also done. For crocodilians, data collected during UAV survey was analyzed, and habitat suitability modelling and Population Viability Analyses were done. Survey of birds (both breeding and non-breeding seasons) was carried out in PTR and the data was analyzed. Analysis of data collected from riparian habitat and aquatic sampling was completed. Restoration priority map of the riparian zone of main Ken River channel was assessed based on Riparian Vegetation Index. Phyto-sociological analysis of sampled vegetation data was completed. Spatial prioritization for Greater Panna Landscape (GPL) and PTR based on biodiversity richness was completed. Villages where forest resource-based cooperatives may be established, were identified for the landscape. Bringing information from field, spatial prioritization and connectivity modelling, overall map was prepared depicting all the areas proposed for habitat consolidation. Field verification of important habitats (satellite core, stepping stones, and corridors, intersection points, riparian habitat and other conservation priority areas) was carried out. Based on existing knowledge, the data collected, analyses, recommendations, and prescriptions for each of the thematic component were formulated. All the maps were also clipped with district, forest division and protected area boundaries, and detailed recommendation given for each of these administrative units/zones.

Review meetings were organized with NWDA representatives, NTCA, UPFD and MPFD representatives and again, on 15 February 2022 with DG NWDA and senior Joint Commissioner MoJS, at WII. A series of consultation meetings/writing workshops were organized with the experts'/ resource persons, to plug data and analyses gaps and seek inputs on plan writing. Furthermore, a series of consultation meetings were also organized with district administrations and other line agencies including the forest department, in hybrid mode (some team members present physically, other joining virtually) starting from Panna District administration, followed by Damoh District administration and Chhatarpur District administration. Final draft of ILMP was prepared in March 2022 and shared with principal signatories, as well as relevant experts for critical comments and review.

Outputs and Outcomes: Tiger, co-predators and prey: In buffer zone of PTR, among the carnivores captured in camera traps, hyena was detected most frequently (0.11), followed by leopard (0.08), jackal (0.04), tiger (0.03), sloth bear (0.02) and wolf (0.005). Amongst prey species, livestock was the most frequent (1.27), followed by nilgai (0.16) sambar (0.15), wild pig (0.12) and chital (0.03). Occupancy analysis of tigers and co-predators revealed that only ~11% (ψ = 0.105) of the sampling area was occupied by tigers. However, leopards and hyenas were found to be widely occupying the buffer zone with an overall high detection probability. Sloth bear occupancy was also high in buffer zone, with a substantially low detection probability, indicating the elusiveness of this wide-ranging species in human-dominated landscape. Occupancy estimates of wolf, which is predominantly found in buffer zone, indicated that a small proportion of the sampled area was occupied by wolves but with comparatively high detection probability.

Thematic map of prey species encounter rate revealed that wild ungulates are distributed widely in core zone. Encounter rate of wild ungulates is low, except for some small patches in Madla, Hinouta, and Panna Ranges. Livestock was majorly encountered in Chandranagar core. However, major prey species of tigers such as chital and sambar were encountered in all four ranges of core. Apart from the major prey species, nilgai was also encountered in most parts of the core area. Encounter rate of wild ungulates was low in buffer zone, except for some small patches in Panna buffer and Madiyadoh Range. Livestock was majorly encountered in Kishangarh buffer. Among major prey species of tiger, chital was encountered mostly in northern part of Panna buffer and Kishangarh buffer. Sambar was found to be consistently low in buffer zone and mainly found in northern Kishangarh, Madiyadoh and Panna buffer, in areas that have comparatively dense forest cover and rugged terrain.

Vulture: The radio telemetry study of 25 tagged vultures revealed that, resident vultures are ranging widely, going even beyond the landscape boundaries, some going as far as Kuno-Palpur Wildlife Sanctuary in Rajasthan. Among the migratory vultures, Eurasian Griffons have gone to Pakistan and the flight is still continuing, whilst the Himalayan Griffons have travelled to Nepal and China, crossing over the Mt. Everest. Data retrieved for the last one year from the three birds tagged in 2020, offered useful insights for management of vultures in PTR and the landscape. During the observation period (December 2020 – December 2021), Indian Vulture was recorded to have covered a cumulative distance of around 12,000 km with average distance of 41.60 km per day, whereas, both the Red-headed Vultures covered twice the distances as that of Indian Vulture. However, the Indian Vulture mostly kept its movement confined within PTR and occasionally moved around PTR in Chhatarpur and North Panna Forest Divisions. On the other hand, both the Red-headed vultures showed significant movement outside PTR, traveling up to 159

km. The first tagged Red-headed Vulture has covered Chhatarpur, South and North Panna, and Satna Forest Divisions, even moving outside the landscape. The second tagged Red-headed Vulture showed variable movement throughout the landscape and beyond. Although these two birds (Red-headed Vultures) are closer to adult stage in their growth phase, the wide-ranging behaviour offers the species wider choices of resources in the landscape and makes the population count and management challenging.

Crocodile: The aerial survey using high-resolution UAV across PTR and KGS resulted in recording 62 muggers, represented by 3 in 2-4 ft. size class, 10 in 4-6 ft. size class, 29 in 6-8 ft. size class, 13 in 8-10 ft. size class and 7 in 10-12 ft. size class, reflecting healthy population with a high number in the mid-size class. Muggers were mostly encountered from Magara Dabri to Judi in Madla. The habitat suitability analyses for gharials revealed that the entire stretch of Ken River from PTR to KGS, could be characterized into five suitability classes. With a habitat area of 3.4 sq.km falling in very high suitability class, 9.4 sq.km in high suitability class, 10.0 sq.km in moderate suitability class, 6.4 sq. km in low suitability class and 0.4 sq. km in very low suitability class. The PVA for gharials after 100 iterations revealed that the current population requires supplementation, as well as, support from an ex-situ hatchling facility once a nesting population is formed in PTR.

Biodiversity: A total of 206 avian species were recorded in PTR including resident non-endemics (132 species), endemic to India (32 species), non-endemic (24 species) and data deficient (18 species). The RVI calculated for riparian zone of main Ken River (7th order) and streams (6th, 5th and 4th order) in PTR, ranged from 2 to 20, the lowest value representing critically modified riparian zone while highest value representing natural and unmodified riparian zone. Riparian areas with lower values of RVI needs restoration efforts. Results of spatial conservation prioritization using Marxan reveal that in GPL categorizing planning units based on cost and biodiversity richness, 1388 units have low conservation cost and low biodiversity richness, 990 units have low cost and moderate richness, 430units have low cost and high richness. Similarly, 103 units have moderate cost and low richness, 34 units have moderate cost and moderate richness, and 23 units have moderate cost and high richness. 97 units have high cost and low richness, 36 units have high cost and moderate richness and 17 units have high cost and high richness. Out of total of 3236 planning units, 1356 units were selected by Marxan as best solution (fulfils target with minimum cost). Based on the spatial prioritization output, area prioritized for conservation of biodiversity richness in each district were identified.

Milestone: Field data collection from landscape, as well as, PTR was completed for all the components of the Landscape Management Plan. Radio-tagging of 23 vultures and UAV survey of Ken River for crocodilian population status assessment, were successfully accomplished. Areas for landscape consolidation were identified, specific prescription and recommendations for each of the key themes and zones were devised.

Community: 103 villages were identified in Greater Panna Landscape for developing forest resource based cooperatives and growth centres. Plan writing was completed after consultation with experts, district collectors and principal signatories. Integrated landscape management plan along with a summary report were prepared and submitted to all concerned.

RESEARCH ONGOING

ADDRESSING MANAGEMENT ISSUES OF KAZIRANGA TIGER RESERVE AND PRIORITY APPLIED RESEARCH (COMPONENT 3: CONNECTING THE DOTS: FINDING DISPERSAL CORRIDORS FOR TIGERS IN KAZIRANGA-KARBI ANGLONG LANDSCAPE)

Funding Source
National Tiger Conservation Authority (Ministry of Environment, Forests and Climate Change)

Investigators
Dr Ruchi Badola and
Dr Syed Ainul Hussain

Researchers
Mujahid Ahamad, Jyotish Ranjan Deka, Priyanka Borah

Date of Initiation
October 2019

Proposed Date of Completion
March 2025

Objectives: The objectives of the project are to (i) delineate possible corridors linking the Kaziranga Tiger Reserve with surrounding landscape and intra-spatial connectivity that maintain the gene flow of large mammals in the Kaziranga - Karbi Anglong Landscape; (ii) assess the biophysical conditions of these corridors and connectivity in terms of their structure and composition (habitat quality); (iii) examine the functionality of these corridors in terms of their suitability for maintaining dispersal of large mammals, especially tigers, in order to maintain meta-population dynamics in the Kaziranga - Karbi Anglong Landscape; (iv) identify critical points along the corridors with high probability of negative human-wildlife interface; and (v) develop mechanisms to minimize human – wildlife conflict in the landscape through community involvement and innovative conflict resolution techniques.

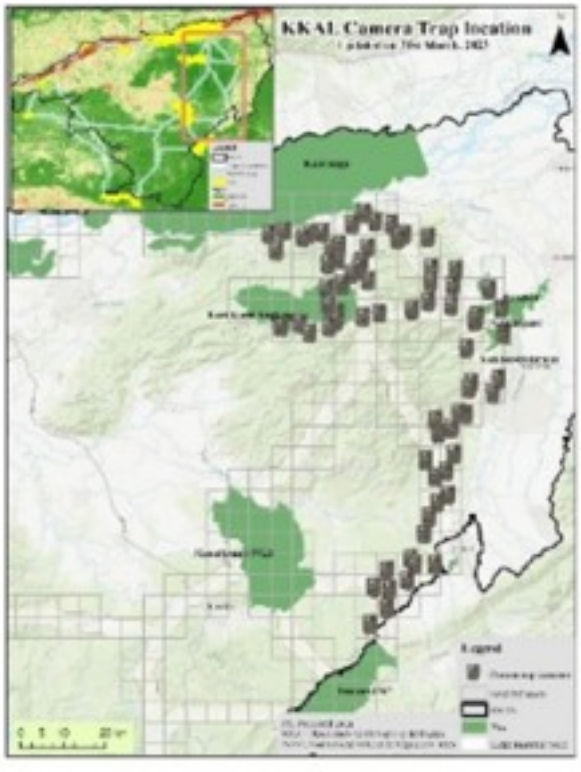
Progress: For finding dispersal corridors of tigers and other large mammals, potential dispersal route was developed and 130 grids of 5 x 5 sq. km were laid enroute Karbi Anglong till Intanki National Park for biophysical assessment and to assess the functionality of these places in terms of wildlife movement and space utilization. The route includes important protected areas such as the East Karbi Anglong wildlife sanctuary, Nambor-Doigrung wildlife sanctuary, Nambor wildlife sanctuary, Garam Pani wildlife sanctuary and Intanki National Park.

Camera traps were deployed in total 65 grids out of 130 till Intanki National Park for total 72 trap days. Maximum grids were attempted to cover but due to immense human disturbance and widely spread human habitation, certain areas were avoided for camera trapping.

Outputs and Outcomes: The habitat along the route from Karbi Anglong till Nagaland is mostly moist mixed deciduous type with pockets of bamboo brakes. Only certain pockets where protected area is present, the canopy cover is 85-95%, and the rest has very less canopy (60-45%) or none. The terrain is completely undulating 20-25% is rocky, 30-35% barren, 30% covered with shrubs or herbs.

Large trees include Gomari, Gmelina arborea, Teak, Tectona grandis, Leteku, Baccaurea ramiflora, Chuselok, Abrus precatorius, etc. Small shrubs and herbs include Tara, Alpinia nigra, Mani muni, Centella asiatica, Xutura, Amaranthus spinosus, Dorun, Leucas aspera, Kaempferia galanga, Lippia alba, Mikania sp., Chromolena sp., Lantana camara, etc. Tall grasslands like the Saccharum ravennae, Cenchrus sp., Imperata cylindrica, etc. were present.

During the study, it was observed that the whole landscape is destructed due to tree cutting and lopping, use of large and noisy motor vehicles like the Fockland, Dumper, etc. to extract soil from hills and sand from the river Doigrung and Kalioni. The landscape is completely human induced and therefore very less signs of animal movement was recorded during sign survey.

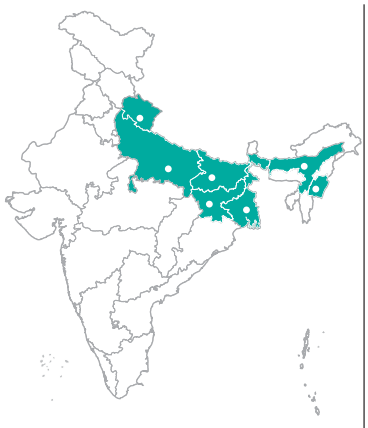


Camera trap deployed from Karbi Anglong to Intanki National Park

Camera trap records showed the movement of mammals such as the Asian Elephant, Elephas maximus, Common leopard, Panthera pardus, Sambar, Rusa unicolor, Red serow, Capricornis rubidus, Hog deer, Axis porcinus, Barking deer, Muntiacus muntjac and Wild pig, Sus scrofa. The presence of wildlife is very less due to anthropogenic pressure and loss of habitat.

Few photo-captured images from camera trap records

Milestone: Establishment of new potential dispersal route of tiger and large mammals of Kaziranga Tiger Reserve till Intanki National Park through the Karbi Anglong landscape. Ground truthing of these routes through camera trap has been done for the first time by the Kaziranga-WII team.



ESTABLISHMENT OF COMMUNITY COVID RESILIENCE RESOURCE CENTRES (CCRRCS) IN (A) DUNDA BLOCK, UTTARKASHI DISTRICT, DEVPRAYAG BLOCK, TEHRI GARHWAL DISTRICT OF UTTARAKHAND STATE, (B) MOHAMMADPUR DEVMAL BLOCK, BIJNOR DISTRICT, CHAKA BLOCK, PRAYAGRAJ DISTRICT, CHOLAPUR BLOCK, VARANASI DISTRICT OF UTTAR PRADESH STATE, (C) RASALPUR BLOCK, SAMASTIPUR DISTRICT OF BIHAR STATE, (D) SAHIBGANJ BLOCK, SAHIBGANJ DISTRICT OF JHARKHAND STATE, (E) FARAKKA BLOCK, MURSHIDABAD DISTRICT OF WEST BENGAL STATE, (F) GOLAGHAT DISTRICT OF ASSAM STATE (G) BISHNUPUR DISTRICT OF MANIPUR STATE

Funding Source
Department of Science and Technology (DST)

Date of Initiation
April 2022

Proposed Date of Completion
April 2025

Investigator
Dr Ruchi Badola

Researcher
Vinod Chandra Joshi

RESEARCH ONGOING

Objectives: The project has the following objectives (i) to strengthen and supplement various initiatives for resilience building at community level during COVID pandemic and beyond through appropriate STI based interventions; (ii) capacity building in relevant STI solutions at community level for self-reliance against pandemic and other aberrations for risk reduction, adaptation and mitigation; and (iii) strengthening STI based socio-economic and ecological resilience of the communities for sustainable development

Progress: A total of three Community COVID Resilience Resource Centers (CCRRC) were established (one at Dunda block, Uttarkashi Uttarakhand state, one at Golaghat district, Assam, one at Bishnupur District of Manipur State). In the Dunda Block of Uttarkashi a cluster of five villages, *i.e.*, Barethi, Mathli, Gewla, Chinakholi, and Kharwa was selected for the study and meeting with the village representee (Gram Pradhan) was conducted and census data of villages was collected from secondary sources.

In the Dunda block of Uttarakhand, an awareness program on the topic of "Forest Resource and Conservation: Role of School Children" at the Government Primary School Gewla was organized. Total 34 participants (20 School Children, 10 College-Level Students, two School teachers, Gram Pradhan and one resource person) were present.

A total of four sensitization/orientation programme was organized at Golaghat district, Assam (one at Kandhulimari village, one at Palashguri, Dhansiri, one at Lahore chapori and one at Bokakhat CCRRC centre). Altogether a total 96 participants participated in these programmes.

Scoping study in 527 households under the Sustainable Livelihood Framework (DFID, 1999) across 17 villages of Golaghat District, Assam were done. The study identified immediate repercussion of pandemic like COVID-19, civil unrest and flood as shocks (sudden pressure) and market competition and long-lasting impact of COVID-19 as stress.

CCRRC at Golaghat district, Assam and briefing SDO (Civil) Bokakhat Sub-division regarding CCRRCs activities at Golaghat District, Assam

A total of three sensitization/orientation programme was organized at Bishnupur District of Manipur State (one at Wapokpi village, Bishnupur, one at Sagram Makha village, Keibul Lamjao, and one at Keibul Lamjao National Park, Bishnupur). Altogether a total of 56 participants participated in these three workshops. In these workshops the project objectives and roadmap for organizing skill and livelihood development trainings and workshops including mask, sanitizer and PPE kits making were discussed, followed by interactive session with the participants regarding their experiences during the COVID-19 pandemic.

Outputs and Outcomes: In the Golaghat District of Assam state established a tourism model in two villages, and conduct activity or programme that is based on Ethnic food, guided village walk, exhibition of traditional handloom, local beverage preparation and tasting, folk dance performances, exhibition of traditional fishing gears and angling etc. A total 20 women and four men involved in these livelihood activities. A total of Rs 41,000 was obtained through sales from the ethnic food, Rs 12,000 earned from cultural performances, local beverages & traditional fishing gears exhibition.

Milestones: Established three Community COVID Resilience Resource Centers (CCRRC), in Uttarkashi, Uttarakhand, Golaghat, Assam, and Bishnupur, Manipur State.

RESEARCH ONGOING

BRINGING BACK THE CHEETAH TO INDIA

Funding Source
Ministry of Environment, Forest & Climate Change through National Tiger Conservation Authority (NTCA)

Investigators
Dr Y.V. Jhala and Shri Q. Qureshi

Researchers
Bipin CM, Dr Sanath K. Muliya (Veterinary Officer, National Zoo, Delhi on deputation to the project by the NTCA), Harshvardhan Singh Rathore, Keshab Gogoi, Parul Sen, Moulik Sarkar, Sultan, Nupur Rautela, Akshay Jain, Kesha Patel, Dr Sumit Patel and Amandeep Rathi

Date of Initiation
November 2020

Proposed Date of Completion
November 2025

Objectives: The project aims to establish multiple breeding populations of cheetahs at selected sites in partnership with National Tiger Conservation Authority (NTCA), Ministry of Environment, Forest and Climate Change (MoEFCC) and State Forest Departments (Madhya Pradesh and Rajasthan initially). The goal is to establish viable cheetah meta-population in India that allows the cheetah to perform its functional role as a top predator and provides space for the expansion of the cheetah within its historical range thereby contributing to its global conservation efforts.

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Cheetah release by Hon. Prime Minister in Kuno National Park

Source: X handle of the Hon'ble Minister (@byadavbjp)

Signing of Memorandum of Understanding between India and Namibia by Hon. Minister EF&CC and Hon. Deputy Prime Minister of Namibia

The objectives of the project are (i) to establish breeding cheetah populations in safe habitats across its historical range and manage them as a meta-population, (ii) to use the cheetah as a charismatic flagship and umbrella species to garner resources for restoring open forest and savanna systems that will benefit biodiversity and ecosystem services from these ecosystems, (iii) to enhance India's capacity to sequester carbon through ecosystem restoration activities in cheetah conservation areas and thereby contributing towards the global climate change mitigation goals, (iv) to use the ensuing opportunity for eco-development and eco-tourism to enhance local community livelihoods and (v) to manage any conflict by cheetah or other wildlife with local communities within cheetah conservation areas expediently through compensation, awareness, and management actions to win community support.

Progress: Based on years of research, Kuno National Park (NP) in the State of Madhya Pradesh was selected as the first site for the introduction of the cheetah because of its suitable habitat, inviolate space and adequate prey base.

As part of the preparations, a draft Memorandum of Understanding (MoU) on biodiversity conservation with emphasis on cheetah conservation was jointly prepared by the Governments of Namibia, South Africa and Government of India and shared with various Government ministries/ agencies in the respective countries. In May 2022, a team of senior officials visited Namibia and South Africa for training/ exposure on various approaches, methods, techniques and models of cheetah management and conservation. The team also met Government officials in Namibia and apprised them of the preparations in India for translocation of cheetahs. Further, in June 2022, cheetah experts visited Kuno NP, Mukundara Hills Tiger Reserve and Gandhi Sagar Wildlife Sanctuary provided additional inputs met officials of Madhya Pradesh State Government, Madhya Pradesh State Forest Department, NTCA, and Hon. Minister of Environment, Forest and Climate Change, Shri Bhupendra Yadav for discussing, planning and finalizing the plethora of activities required for translocating cheetah to India.

MoU between the Governments of India and Namibia on biodiversity conservation with emphasis on cheetah conservation was signed by the Hon, Minister of Environment, Forest and Climate Change Government of India and Hon. Deputy Prime Minister and Foreign Minister, Government of Namibia in July 2022. A delegation of South African government officials- Mr. Mpho Tijane- Deputy Director CITES, Department of Forestry Fisheries and the Environment (DFFE), Ms. Michele Pflab- Deputy Director, South African National Biodiversity Institute (SANBI), Dr David Zimmerman- Senior Veterinary Manager- South African National Parks (SAN Parks), Mr. Dzunisani Makhubele- Policy Analyst- DFFE visited Kuno NP in August 2022. Additionally, multiple meetings and discussions were conducted with Namibian and South African officials for addressing/ completing the different modalities, formalities, logistics, permissions and paperwork related to translocation of cheetah to India.

The inspection of the predator proof soft release enclosure was continuously carried out along with regular monitoring of the area. Removal of large carnivores from inside the cheetah enclosure were undertaken and continuously monitored with camera traps. A disease risk analysis report in collaboration with international cheetah experts and veterinarians before the translocation reviewed by Dr Richard Kock, Royal Veterinary College, London was published as per World Organization for Animal Health (OIE) and IUCN guidelines. Permissions from the CITES authority and Department of Animal Husbandry and dairying and customs department were obtained as required.

Subsequently, a batch of eight cheetahs (five females and three males) were brought from Namibia accompanied by the experts and veterinarians from Namibia and South Africa along with Dr Y.V. Jhala and Dr Sanath Muliya, Veterinary Officer from National Zoo, Delhi deputed to the project by the NTCA, after a month of quarantine at CCF facility in Otjiwarango and released in to the quarantine bomas in Kuno National Park by the

Hon. Prime Minister of India in September 2022. On 5th November 2022, the first Namibian cheetahs were released into the larger predator proof soft release enclosure (hunting bomas) after completing their quarantine period and the. On 11th March 2023, the first two cheetahs were released in free-ranging environment and till date, four Namibian Cheetahs have been released into the wild and currently three individuals from this stock are free-ranging and are being monitored throughout.

MoU between the Republic of South Africa and the Republic of India on cheetah reintroduction was signed in January 2023. Following the provisions of the MoU, first batch of 12 cheetahs (7 males, 5 females) were translocated from South Africa to Kuno NP 18 February 2023. They were released into the quarantine bomas by the Hon'ble Minister of Environment, Forest and Climate Change, Hon'ble Chief Minister of Madhya Pradesh State, Shri Shivraj Singh Chauhan and Hon'ble Union Minister of Agriculture and Farmers Welfare, Shri Narendra Singh Tomar. Since their arrival in India, cheetahs have been under continuous monitoring and their activity is being recorded in quarantine bomas, soft release enclosures and free-ranging environment. One female brought from Namibia died due to renal failure in March 2023. One female gave birth to a litter of four cubs in March 2023 inside one of the compartments (Area- 1.5 sq km) of the predator proof soft release enclosure. Few other predators in the area such as leopards, striped hyenas and jungle cats as well prey-chital have been radio collared and are being regularly monitored for interactions. Prey base estimation was also carried out.

A workshop on cheetah management attended by international experts- Dr Stephen O'Brien, Cheetah geneticist, United States of America, Dr Laurie Marker, Dr Mike Toft- Wildlife Veterinarian, South Africa, Mr. Vincent van der Merwe, Dr Adrian Tordiffe, Mr. Simon Naylor, Mr. Kester Vickery & Mr. Grant Tracy-Wildlife translocation specialists, Conservation Solutions, South Africa and Dr Andrew Fraser, Rooiberg Veterinary Services, South Africa was conducted in Shivpuri during February 2023.

All the cheetahs are being monitored regularly. The wild released animals are monitored 24X7 by teams. All the cheetahs are fitted with satellite collars which is enabling collection of additional ecological information. Cheetah in adaptation (predator proof soft release/hunting) bomas are monitored during day time and as and when needed the night vigil is also carried out.

Outputs and Outcomes: International cooperation on biodiversity conservation, expertise and knowledge sharing. Strategies to minimize disease risk to the translocated animals as well as native fauna have been put in place. Revitalization of Protected Area administration and ecosystem recovery based on adaptive management.

Milestone: The project is the first wild to wild intercontinental translocation of a large carnivore in the world based on IUCN guidelines and modern conservation practices. The cheetahs are acclimatizing airly well and are hunting wild prey regularly. Additionally, the birth of cheetah cubs is a landmark moment for the project. After 50 years of implementation of Wildlife Protection Act in 1972 and Project Tiger, probably the biggest political impetus for wildlife conservation.

RESEARCH
ONGOING

RECOVERY OF DUGONGS AND THEIR HABITATS IN INDIA: AN INTEGRATED PARTICIPATORY APPROACH

Funding Source
Ministry of Environment, Forest and Climate Change- National Compensatory Afforestation Fund Management and Planning Authority (MoEFCC-CAMPA)

Investigators
Dr JA Johnson, Dr K. Sivakumar and Dr Nehru Prabhakaran

Researchers
Dr Oishinee Chakraborty, Swapnali Gole, Sameeha Pathan, Chinmaya Ghanekar, Prachi Hatkar, Sagar Rajpukar, Sumit Prajapati, Sweta Iyer, Srabani Bose, Sohom Seal, Garima Dhiman, Sonia Negi, Vabesh Tripura and Anagha Biju

Date of Initiation
July 2016

Proposed Date of Completion
December 2025

Objectives: The project has the following objectives (i) species conservation and management: Assess dugong population status through advanced censes techniques, identify critical habitats, classify threats and develop site specific monitoring plan; (ii) habitat conservation and management: Characterize the critical dugong habitats, reduce and indirect threats participatory approaches; (iii) participatory management of dugong and their habitats:

Raise awareness on the species and encourage the participation of the local communities, include other stakeholders in conservation efforts and enhance dugong conservation program by spread in awareness on a national scale; and (iv) capacity-building of state forests department & local communities: Enhance the capacity of the State Forests Department staff; train staff and local communities in underwater survey for long-term habitat monitoring.

Progress: Population assessment surveys were conducted with the use of drone technology. Aerial surveys were conducted in the North West region of Gulf of Kutch; Chusna Peer, Khara-Mitha Chusna, Chepri and Bhyder Islands; Dugong Conservation Reserve (DCR), North Palk Bay, Tamil Nadu and at Andaman and Nicobar Islands at North Andaman, South Andaman and in Ritchie's archipelago.

Furthermore, a citizen science-based approach was initiated in Andaman and Nicobar Islands through the 'Dugong Monitoring Program'. As a result of the initiative, a total of 203 dugong sightings were received from 771 personnel of fishers, defense bodies (Indian Navy and Indian Coast Guard), Forest Department and the Tribal Protection Police.

The 'Dugong Volunteer Program' was expanded at all three sites. The project had proposed to incentivize the rescue and release of dugongs thereby promoting the participatory approach for dugong conservation in the local community. In regards to this, 7 dugongs were rescued by fishermen in Tamil Nadu.

Habitat assessment surveys conducted at the South West of Gulf of Kutch charted more than 10 reef-top meadows, 4 vast mid-intertidal meadows and more than 5 subtidal meadows in the region.

Seasonal variations in shoot density of Halodule uninervis, Halophila ovalis complex and H. beccarii to light intensity and temperature were carried out Paga reef, Bhaidar reef and Tam reef, Gujarat.

Seagrass assessment studies at the Dugong conservation reserve at Tamil Nadu were carried out and the genera; Halophila, Cymodocea, Syringodium and Halodule were recorded.

Further seagrass substrate analysis of the region showed a cover of >60% in 64 points with seagrass substrate being majorly sand in the offshore areas and mud in the nearshore areas.

Seagrass assessment surveys at ANI reported the occurrence of 11 species, viz., Enhalus acoroides, Halophila ovalis, Halophila beccarii, Halophila decipiens, Halophila minor, Halodule pinifolia, Halodule uninervis, Syringodium isoetifolium, Cymodocea serrulata, Cymodocea rotundata, and Thalassia hemprichii, from the survey sites. Seagrass mapping surveys were conducted at Gulf of Mannar, Palk Bay and South Andaman. The output maps of seagrass distribution were made. Seagrass-associated macrobenthos samples were collected and analyzed from the Paga reef, Taam reef, Chepri reef, Chusna pir Island and Mithapur, Gujarat.

In Palk Bay, Tamil Nadu, macrobenthic organism analysis were carried out to understand the group diversity between vegetated and unvegetated regions as well as mono and mixed seagrass species beds. An analysis of macrobenthic group diversity was carried out in Andaman and Nicobar Islands. Studies on the seagrass-associated fish assemblages were carried out at Gujarat as well as Tamil Nadu. Threat analysis were carried in the Dugong Conservation Reserve at Tamil Nadu and an assessment of various types of litter were made. Nutrient analysis for assessment of organic carbon, Na, K, and N were carried out for the sediment and seagrass samples from Palk Bay, Tamil Nadu and ANI. A total of 25 dugong stranding were reported from all three sites and gt content analysis were carried out to understand their dietary preferences. Through the Dugong Scholarship program, which was initiated to provide financial support to the students from fishing backgrounds, 398 students at Gujarat, 447 students at Tamil Nadu and 80 students at Andaman and Nicobar Islands have been awarded Rs. 500 per month towards their education and are identified as Dugong Ambassadors.

In line with the objective of participatory management of dugong and their habitats, numerous activities were conducted for the local communities at all three sites. These outreach, awareness and capacity building programs involved various stakeholders like school and college students, teachers, forest department, marine police, Forest Department, Range Officers, Indian Forest Service Officers, Police officers Indian Coast Guard, Indian Navy, fishermen and locals.

Outputs and Outcomes: During the aerial surveys, two dugongs were detected at Gujarat, sightings of dugong herd and a mother-calf pair were reported from the DCR. Thus, emphasizing the DCR as a vital breeding habitat for the species. The presence of dugongs was confirmed from Little Andaman, this being the first photo-documented validation after Indian Ocean tsunami, 2004. Dugongs in Little Andaman were speculated to be locally extinct after the devastation caused by the Indian Ocean tsunami, 2004. Dugong distribution coldspots filled, since many of the sightings are from tribal protected areas and defense restricted regions.

A new regional record of Halophila decipiens meadow was also made from the Mithapur reef, Gujarat as result of habitat assessment surveys. The study on seasonal variations in seagrasses of Gujarat showed a clear pattern in seagrass abundance variations all survey sites of Gujarat, where Halodule sp. meadows were observed to be seasonally persistent than the Halophila sp. meadows.

As a result of the seagrass assessment surveys, about 70% of the seagrass observed from the intertidal region (0.4 to ~5 m) were mixed species meadows while the remaining were mono-species. Further, at ANI, the highest seagrass cover percentage was observed at Safed Balu, Trinket (94.5 %), and the least cover was recorded from Halophila ovalis and Halophila decipiens dominated meadows at Pilpilow, Kamorta (3.6%). Preliminary analysis of seagrass mapping estimated an expected seagrass cover of 620 sq km in Tamil Nadu, i.e., 310 sq km in South Palk Bay and 307 sq km in Gulf of Mannar. Further, it was observed that though Gulf of Mannar has clearer waters, the estimated seagrass cover was lower as compared to Palk Bay. Seagrass maps shows that South Andaman and Gulf of Mannar with lesser seagrass cover in comparison to Palk Bay.

As part of the seagrass associated faunal diversity studies carried out at Gujarat, a total of 17 groups, viz., Gastropods, Pelecypod, Crustaceans such as Tanaidceans, Cumaceans, Amphipods, Isopods, Polychaetes, Holothuroidea, Ophiuroidea, Scaphopoda, Polyplacophora and Marine insects were recorded from the survey sites. The macrobenthic analysis of Palk Bay, Tamil Nadu showed the presence of higher group diversity at seagrass vegetated areas as compared to non-vegetated regions. Furthermore, the group diversity was higher in mono specific seagrass beds as compared to mixed species beds.

As a result of the macrobenthic group diversity studies at ANI, the highest group diversity was recorded in Little Andaman and the total biomass higher in North and Middle Andaman. Studies on the seagrass-associated fish assemblages showed the occurrence of 28 species and 22 species at Gujarat and Tamil Nadu, respectively. Our findings also highlight the importance of seagrass habitats as fishing grounds. Two types of threats were recorded, viz., fishing activity and floating litter., as a result of the threat analysis at the DCR. It was observed that there were greater number of small boats than trawlers operating in the region. Further, an assessment of the various types of litter in the DCR reported the highest percentage contribution by Styrofoam.

In Palk Bay, Tamil Nadu, the higher quantities of organic carbon were found in mono-species specific seagrass meadows but no difference were observed in terms of presence and absence of seagrasses. Also, higher concentration of Na and K was found in unvegetated areas as compared to vegetated regions.

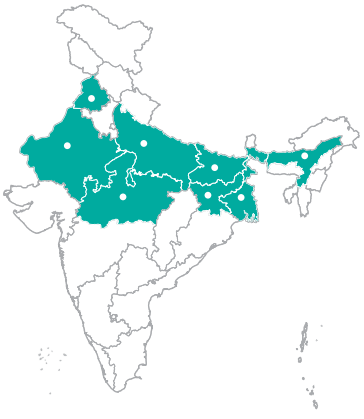
In Andaman and Nicobar Island, Na, organic carbon and N content was higher in South Andaman as compared to North and Middle Andaman. Also, the K content was higher at North and Middle Andaman in comparison to South Andaman. Nine of the 26 seagrass meadows investigated are newly reported from the Andaman and Nicobar Islands, filling the seagrass cold-spots of the region. The baseline biodiversity survey of DCR has been translated into a detailed management plan for better management of country's first dugong conservation reserve. Maps of seagrass distribution in Palk Bay and Gulf of Mannar have been created. A Manual on Marine Mammal Stranding Response has been published detailing the handling protocols for stranded marine mammals. A total of 23 programs at Gujarat, 13 programs at Tamil Nadu and 17 programs at ANI were conducted as part of the project.

Milestone: The first Dugong Conservation Reserve was established in Tamil Nadu, India in September 2022. The region is a 448- square-kilometer area in the northern part of the Palk Bay stretching from Adirampattinam to Ammapattinam.

The first "Marine Mammal Stranding Response Workshop" was conducted at Tamil Nadu for forest officers and veterinarians which included hands-on training for stranding response for both live and dead marine mammals. The event was organized by the Wildlife Institute of India in collaboration with the Ministry of Environment, Forest and Climate Change, Government of India, Central Zoo Authority, ICAR CMFRI, and the Forest Department Rameswaram, Tamil Nadu, during 17-19 October 2022. The workshop was an attempt to help strand networks and the forest department aid in quick response to both alive as well as dead marine mammal strandings, sample collection, and necropsy protocols.

For the first time, the researchers were able to successfully implement the "Mobile Marine Mammal Rescue Facility'' for the Andaman and Nicobar Forest Department which will aid and strengthen the emergency response and rescue facility in case of emergency response. First photographic record of dugongs was made from Gujarat. Sightings of a dugong herd and a mother-calf pair emphasize DCR's significance as a vital breeding habitat for the species. More than 60 sightings of dugong herds were reported from ANI. Dietary preferences of stranded dugongs from Indian waters were assessed and published.

RANGEWIDE ESTIMATION OF RIVER DOLPHIN



RESEARCH ONGOING

Funding Source
CAMPA-MoEFCC

Investigators
Dr. Vishnupriya Kolipakam and Shri Qamar Qureshi

Researchers
Abdul Wakid, Shovana Ray, Vineet Singh, Sunny Deori, Merin Jacob, Gargi Roy Choudhury, Kanad Roy, Abhishek Bettaswamy, Hiyashri Sharma, Ayan Dutta, Anurag Rokade, Bhavna Pant, Sneha Mane, Ranjana Negi, Aaranya Gayatri, Gautam, Jitul Kalita, Subhasree Das, Sajal Sharma, Syeda Tabassum Tasfia, Abhikrishna G, Abhishek Dudi, Aparna Santhosh, Arnab Dey Sarkar, Athul A, Atit Rai, Biswajeet Pujari, Devashish Saurav, Dipamoni Taye, Gunjan Chawla, Madhushree Das, Panchali Hazarika, Praful Pareek, Pranav Kulkarni, Pranjal Bhattacharjee, Rishav Bhattarai, Santosh HR, Shailza Negi, Shantam Ojha, Shyamal Saikia, Soumyadip Panja, Sreelekha Suresh PC, Srikrishna Narashiman, Supravat Mahata and Vijay Pratap Singh

Date of Initiation
November 2021

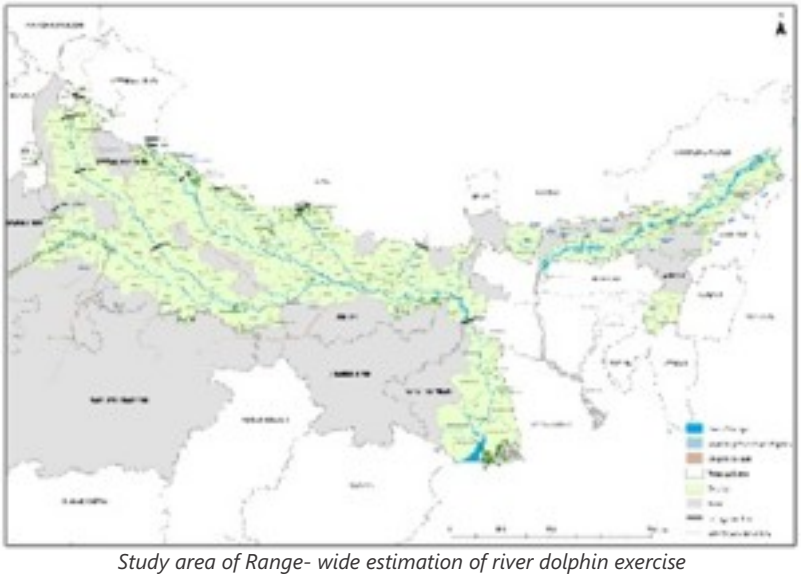
Proposed Date of Completion
December 2025

Objectives: The project has the objectives of (i) Range-wide estimation of River dolphin population in its ranges; (ii) Estimation of the associated fauna in the river dolphin ranges; (iii) Assessment of Water quality and pollution in the river dolphin habitat; (iv) Intensive site monitoring of river dolphin, associated fauna and its habitats; and (v) Intensive study on the availability of river dolphin prey species.

Progress: *Dolphin surveys in tributaries of Ganga and Brahmaputra:* Tributary surveys for river dolphins' population status were carried out from September 2022 to March 2023. The analysis is in progress. Total of 3165km Ganga (Uttar Pradesh: Sharda, Yamuna, Rapti, Geruwa, Kauriala and Ghaghara in Uttar Pradesh; Bihar: Part of Ghaghara, Mahananda, Kosi and Gandak; West Bengal: Rupnarayan, Mundeshwari, Bakshi canal, Dwarakeshwar, Torsa, Kaljani, Churni and Haldi) and 136km in Brahmaputra (Beki and Kolong). Analysis is ongoing. Survey in total 1524km of Indian Sunderbans (SBR 566km and STR 958km) in West Bengal and 124km of Barak river was also surveyed. Analysis is being done.

Training and workshops for Forest Department: State-wise hands on training and workshops were organized in the states of Uttar Pradesh (in Etawah and Lakhimpur Kheri), Bihar (Bhagalpur), West Bengal (Cooch Behar and Sunderbans) prior to each tributary surveys to ensure homogenous survey effort throughout its range.

Ganges Dolphin Conservation Training Program: A two-day training program for Uttar Pradesh Forest Department for Dolphin Conservation and Survey Protocol during 23-24 September 2022. Trained UP forest department personnel for the conservation of Gangetic River dolphins and explained various dolphin survey techniques. The hands-on training was provided pertaining to all instruments employed during dolphin survey.



Study area of Range- wide estimation of river dolphin exercise

Fish survey is completed in the intensive sites of Ganga River in Uttar Pradesh, Bihar, West Bengal and Brahmaputra River in Assam. During fish survey, fish sampling, fish market survey, and fisherman questionnaire was conducted in 3-4 grids (10X10km) of each 100km stretch covering all the dolphin hotspots and coldspots. Data analysis is in progress.

Bank line survey for turtle, gharials, otters and mugger: A transect of two km on the bank line was also conducted alongwith fish survey to understand the status of turtle, gharials, otters and mugger on the intensive sites of Uttar Pradesh, Bihar, West Bengal and Assam.

Pollution survey: Pollution survey in ongoing in the intensive sites of Ganga and Brahmaputra Rivers. The objective of the study is to estimate the status of water quality, emerging pollutants, pharmaceuticals and micro plastics in the system. Water, fish and sediment samples were collected from the sites.

Outputs and Outcomes: Tributary survey for Ganges dolphin and associated fauna is complete. About 150 forest department officials were trained during the training and workshop programs.

Milestones: It is the largest freshwater survey in the world. The researchers completed the first rangewide assessment of river dolphins in India. The team surveyed more than 9,000 Kms of river length. First time data was collected across the range of river dolphins regarding habitat and fish fauna status.

RESEARCH ONGOING

DEVELOPMENT OF CONSERVATION ACTION PLAN FOR GANGES RIVER DOLPHINS

Funding Source
CAMPA-MoEFCC

Investigators
Shri Qamar Qureshi,
Dr Vishnupriya Kolipakam,
Dr Lallianpuii Kawlni, Dr Bitapi Sinha and Dr Ruchi Badola

Researchers
Dr Abdul Wakid, Dr Shovana Ray,
Dr Vineet Singh, Dr Sunny Deori,
Merin Jacob, Gargi Roy Chowdhury,
Kanad Roy, Abhishek B., Ayan Dutt,
Anurag Rokade, Bhavna Pant,
Sneha Mane and Gautam

Date of Initiation
April 2016

Proposed Date of Completion
December 2025

Objectives: The project has the objectives (i) to develop monitoring protocol for dolphins; (ii) Status of associated river fauna like Gharial, Otter, Turtles and Fishes; (iii) Quality assessment of river habitat in terms of water quality, anthropogenic pressure and landscape surrounding riverscape; (iv) Evaluate the current status of invasive species in riverscape; and (v) Involve stakeholders to develop a network which will assist in dolphin conservation.

Progress: *Intensive site study:* River dolphin acoustic experiments were conducted along 3 districts at the bank of River Hooghly in West Bengal. The data was collected using CPOD, a hydrophone (Passive acoustic monitoring device) that recorded the dolphins' echolocation clicks. The study compared the frequency range of echolocation clicks (MaxF, MinF, Frange, Figure 1) between the two groups. Ambient was recorded using a C57 hydrophone deployed at these sites in absence of any other anthropogenic noise such as vessel movement, construction etc.

Socio-economic surveys and awareness programs in West Bengal: Socioeconomic survey with emphasis on ghost net management was conducted in fishing villages from 8 districts of West Bengal (N= 507). Aim of this survey was to record the cost involved in preparation of fishing nets, disposal methods, potential for recycling and feasibility of buy back policies.

Across 5 districts of West Bengal river related folk art forms explored and artists were interviewed (N=40, Figure 3). Handicrafts developed by rural artisans were

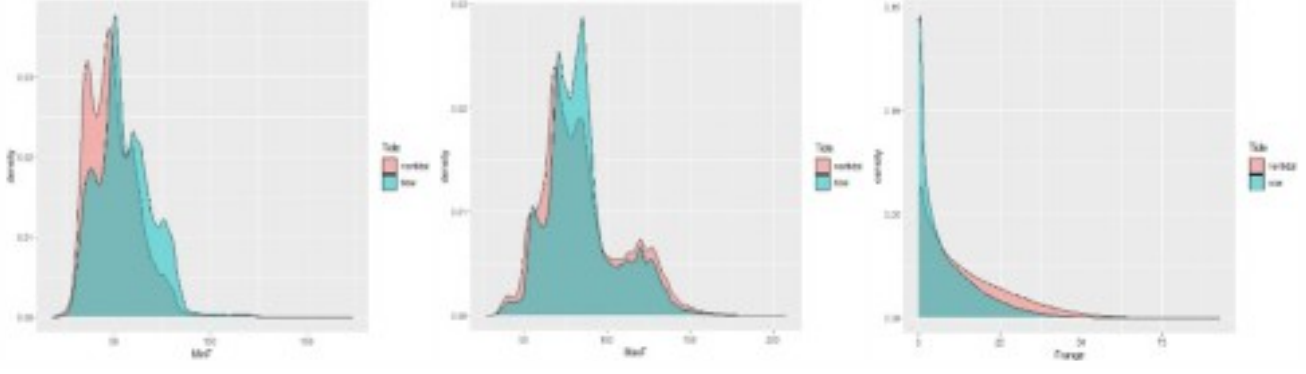


Figure showing density plot of Minimum frequency (MinF, top left), Maximum frequency (MaxF, top right) and frequency range (Frange, bottom) for the two different groups of Ganges dolphin residing in tidal (teal) and non-tidal (peach) locations

collected for river dolphin conservation related outreach programmes.

In schools across 3 districts of West Bengal, interactive games were arranged for students (N=167, Figure 4). These games were designed for imparting Ganges river dolphin conservation message to the students using models and fun activities.

Fisheries scheme awareness workshops were organized in collaboration with local fishing cooperatives and State fisheries department at 3 districts (N=200).

National Dolphin day was celebrated at Kolkata and Farakka in West Bengal and in Kalahgaon, Bihar. Awareness walk, plays and quiz show were organised at local schools. School students residing near the river ghats participated in the event (N=260, Figure 6).

Environment day was celebrated on 5 June 2022 across 2 field sites of West Bengal (N=200). Activities like plogging, awareness announcement and rally, street play were organised at Farakka and Kolkata.

Socio- economic surveys and awareness campaigns in Assam

Study on folk art culture among the riverine communities was conducted to understand the importance of river dolphins in cultural history of Assam.

World Environment Day (5 June 2022) Celebration at Assam: The researchers conducted two awareness events on dolphin and river ecosystem conservation on the occasion of World Environment Day 2022 – one at Chunari and another at Jugighopa. The researchers presented Posters, followed by a drama performance on dolphins and river ecosystem conservation were conducted. About 500 people including students participated in these awareness events.

Student art competition: The researchers conducted student art competion in Sankardev Sishu Niketon (Kukurmara, in the bank of Kulsi River), where 40+ students participated in different topics related to dolphin and river ecosystem conservation. All participants were given awards.

Rescue and release of Net stranded dolphin:

On 4th February, 2023 CAMPA Dolphin team in association with the North Kamrup Forest Division (Assam) safely rescued and released a net stranded dolphin from a Berjal (Figure 13). This dolphin was stranded for more than 2 months in the Berjal. CAMPA Dolphin team worked closely with the fishermen team including the lease holder to keep the dolphin safe and release it safely.

Assisting different Forest Divisions of Assam Forest Department:

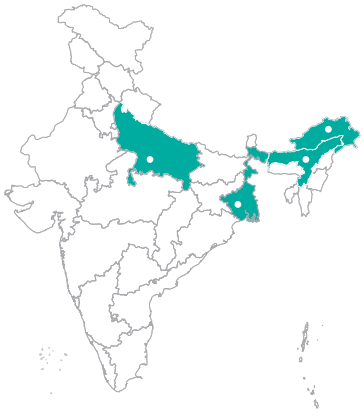
- During this Reported period, the researchers assisted the Divisional Forest Officers of Kamrup West Forest Division, Guwahati Wildlife Division, Dibru-Saikhowa National Park, Kaziranga National Park, and Biswanath Wildlife Division for various activities and inputs in context to dolphin conservation of their respective Divisions.
- Project Scientist Dr. Abdul Wakid accompanied Union Finance Minister (state) during his trip to the 6th addition of Kaziranga National Park in March, 2023 to see the dolphins. WII assisted Assam Forest Department in submitting the APO for 2022-23 including a 5-years project under Project Dolphin, which the CWLW-Assam submitted to MoEFCC for funding.
- CAMPA Dolphin team also assisted the Divisional Forest Officer of Kamrup West Forest Division to investigate on the mortality of dolphin in Chayyagaon stream.

Talk show on Air India Radio on the occasion of Dolphin Day (5th October, 2022)

A talk show was organized by All India Radio on the occasion of Dolphin Day where Prof. Qamar Qureshi and Dr. Vishnu Priya Kolipakam alongwith other researchers delivered the talk. The talk was about Dolphins and conservation issues related to Dolphins and their habitats.

Dolphin mortality monitoring in Assam: In 2022-23, the researchers recorded 7 dolphin deaths in different parts of Assam as follows:

Date of death	Place of death	River	Number	Age class
20-05-2022	Morisapathar	Pahumara	1	Adult
04-08-2022	Hiloikhunda	Brahmaputra	1	Calf
25-09-2022	Bihpuria	Dikrong River	1	Adult
06-10-2022	Thelamara	Brahmaputra	1	Adult
05-12-2022	Kashoshila	Brahmaputra	1	Adult
02-03-2023	Bherbheri	Kulsi	1	Adult
05-03-2023	Bherbheri	Kulsi	1	New born
		Total		**7**



LANDSCAPE SCALE ASSESSMENT OF HABITAT, POPULATION AND GENETIC STRUCTURE OF HISPID HARE, CAPROLAGUS HISPIDUS IN THE HIGHLY FRAGMENTED TERAI GRASSLAND OF INDIA

RESEARCH ONGOING

Funding Source
DST-SERB, Duleep Matthai Nature Conservation Fellowship Programme, Prakrirti Research Fellowship

Researcher
Anukul Nath

Date of Initiation
May 2020

Investigators
Dr Sutirtha Dutta and
Dr Vishnupriya Kolipakam

Proposed Date of Completion
December 2023

Objectives: The project has the objectives of (i) Understanding the site occupancy and habitat relationships of hispid hare across its distribution range in India; (ii) Implementation of a refined population assessment method by integrating sign based and individual identification-based approaches to estimate hispid hare abundance; and (iii) Understanding the population genetic structure of hispid hare within the distribution range in India.

Progress: Data collection on distribution, habitat occupancy, and density of hispid hare was completed for Manas National Park, Manas Reserve Forest, Barnadi Wildlife Sanctuary (Assam), D'Ering Memorial Wildlife Sanctuary (Arunachal Pradesh), Jaldapara National Park (West Bengal), Dudhwa National Park and Katarniaghat Wildlife Sanctuary (Uttar Pradesh). The dataset was collected using an occupancy framework in a systematic grid (2×2 km) design in the grassland areas. Species' detection/non-detection data was generated by recording pellet groups along segments of trails (spatial surveys) to achieve adequate spatial coverage. The pellets of Hispid hare were distinguished on the basis of their size and shape. In each grid, 0.5-2.5 km area was surveyed for the pellets of hispid hare with the help of two independent persons following MRDS (Mark-recapture distance sampling approach). Subsequently, fresh pellets were marked on the site of observation and two-four weeks' interval and status of the rate of decay was recorded. DNA was extracted from the fresh pellets collected from different study sites and analysis on progress. Furthermore, the researchers has selected a (1.5 × 1.5) km grassland plot in the Bansbari range of Manas National Park and carried out intensive pellet sampling, and to systematically distribute the sampling effort and to avoid "spatial holes", and further divided this plot into 50 × 50 m (0.5 ha) sampling units. Fresh pellet samples were collected from each of these 0.5 ha plots, and genetic analysis is currently underway.

Outputs and Outcomes: The presence of the hispid hare was confirmed in four out of the eight sampled sites: Manas National Park (NP), Manas Reserved Forest (RF), Jaldapara National Park (NP), and Dudhwa National Park (NP). Among these sites, the highest number of hispid hare pellet groups was found in the Manas landscape, (5830), followed by Jaldapara (255) and Dudhwa NP (224). Additionally, DNA analysis conducted on fresh pellets further confirmed the presence of the hispid hare in these sites. No sign of hispid hare was found in Barnadi WLS, D'Ering Memorial WLS and Katarniaghat WLS. The grassland of Barnadi has highly degraded in the recent years and dominated by the invasive Chromolaena odorata. It was also observed that the small patches of riverine grasslands of Barnadi southern boundary area of D'Ering and grassland patches of Katarniaghat WLS was highly threatened to cattle grazing. Our landscape scale analysis showed that percent grassland cover followed by fire density, distance from protected area, and annual mean temperature was key in determining hispid hare occurrence. At micro-scale, hare prefers tall grass species assemblages dominated by Narenga porphyrocoma. At present, the predicted habitat area available for the species is roughly less than (295. 56) 300 sq.km. Manas landscape holds more than 50% of suitable area within the distribution range of the species. In natural condition, the mean pellet decay rate was estimated (136.52 ± 17.43 days; CV=12.77%). The density of hispid hare in Manas landscape varies from 0.10-0.20 individuals/ha at 95% CI (0.14 ± 0.019 individuals/ha; CV: 13.8%). Bhuyanpara range has highest density followed by Bansbari and Kahitema range. Panbari range of Manas NP and adjacent Manas RF has the lowest density. Almost all known surviving populations of hispid hare are restricted to small areas of riverine grassland in the flood plains. However, the habitat of the species is susceptible to minor changes in the course of these rivers, which can

destroy habitat. Besides, human population pressure in the surrounding areas, which makes alternate habitats unlikely.

Milestone: The researchers presented a robust and consensus habitat selection by including the most important climate, landscape, and anthropogenic variables. Using a non-invasive and sign-based survey, a scientifically credible system for monitoring the elusive endangered Hispid hare has been developed. The continued implementation of educational and outreach programs has contributed to the dissemination of knowledge among local communities regarding the management of natural resources in the region.

RESEARCH ONGOING

CONSERVATION ACTION PLAN FOR MANIPUR'S BROW ANTLERED DEER OR SANGAI: AN INTEGRATED APPROACH

Funding Source
National Compensatory Afforestation Fund Management and Planning Advisory Council, Ministry of Environment, Forest and Climate Change, Government of India

Researchers
Mirza Ghazanfarullah Ghazi, Dr Nengneikim Baite, Dr Sharmila Naosekpam, Akoijam Santikumar Singh and Roshani Bisht

Investigators
Dr Ruchi Badola and Dr S.A. Hussain

Date of Initiation
March 2016

Proposed Date of Completion
December 2025

Objectives: The project has the following objectives (i) Strengthening of existing population in Keibul Lamjao National Park; (ii) Establishment of a second population in wild; (iii) Improved habitat condition and protection measures; (iv) Involving the local community in conservation efforts; and (v) Conducting applied research on the ecology of the species.

Progress: Strengthening the existing population in KLNP: To achieve the conservation of Sangai, "The Integrated Management Plan of Keibul Lamjao National Park, Manipur (2020-21 to 2030-31)", prepared by the Wildlife Institute of India with support of the Manipur Forest Department was released on 20th June 2022 during an auspicious event held at Classic Grande, Imphal. Around 50 participants including representatives from different educational institutions, government departments, NGO's working for biodiversity conservation in Manipur, Gram Panchayat members, officials of the Forest Department and other dignitaries were present.

Population estimation of Sangai and associated species has been conducted. Standardization of advanced techniques for population estimation based on optical and thermal imaging using Unmanned Aerial Vehicle (UAV) or drones is in progress. Genetic and stress physiology profiling of captive and wild populations of Sangai for conservation breeding. The whole genome of Sangai using Next Generation Sequencing has been completed and the analysis is in process.

Establishment of a second population in wild: A layout plan for developing a Conservation Breeding Centre (CBC) for Sangai at KLNP was prepared under the WII CAMPA-Sangai project in consultation with the Smithsonian Institute of Conservation Biology, USA and the National Institute of Animal Health, following the Central Zoo Authority guidelines.

Landfilling at the CBC is completed and the layout plan for enclosure design has been prepared and enclosure construction will be initiated. State, site and village level consultations involving multiple stakeholders on establishing a second home Sangai were conducted. Field surveys for identifying other suitable reintroduction sites within Manipur have also been conducted with Manipur Forest Department.

Improved habitat condition and protection measures: The researchers also liaised with the Forest Department in matters pertaining to incidences of poaching, resource extraction by local communities and rescue of animals from the park and surrounding area of the Park. The rescued animals are treated or given First-Aid before rehabilitation and handed over to Manipur Zoological Garden for rehabilitation. From the month of January 2023 to April 2023, two hog deer were rescued and one Hume's pheasant was rescued. A hog deer rescued from Yawa Lamjao Toupokpi was given first-aid and released inside KLNP, while the other Hog deer and Hume's pheasant was handed over to Manipur Zoological Garden for rehabilitation. Capacity development

activities for frontline staff of KLNP were conducted. Liaison with MFD in matters related to protection and management of the Park and the surrounding villages.

Involving the local community in conservation efforts: Various community outreach and conservation education programmes were conducted around the Park under in order to raise mass awareness and garner public support for the Sangai conservation. More than 600 people including school children participated in these programmes viz. Celebration of International Day for Biological Diversity 2022, World Environment Day 2022, Wildlife Week 2022, World Wetlands Day 2023, and World Wildlife Day 2023. Awareness talks, conservation education, on-spot quiz competition, slogan writing, painting competition, awareness rally, etc. were held under different topics and themes.

The WII in collaboration with the Manipur Forest Department (Wildlife Division) set up an exhibition stall named 'Manipur: The Cradle of Sangai' at the Manipur Sangai Festival which is the biggest annual cultural festival of Manipur state organized by Manipur Tourism Department from 21st to 30th November 2022. The stall showcased the rich biodiversity of Keibul Lamjao National Park. Information brochures, pamphlets, booklets, etc. were distributed among the visitors and also, exhibited products handcrafted by the local women SHGs of KLNP. The stall was visited by more than 300 people including local, national and international tourists, academia, students and others.

Wildlife Institute of India, Dehradun conducted three animal health camps from 28 February 2023 to 1 April 2023 at Chingthi Komlakhong – Hiyangkhong, Khordak and Keibul villages. A total of 126 pet animals were vaccinated against rabies and the livestock owners consulted about the ailments their animals are suffering from.

A one-day national level workshop on 'Protection and Conservation of Wetlands' was jointly organized by WII CAMPA-Sangai, Department of Zoology, Manipur University, Pole Star College; Biodiversity, Ecology & Environment Network (BEENET) Manipur at Manipur University. The workshop highlighted the status of wetlands in Manipur and North East India and their conservation issues.

A one-day orientation programme for the development of women Self Help Groups (SHGs) with Manipur State Rural Livelihoods Mission (MSRLM) was jointly organised on 2nd December 2022. The program was attended by 90 local women from 13 SHGs. This not only help in strengthening the functioning of SHGs, but also sustain their convergence with MSRLM in areas of sustainable livelihood promotion around the Park.

Training programme on vermicomposting on 8 June 2022 and one-day orientation programme on post-COVID livelihood improvement of local community living around KLNP through Science & Technology on 12 January 2023 were carried out as part of the capacity building activities for enhancing the livelihoods of the local people.

Conducting applied research on the ecology of the species: Monitoring the population trend of Sangai and Hog deer in KLNP was done to detect any change in population structure. Assessment of genetic structure of captive & wild populations of Sangai for conservation breeding. Profiling of stress physiology using fecal glucocorticoids concentration in captive & wild population of Sangai has been conducted. Further assessment of stress physiology is ongoing. Continuous monitoring of habitat conditions, including phumdi thickness and the water level, is being carried out to detect any change in the existing habitat condition.

Regular monitoring of natural resource use by the local communities from the Park is being done at selected entry points around the Park. Baseline information on the population trend of Sangai and associated species in KLNP, genetics, stress physiology, habitat condition and resource dependency has been generated, and data collection and analysis is ongoing.

Outputs and Outcomes: Preparation of Integrated Management Plan of Keibul Lamjao National Park (2021-2031) for strengthening and effectively managing the existing habitat conditions, protection measures and

population management of Sangai and associated species at KLNP in collaboration with the Manipur Forest Department.

Genetic profiling of captive and wild populations of Sangai is available. This information is assisting the conservation breeding of Sangai and effective management of captive populations across the country. WII in collaboration with experts from Smithsonian Conservation Biology Institute, USA and National Institute of Animal Health, Baghpat has prepared the Action Plan for conservation breeding of Sangai and developing the founder and release stock for reintroduction at the proposed site. Development of the Conservation Breeding Centre at KLNP. The centre is proposed to become functional from March 2024.

Strategies for management of the Park including patrolling routes and fire line cutting, habitat management and capacity building of the frontline staff at KLNP has been provided in the plan. Socio-economic status of the local communities residing around the Park has been evaluated. The degree of dependency of these communities on the Park resources has been quantified in terms of resources extraction from the Park.

Milestone: Integrated Management Plan of Keibul Lamjao National Park has been prepared and released. Action plan for conservation breeding is in place and development of the conservation breeding centre at KLNP has been initiated. Critical information on population size and trends of Sangai and hog deer has been generated which is essential for monitoring the population growth and detect any changes in the population in time to take immediate interventions. Standardisation of advanced population monitoring technique using drones and habitat mapping using optical and thermal imaging of the Park.

Successful integration of 13 women Self-Help Groups (SHGs) formed under the Women Initiative for Sangai Conservation (WISC) into the Manipur State Rural Livelihoods Mission (MSRLM). Further community mobilization, capacity development and livelihood planning is in pipeline in consultation with MSRLM.

RESEARCH ONGOING

AUGMENTATION AND LONG-TERM MONITORING OF TIGER IN BUXA TIGER RESERVE, WEST BENGAL

Funding Source
West Bengal Forest Department, Government of India

Investigator
Dr K. Ramesh

Researchers
Shekhar Sarkar and Ankit Thakur

Date of Initiation
April 2018

Proposed Date of Completion
March 2026

Objectives: The objectives of the project are to (i) strengthen field protection and intelligence-based enforcement for overall habitat revival; (ii) improve habitat quality and prey population status to enable suitable conditions for tiger augmentation in Buxa Tiger Reserve and the landscape complex; (iii) augment tiger population from other source areas involving soft-release, and hard-release strategies towards ensuring a demographically, genetically, and physically (health-wise) viable population of tiger and its offspring; (iv) institutionalize monitoring of habitat conditions, prey populations and tiger population to enable 24x7 security of released animals and for feedback mechanism for effective management and capacity building of staff on a regular basis; (v) develop a landscape management plan in the context of tiger movement between Buxa and Jaldapara National Park, Buxa and Manas as well as Buxa and neighboring/mm forests of Bhutan.

Progress: The project objectives visualized for Phase I of the project were mostly completed as per the Annual Work Plan. During the year, the following activities were continued and accomplished.

Spatial Database and Land Use Land Cover Map: Prepared a detailed map that includes different land cover types such as forests, shrub lands, grasslands, agricultural lands, water bodies, and human settlements. Map showing the forest area protected by the Joint Forest Management Committee (JFMC) was prepared.

Camera-trap exercise: Camera trap data from the previous year was analysed to assess the status of tigers, co-predators, and prey in the Buxa Tiger Reserve. The reserve was divided into grids, and camera traps were deployed in each grid to capture wildlife activity. The team calculated species capture rates, occupancy, and detection probabilities based on the camera Photographic capture rates of wild ungulate species,

carnivores and livestock were calculated. The relative abundance index (RAI), per 100 trap nights, for each species was calculated by extrapolating the CR to 100 trap nights.

Phase I Monitoring: The team conducted monitoring exercises in the Buxa Tiger Reserve, collecting data using a mobile application. The collected data was analyzed to understand the current prey base in the reserve.

Capacity building of staff: Regular training sessions were organized for the field staff involved in the project activities. The training sessions were conducted at the range level to enhance the skills of the staff.

Focused monitoring of tigers: Special attention was given to documenting the presence and movement of tigers in Buxa Tiger Reserve. Camera traps were strategically placed in regions where tiger sightings were reported or expected. Cameras were also deployed at animal kill sites to determine if the kills were caused by tigers. Scats, potentially from tigers, were sent for molecular identification to the Wildlife Institute of India (WII).

Community engagement and conservation education: The project included activities to engage with the local community and raise awareness about conservation. A questionnaire survey was conducted after standardizing the survey format.

Preparation of an album of key species: An album was compiled, containing images and information about species captured in the camera traps since 2018. Additionally, individual profiles of leopards and clouded leopards, identified by their unique rosette patterns, were developed. These documents are intended to aid in the management and protection of wildlife by the forest department.

Outputs and Outcomes: The project has made significant progress and achieved various outputs and outcomes through its implemented activities. The team collected and updated spatial data layers, including a land use land cover map and a map highlighting forest areas protected by the Joint Forest Management Committee. These datasets were shared with the Field Director's office.

Regarding camera-trap exercises, the team analyzed data from the previous year's camera trapping period, calculating photographic capture rates for different species. They also planned for the upcoming year, dividing the tiger reserve into grids and deploying camera traps strategically in areas with potential tiger movement. Weekly monitoring and data collection were conducted by the team.

During Phase I monitoring, transect line surveys and sign surveys were carried out to estimate prey density and encounter rates of carnivores and mega-herbivores. Distribution maps were prepared based on the collected data, revealing an estimated ungulate density of 12.17/sq km in the reserve.

Sign encounters of carnivores and mega-herbivores were recorded during the survey, with leopards exhibiting the highest number of signs. Other species such as leopard cats, jungle cats, golden cats, and Himalayan black bears were also detected. Elephant signs were widespread, while gaur signs were mainly found in the plain areas of the reserve. Occupancy estimates indicated that leopards occupied 92 percent of the reserve, with high detection rates. Other carnivore species and mega-herbivores were also found to occupy significant portions of the reserve.

Capacity building efforts included regular training sessions for field staff at the range level, benefiting a total of 233 individuals.

Focused monitoring of tigers aimed to document their sporadic visits and understand their habitat use. Camera traps were strategically deployed, but no tiger captures were recorded during this year's monitoring.

In terms of community engagement, a door-to-door questionnaire survey was conducted in villages within the reserve. The survey aimed to understand the perspectives of forest villages and JFMC members, assessing their readiness for the proposed tiger augmentation in the reserve. The survey work in two

villages i.e. Bhutiabast and Gangutia has been completed.

Overall, the project has made substantial progress in collecting data, conducting monitoring exercises, and engaging with local communities. These findings and ongoing efforts will serve as a valuable foundation for future conservation initiatives in Buxa Tiger Reserve.

Milestone: As per the Detailed Project Report on 'Tiger Augmentation and Recovery in Buxa Tiger Reserve', much of the preparatory work has been completed in terms of scientific data collection, monitoring and capacity building of the staff.

A comprehensive report on Phase I of the project has been compiled, encompassing the habitat status, tiger and co-predator status, prey status, and anthropogenic issues. This report will serve as a useful baseline for the reserve in planning and implementing future conservation initiatives.

It is widely known that the Buxa Tiger Reserve experiences occasional tiger movement from the adjacent protected areas of Bhutan and Assam. However, a corridor linking BTR and the nearby Raimona National Park has been identified. This corridor holds promise for facilitating natural tiger movement into BTR in the near future, potentially enhancing the population and genetic diversity of tigers in the reserve.

In addition to regular capacity development inputs, enabling the field data available to frontline staff through beat books and species album was accomplished.

RESEARCH
ONGOING

ASSESSMENT AND MONITORING OF CLIMATE CHANGE EFFECTS ON WILDLIFE SPECIES AND ECOSYSTEMS FOR DEVELOPING ADAPTATION STRATEGIES IN THE INDIAN HIMALAYAN REGION–PHASE II

Funding Source
Department of Science and Technology

Investigator
Dr S. Sathyakumar

Researchers
Project Scientist: Dr. Vineet K Dubey
Senior Project Associates:
Dr. Aashna Sharma, Dr. Ranjana Pal,
Dr. Priyanka Kashyap, Ankit Singh,
Senior Project Fellow: Irina Das,
Shagun Thakur
Junior Project Fellow: Deepali Bansal,
Krishnendu Banerjee
Project Assistant: Himangshu Bora,
Meghavi Purohit, Tuhina Thakur
Project Affiliates: Manisha Mathela,
Amarjeet Kaur

Date of Initiation
December 2021

Date of Completion
April 2027

Objectives: The objectives include generating information on climate change impacts, assessing ecosystem health, characterizing climate refugia landscapes, establishing a spatial database, and implementing long-term monitoring. The project aims to inform conservation strategies and promote climate change adaptation in the IHR region.

Progress: The phase II of the project expanded its geographical coverage in the Indian Himalayan Region by delineating a 3,800 sq km area in the West Kameng basin, Arunachal Pradesh. The researchers conducted reconnaissance survey in the Kameng basin and ongoing sampling for invertebrates (*lepidoptera, hymenoptera* and *odonata*), fishes, amphibians, reptiles, birds, and mammals across different habitats and elevations.

Outputs and Outcomes: The researchers completed camera-trap based mammal sampling in 50 locations of Bhagirathi basin, 76 locations in the West Kameng basin, and 63 locations in the Teesta Basin from December 2022 to May 2023. The team completed sampling of amphibians and reptiles at 95 points, fish at 150 points, and entomofauna at 31 points in the West Kameng basin, covering an elevation range of 590 to 2500 meters. Identified permanent monitoring sites in Beas, Bhagirathi, and West Kameng basin to facilitate long-term studies on selected taxa.

Milestone: Spatial Database Infrastructure was established at WII, which has the capacity of storing large robust datasets. Datasets, spatial layers' preparation and designing the Wb-DSS system is underway.

RESEARCH ONGOING

LONG-TERM MONITORING OF TIGERS, CO-PREDATORS AND PREY IN TIGER BEARING AREAS OF VIDARBHA, MAHARASHTRA

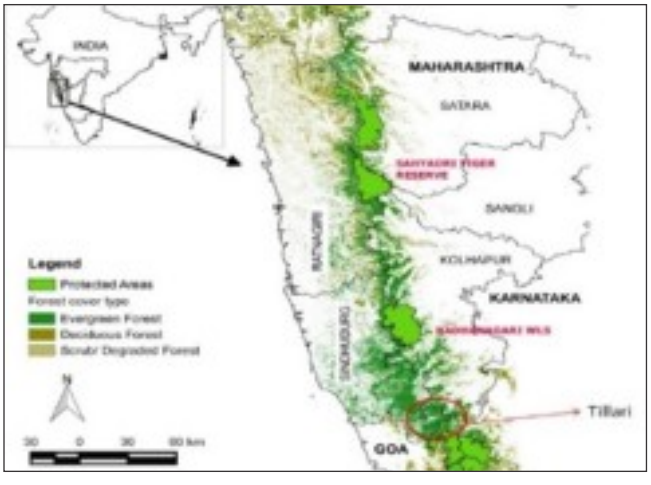
Funding Source
Maharashtra Forest Department

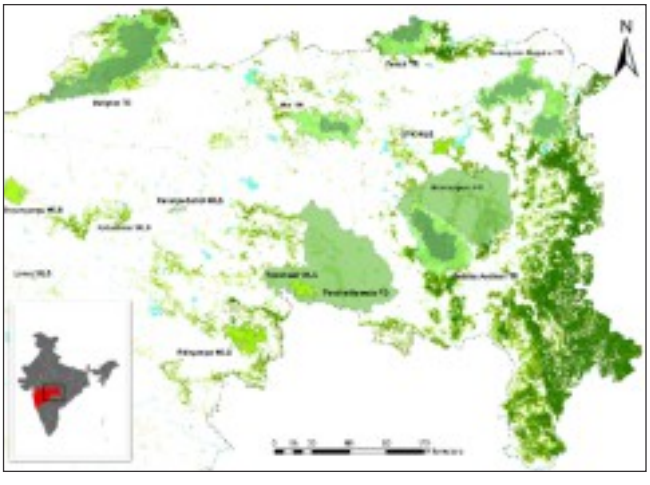
Investigators
Dr Bilal Habib and Dr Parag Nigam

Researchers
Shaheer Khan, Lynette Aditi Gomes, Suman Koley, Jaydeep Patil, A. Krishnan, Sajid Reza, Kanishka, Anubhuti Krishna, Anjali Thapliyal, Sagnik Nandy, Khadija and Deval Kadam

Date of Initiation
March 2019

Proposed Date of Completion
March 2029





Objectives: The project has the following objectives (i) Status of tigers, co-predators and their prey in the landscape; (ii) Development of database on tigers across the landscape; (iii) Identification of tiger dispersal in the landscape, and (iv) Development of feedback for management intervention at reserve and landscape level.

Progress: Development of database on tigers across the landscape: Preparation of the tiger database was initiated in 2019. The database is updated annually building on the existing database. The photo albums have been updated till 2022. Field sessions for the year 2023 is ongoing and the existing database will be updated accordingly, with addition of new captured individuals, once data collection across the landscape is completed.

Identification of tiger dispersal in the landscape: Missing tigers from an area is matched with database of the adjoining area to confirm dispersal of individuals. Currently, data collection for database updation is being carried out. Upon updation of the database post camera-trapping session of 2023, the researchers will identify dispersed individuals and their area of dispersal.

Outputs and Outcomes: The annual report titled "Status of Tigers, co-predators and prey in Vidarbha Landscape Maharashtra" was published based on the analysis performed on the data collected in 2022.

RESEARCH INITIATED

INFLUENCE OF TECTONIC SHIFT ON THE CARBON STOCK DYNAMICS OF MANGROVE FORESTS OF ANDAMAN ISLANDS

Funding Source
Centre for International Forestry Research (CIFOR)

Investigators
Dr Nehru P and Dr Rupesh Bhomia

Researchers
Anoop Raj Singh and Mr. Ajith P

Date of Initiation
April 2022

Proposed Date of Completion
September 2023

Objectives: The objectives of the project are to (i) quantify factors influencing the mangrove vegetation community shift at the uplifted and subsided coastal sites across Andaman Islands; and (ii) assess how the mangrove carbon stocks and sediment accretion rates responding to the uplift and subsidence.

Progress: A total of 26 sampling sites were surveyed using standard protocol (SWAMP) to quantify the factors influencing the mangrove vegetation community shift, and total carbon stock present in the Andaman Islands. These 26 sampling sites were representative of either of the sub-categories formed post disturbance: uplift site (10 sites), subsided site (8 sites), and control site (8 sites). The change in tidal regime due to coastal uplift and subsidence is expected to directly influence carbon stocks linked to tree vegetation and sediments. Therefore, the researchers explored the above and below ground biomass and carbon stocks across the 26 survey locations in the Andaman Islands using Kauffman and Donato (2012) protocol. Soil cores up to 3 m depth were collected to estimate the below ground carbon stocks. The soil samples are prepared and getting analyzed in the lab to estimate the carbon stocks.

Outputs and Outcomes: The vegetation carbon stock was estimated to be highest among the Indian Mangroves. The composition and species diversity has shown clear response to the sea level increase and decrease gradients. The above ground carbon (AGC) stocks were estimated to be the highest in Andaman Islands (298.7 ± 38.06 MgC/ha) among the Indian Mangroves. Though, AGC within Andaman Islands were higher in the control sites (116.6 ± 31.4 MgC/ha) than the uplifted sites (103.6 ± 38.8 MgC/ha) and the subsided sites (78.5 ± 44.0 MgC/ha). A baseline on the mangrove vegetation composition was established for Andaman Islands. The baseline information was shared with Forest Department for effective mangrove management. Capacity of frontline forest staff was enhanced in mangrove management and identification.

Milestone: Two capacity building programs were conducted in Andaman Islands to sensitize and train the front line forest staff in mangrove monitoring and restoration. First set of Rod Surface Elevation Table (rSET) was installed at 7 locations in Andaman Islands to study the mangrove response to sea level rise. This was the first such attempt in India.

RESEARCH INITIATED

IDENTIFICATION OF TIGER CORRIDOR IN AND AROUND PALAMAU TIGER RESERVE

Funding Source
Jharkhand Forest Department

Investigator
Shri Qamar Qureshi

Researchers
Rohan Desai and Shehzada Iqbal

Date of Initiation
April 2022

Proposed Date of Completion
April 2024

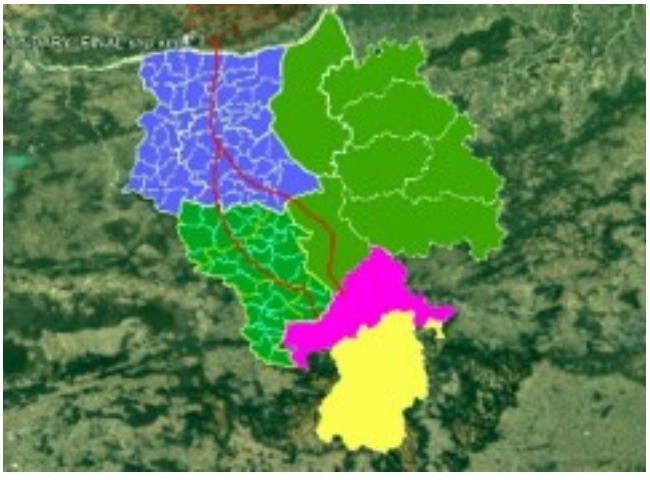


Fig 1: *Surveyed Corridor (Palamau – Kaimur)*

Fig 2: *Carrying out field survey in Palamau*

Progress: Camera Trapping has been carried out in the entire Palamau Tiger Reserve covering 325 camera trap points and comprehensive field survey has been conducted using the MSTrIPES Mobile Application (Polygon search) to assess the presence of major mammalian fauna within the Palamau Tiger Reserve and the divisions along the corridor connecting it with the Kaimur Wildlife Sanctuary in Bihar. The survey focused on recording species information, sign types, sign age, as well as time and location details. To ensure a systematic approach, habitat plots with a diameter of 30 meters were established at intervals of 500 meters along the survey trail. These plots were used to document signs of human impacts, including tree felling, lopping, grass and bamboo cutting, as well as the presence of livestock, people, and the extent of human trails. Additionally, the vegetation structure, encompassing the cover of invasive plants, grass, shrubs, and canopy, was assessed within these habitat plots. Furthermore, rectangular plots measuring 2x20 meters were employed at the same locations to enumerate the scat, pellets, or dung of herbivorous species. The polygon survey has been successfully conducted throughout the entire Palamau Tiger Reserve, along with the North Garhwa Division, South Garhwa Division (excluding Ranka east/west range), and Medininagar Division (Chainpur Range) that fall within the corridor connecting the reserve to the Kaimur Wildlife Sanctuary in Bihar.

In addition to the field surveys, a questionnaire survey was administered in the South Garhwa, Medininagar Divisions, and the Palamau Tiger Reserve. The primary objectives of this questionnaire survey were to gain insights into the local community's perception of conservation and their attitudes towards wildlife. It also aimed to understand the socio-economic conditions of the local population residing in these areas. These comprehensive surveys, comprising both field assessments and questionnaire surveys, provide valuable data for monitoring wildlife presence, assessing human impacts, and gaining an understanding of the perceptions and socio-economic dynamics of the local communities. The information gathered through these surveys is vital for effective conservation planning and the implementation of appropriate management strategies in the Palamau Tiger Reserve and its adjacent regions.

Monitoring of Dispersed Tiger from Chhattisgarh in Palamau Tiger Reserve: In March 2023, a solitary male tiger, approximately 3 to 4 years old, originating from the Anuppur forest division of Chhattisgarh, entered the Palamau Tiger Reserve. In order to monitor the tiger's movements within the reserve, a comprehensive approach was undertaken, including a vigorous sign survey and camera trapping. These methods were employed to gather data on the tiger's presence and behaviour. To obtain genetic information, scat samples were systematically collected and subsequently submitted to the Wildlife Institute of India for genetic analysis. This analysis aims to provide insights into the tiger's genetic profile, lineage, and population connectivity, which are essential for conservation efforts and understanding the genetic health of the tiger population.

In conjunction with genetic analysis, a track detailing the tiger's route was meticulously recorded using the Locus Navigation App, incorporating GPS coordinates. This allowed for accurate mapping of the tiger's movements throughout the Palamau Tiger Reserve. By tracking its path, the researchers can gain valuable information about the tiger's preferred habitats, potential corridors utilized, and behaviour patterns within the reserve. Furthermore, vegetation plots were taken at kill sites and resting places frequented by the tiger. These plots serve to characterize the local vegetation composition and provide insights into the tiger's hunting patterns and habitat preferences. The analysis of these vegetation plots aids in understanding the ecological requirements of the tiger and the potential impact of its presence on the surrounding ecosystem. Overall, the combination of rigorous sign surveys, camera trapping, genetic analysis of scat samples, GPS tracking via the Locus Navigation App, and the collection of vegetation plots at significant locations offers a comprehensive approach to studying the movements, behaviour, and ecological interactions of the solitary male tiger within the Palamau Tiger Reserve.

RESEARCH INITIATED

CONSERVING VITAL CONNECTIONS ACROSS EXPANDING LINEAR INFRASTRUCTURE IN A TRANSBOUNDARY TERAI ARC LANDSCAPE (TAL)

Funding Source
US Fish & Wildlife Service (Rhinoceros and Tiger Conservation Fund)

Investigator
Dr Bilal Habib

Researchers
Akanksha Saxena and Manisha

Date of Initiation
April 2022

Proposed Date of Completion
March 2026

Objectives: The objectives of the project are to (i) Identify movement corridors for tiger and rhino populations in the Indo-Nepal Terai Arc Landscape; (ii) Create transportation infrastructure data layers (Current and Future Road Network); (iii) Identify conflict sections of transportation infrastructure projects that limit tiger and rhino movements for mitigation prioritization; and (iv) Strengthen transboundary connectivity coordination, science implementation and capacity building

Progress: Literature review of current status of tiger and rhinoceros conservation in transboundary TAL. Collation of presence locations of tiger and rhinoceros for modelling connectivity in TAL under present and future linear infrastructure development scenarios. Preparation of habitat suitability and connectivity maps for tiger and rhinoceros in the landscape to ascertain priority areas of conflict with linear infrastructure development for future investigation.

Outputs and Outcomes: Interim report on status of tiger and rhinoceros conservation in the transboundary Terai Arc, with reference to past and present population status was prepared. A database of tiger and rhinoceros presence locations in the landscape sourced from primary and secondary sources.

RESEARCH INITIATED

EVALUATION OF EFFICACY OF VARIOUS POPULATION ESTIMATION METHODS FOR ELEPHANTS TO DEVELOP POPULATION MONITORING PROTOCOL

Funding Source
Project Elephant

Investigators
Dr Bilal Habib, Dr (Capt). Parag Nigam and Dr Muthamiz Selvan

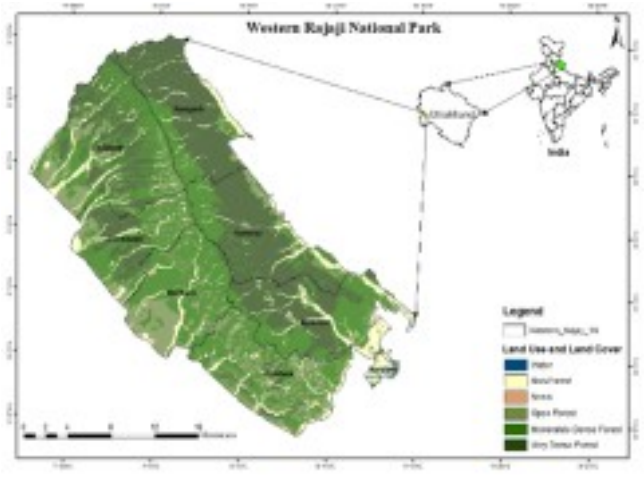
Researcher
Charanjot Kaur

Date of Initiation
April 2022

Proposed Date of Completion
April 2024

Objectives: The objectives of the project are to evaluate the efficacy of proposed population estimation methods for monitoring of elephant populations across the elephant landscapes of India.

Progress: The fieldwork was carried out in two sessions one during the Pre-monsoon (April-June, 2022) and second in the winter season (January-April, 2023), to evaluate the efficacy of the different methodologies for elephant population estimation. The following methods are used in the western part of the Rajaji National Park which constitutes Chillawali, Dholkhand, Beribara, Haridwar, Motichur, Kansrao and Ramgarh: (i) Road-based segments survey to detect the presence of elephants was performed. In addition to it, the collection



Map showing the western part of the Rajaji National Park

Table : Age and sex composition on the bases of 90 different visual encounters in Phase–I (April–June 2022)

S.No.	Total number of the individual	Age-sex category
1	199	Adult females
2	48	Adult males
3	69	Sub-adult females
4	29	Sub-adult males
5	59	Juvenile females
6	33	Juvenile males
7	80	Calves
8	39	Unidentified

of dung for DNA analysis and the collection of photographs for further identification was also done; (ii) Tagging and monitoring of the elephant dung to calculate dung decay or dung disappearance rate to calculate the abundance of elephants in Rajaji NP was used; (iii) Abundance and density estimation by line transect using a distance sampling framework was utilized; (iv) Spatial Capture–Recapture methods, including photograph-based captures; (v) NA-based captures will be used to assess elephant density; (vi) Traditionally used methods like block count for the estimation of elephant population will be deployed; and (vii) Demographic parameters such as density, abundance, group size and age-sex structure will be estimated. The age and sex composition of elephants will be formulated by dividing elephants into four different age and sex class categories i.e., Adult, Sub-adult, Juvenile males or females and calves.

Outputs and Outcomes: *Phase – I:* To assess the occupancy of elephants in the study area, a total of 363 road segments of 1km were laid. By the end of phase – I, the researchers recorded 556 elephant individuals of different age groups based on 90 direct encounters. The total number of faecal samples collected for DNA extraction was 1,084 while 87 dung piles were tagged for monitoring the dung decay rate during the 71 days of fieldwork.

Phase – II: After a quick reconnaissance survey, 31 line transects were placed randomly. Each transect was separated from the other with a distance of ~5-6 km which provide adequate coverage of the entire study area. Each transect was sampled temporally for 4-5 times during the morning (0630-0830 h) and evening time (1600-1830 h). A total of 1,059 faecal samples of elephants were collected from phase – II, for the DNA-based capture-recapture sampling. Further, 23 elephant dungs have been tagged to monitor the dung decay rate. Apart from that ~500 photographs have been taken to uniquely identify the elephants. Data analysis is currently in progress.

DOCUMENTATION OF ENDANGERED FLORA AND FAUNA OF MEGHALAYA

Funding Source
Meghalaya Biodiversity Board

Date of Initiation
April 2022

Investigators
Dr Abhijit Das and Dr Navendu Page

Proposed Date of Completion
March 2024

Researcher
Bitupan Borah

Objective: The objective of the project is to study floristic and hespeat faunal diversity with a focus on endemic threatened species of Meghalaya State.

Progress: During the reporting period, the permission to conduct the study was received from Meghalaya Forest department. First field trip for reconnaissance survey was undertaken between during 18 May 2022 to 4 June 2022 in Garo, Khasi and Jayantia Hills of Meghalaya state which includes five protected areas. The preliminary report of the study submitted to Meghalaya Biodiversity Board.

Outputs and Outcomes: The researchers recorded 63 species of herpetofauna which includes 34 species of Amphibians belonging to 23 genera and seven families, 29 species of reptiles belonging to 20 genera and seven families. During the study period, the researchers recorded five species of amphibians endemic to Meghalaya are Bufoides kempi, Garo Hills Tree Toad, *Xenophrys oropedion*, Little Meghalayan Horned Frog, *Leptobrachella nokrekensis*, Nokrek's Spadefoot Toad, *Philautus kempiae*, Kemp's Bush Frog, *Ichthyophis daribokensis*, Daribok's Striped Caecilian. The researchers also recorded two endemic species of gecko such as *Cyrtodactylus bapme,* Garo Hills Bent-toed Gecko and *Cyrtodactylus jaintiaensis*, Jaintia Hills Bent-toed Gecko. The team recorded three amphibian species *Philautus kempiae, Raorchestes shillongensis* and *Bufoides meghalayanuswhich* are categorised as Critically Endangered (CR) in IUCN Red List. During the floristic survey, the team recorded a total of about 350 species of flowering plants belonging to 110 families and 250 genera. The study also recorded six species of flowering plants endemic to the state such as *Polyalthia meghalayensis, Adinandra griffithii, Salacia khasiana, Impatiens khasiana, Leptodermis griffithii, Ilex khasiana*.

Topotype specimens of 16 amphibian species and nine reptilian species were collected and deposited in the Reptile and Amphibian Repository of Wildlife Institute of India. Genetic samples of amphibians and reptiles were collected for future phylogenetic and Biogeographic study.

Milestone: Discovery of new locations and populations of species endemic to Meghalaya.

RESEARCH INITIATED

ASSESSMENT AND MONITORING OF CLIMATE CHANGE EFFECTS ON WILDLIFE SPECIES AND ECOSYSTEMS FOR DEVELOPING ADAPTATION STRATEGIES IN THE INDIAN HIMALAYAN REGION PHASE-II (SOIL BIODIVERSITY COMPONENT)

Funding Source
Department of Science & Technology (DST)

Investigators
Dr S. Sathyakumar and
Dr Gautam Talukdar

Researcher
Deepali Bansal

Date of Initiation
May 2022

Proposed Date of Completion
March 2027

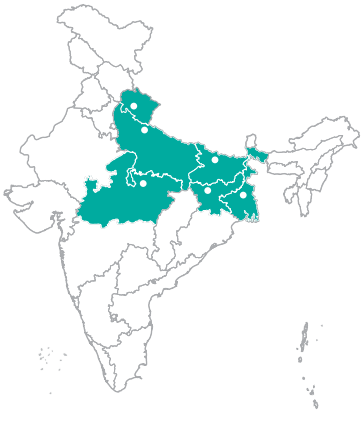
Objectives: The objectives of the project are to (i) assess the impacts of experimental warming on soil and ecosystem respiration in alpine meadow ecosystems in the Western Himalayas; (ii) investigate the effects of experimental warming on plant responses and ecosystem dynamics in alpine meadow ecosystems in the Western Himalayas; and (iii) understand the impacts of experimental warming on lichen communities in the Western Himalayas.

Progress: The researchers installed 21 hexagonal Open Top Chambers (OTCs) and their respective control plots in Gangotri National Park, Western Himalaya, to study ecosystem responses. The team conducted an extensive literature review on the impacts of experimental warming on soil and ecosystem respiration, plant responses, and lichen communities in alpine ecosystems. They selected Rhizocarpon geographicum as the focal species to investigate the impacts of experimental warming on

lichens in the Western Himalayas, considering its ecological significance and sensitivity to temperature changes.

Outputs and Outcomes: Enhanced understanding of the existing knowledge related to the impacts of experimental warming on soil and ecosystem respiration, plant responses, and lichen communities in alpine ecosystems. This literature review informed the study design, identified research gaps, and provided a foundation for the research objectives. Development of experimental procedures and methodologies for data collection and analysis.

Milestone: Establishment of long-term experimental plots for conducting simulated warming studies in alpine meadow ecosystems. This enables the investigation of the impacts of warming on soil and ecosystem respiration, plant responses, and lichen communities over an extended period.



RESEARCH INITIATED

'JALAJ'– CONNECTING RIVER AND PEOPLE TO REALIZE ARTH GANGA

Funding Source
National Mission for Clean Ganga, Ministry of Jal Shakti

Investigators
Dr Ruchi Badola and Dr S.A. Hussain

Researchers
Team of 21 research personnel

Date of Initiation
September 2022

Proposed Date of Completion
September 2024

Objectives: The objectives of the project are to (i) establish 75 Jalaj Centre for realizing Arthganga in Ganga River Basin by linking conservation and livelihoods; and (ii) create societal awareness towards aquatic biodiversity conservation in Ganga River Basin.

Progress: A total of 26 out of the 75 proposed Jalaj centers have been successfully inaugurated, out of which two are located in Uttarakhand, eleven in Uttar Pradesh, five in Bihar, one in Jharkhand, six in West Bengal and one in Madhya Pradesh. These Jalaj centers are a holistic models bridging the ecological and socio-economic value of freshwater ecosystem as traditional homestay, skill development centres, Sale Point, production unit, dolphin Jalaj boat safari rides, souvenir shops, health & wellness centre and awareness corners on conservation & protection of freshwater species in the Ganga river Basin.

More than 10 lakh people have been sensitized by Ganga Praharis at various Jalaj centers through Jalaj dolphin safari rides, display panels, 3D models of aquatic species installed at various Jalaj centers on the conservation and protection freshwater species including gangetic dolphin, freshwater turtles, crocodilians Ganga River.

Outputs and Outcomes: Capacity building of 709 Ganga Praharis including 424 women during various livelihood skill development programme in making variety of conservation awareness customized Jalaj products including edibles from native fruits, vegetables, etc, immunity boosting food like millet value added products, vegan stationery items, traditional clothing materials and accessories, and decorative items.

A total of 13 awareness meetings and workshops have been conducted with 258 participants including 192 women including stakeholders such as; boatmen (8), students (22), teachers (3) local communities (139), Ganga Praharis (62), Inline Agencies (22) representatives from local government bodies (1). The topics covered during these awareness workshops and meetings include; aquatic species conservation, solutions to prevent water pollution, eco-tourism through Jalaj Safaris, sensitization of the women groups for conservation of Gangetic Dolphins, Turtles, Gharials etc. and interesting quiz competitions. Community mobilization to encouraged the local women to participate in these training programs, locals and children was also undertaken. Further the particioants were briefed on millets, millet-based products and its consumption, as well as the various health benefits associated with it. Group discussions were held with Women Ganga Praharis of Jalaj Centers on ways of improvement of product quality, unique designs, effective marketing and value efficient procurement of

raw materials. These activities have been undertaken at various sites in Ganga River basin including; Prayagraj (Uttar Pradesh), Sahibganj (Jharkhand), Murshidabad (West Bengal), 24 Parganas South (West Bengal), Uttarkashi (Uttarakhand) and Begusarai (Bihar).

Alternate livelihood skill development training workshop for Ganga Praharis at Jalaj center under the NMCG-WII project was organized for 160 participants, including; 64 women Ganga Praharis at Jalaj center trained in health and wellness, was imparted. A training workshop in Jute handicraft making was organized at Murshidabad in order to train the locals (6) with regards to manufacturing of jute products. NMCG_WII team organized a three-day workshop for 104 participants at Jalaj Sundari Sunderbans, including Eco tourist guides and Ganga Praharis.

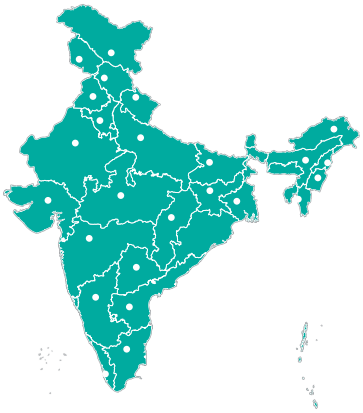
Consultative meetings were held with Ganga Praharis (23), members of local communities (19), district administration (1) and potters (19) (for making different terracotta products for sale to improve their livelihood at Taljhari village in Sahibganj, Jharkhand) on initiating activities under Jalaj concept. Commemorating the the International Year of Millets two additional consultative meetings were held at Matli village in Uttarkashi regarding making and promotion of millet based bakery products and their quality.

A total sale of INR/- 2,09,534, made by various Jalaj societies, Self-Help Groups and individual Ganga Praharis from sale of Jalaj products from Jalaj Corners installed during various exhibitions organized science, conservation and livelihood skill building agencies across the nation including; mega events like; Gaj Utsav celebration 60 years of Project Elephant at the World Heritage site the Kaziranga National Park; ICCON Celebrating 50 years of Project Tiger, at Mysuru, Karnataka; Climate Change Conclave, Lucknow, Uttar Pradesh etc.

Milestone: Recognition of Jalaj as a promising concept for realizing the goals of Arth Ganga and bridging volunteer groups like Ganga Prahari with sustainable conservation efforts of freshwater system and enhancing their socio-economic status by the Hon'ble Prime Minster of India, Shri Narendra Damodardas Modi in the 96th Episode of Mann-Ki-Baat aired on the 25th December 2022.

Inauguration of 26 Jalaj sites along Ganga River and its tributaries in the six states; Uttarakhand, Uttar Pradesh, Bihar Jharkhand, West Bengal and Madhya Pradesh by the Hon'ble Minister of Jal Shakti, Shri Gajendra Singh Shekhawat.

Establishment of Jalaj Corner displaying 3D Models and Panels on freshwater species of Ganga River and its tributaries and direct marketing of Jalaj center products at Dilli Haat, INA, New Delhi.



RESEARCH INITIATED

INTEGRATED DEVELOPMENT OF WILDLIFE HABITATS (IDWH)–SELECT HABITAT MONITORING OF CRITICAL (IDWH) SPECIES

Funding Source
Ministry of Environment, Forest and Climate Change, Govt. of India

Date of Initiation
December 2022

Proposed Date of Completion
December 2023

Investigator
Dr Gautam Talukdar

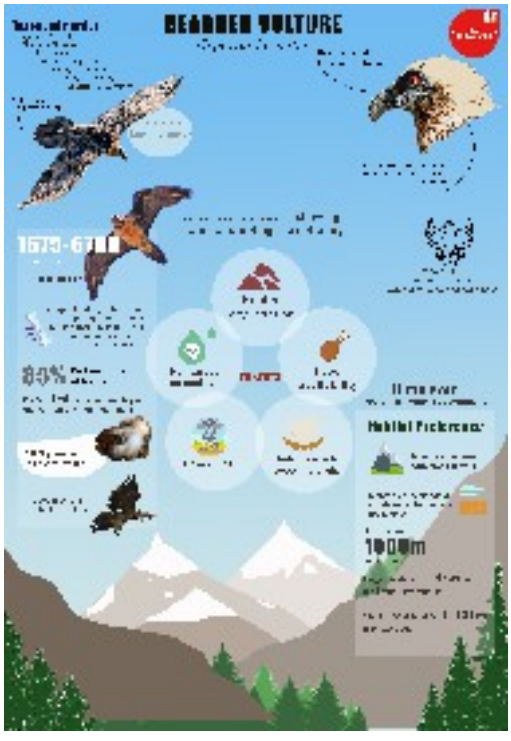
Researchers
Debanjan Sarkar, Sneha Pandey and Himani Singh Khati

Objectives: Following are the objectives of the IDWH-select habitat: (i) Assessing the habitat information of species covered under the IDWH project; (ii) Habitat suitability modeling of IDWH species; and (iii) Field survey and ground truthing of select IDWH species.

Progress: P*reparation of the following documents/outputs/maps:*

Detailed factsheets for 30 IDWH species were prepared. Literature review for 30 IDWH species and the detailed habitat requirements write-up for 30 species were completed during the reporting period. The habitat suitability modeling for the 9 mammal species using the MaXent modelling was also done. The posters of the IDWH species were designed, edited and prepared.

Outputs and Outcomes: Detailed factsheets for the 30 species, detailed habitat requirement write-up for the

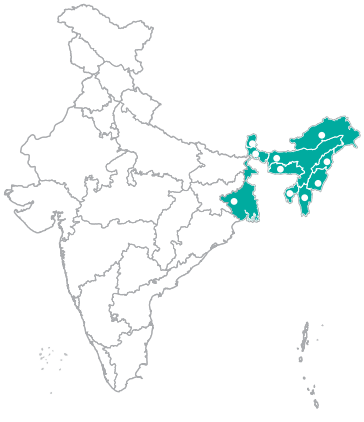


Draft poster for bearded vulture

species, and the literature review sheet prepared for the species, and habitat suitability modeling output for the species.

The first draft maps for habitat suitability of IDWH species were prepared. Based on the outputs the researchers will be able to synthesize the information in poster and booklet form. The team has prepared posters for 19 species and the template of the booklet is under progress. The researchers has collected nesting site locations and points for marine turtle species.

Milestone: The outputs and outcomes of this component under the IDWH will act like a pillar to all other components. The team has prepared factsheets and a detailed literature review on species ecology. It includes information on – species account, breeding pattern, habitat requirements and species distribution model. In addition to this, a separate database has been prepared with the information pertaining to literature available for each species. The team has initiated work on a handbook containing information on the IDWH species.



PAN INDIA ASSESSMENT AND MONITORING OF ENDANGERED SPECIES COVERED UNDER THE INTEGRATED DEVELOPMENT OF WILDLIFE HABITATS SCHEME OF MOEFCC – CLOUDED LEOPARD

Funding Source
Ministry of Environment, Forest and Climate Change

Investigators
Dr Bilal Habib,

Researchers
Azam Khan, Burney Rosetta, Dr Srishti Gwal, Daniel Miranda, Kunal Gokhale, Rameshwar Ghade and Tribhuwan Singh

Date of Initiation
December 2022

Proposed Date of Completion
May 2023

RESEARCH INITIATED

Objectives: The objectives of the project are to (i) assess the potential habitats of clouded leopard in the north-eastern states of India; and (ii) acquire comprehensive insights about the dietary preferences of the species utilizing the existing literature.

Progress: The Clouded leopard is a medium sized felid known for its distinctive fur patterns of large dark gray or brown blotches that are irregularly shaped resembling clouds. It is considered to be one of the most agile and arboreal of all the wild felid species. The species has been reported across the North-Eastern (NE) states of India *viz*. Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Tripura, Sikkim as well as in the northern portion of West Bengal. Due to unprecedented forest loss, ongoing developmental activities, illegal trade and poaching practices, the clouded leopard's habitat are constantly under pressure. Consequently, Wildlife (Protection) Act 1972 has listed the species under the Schedule–I category, the National Board for Wildlife (2018) has identified it under Critically

Endangered Species Recovery Program, whereas Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) has listed it as an Appendix I species (CITES, 2023). In addition, paucity of studies related to movement and habitat ecology, studies pertaining to dietary analysis of the clouded leopard is heavily lacking from India.

In this view, the project aims to identify suitable habitat areas of clouded leopards, and develop an understanding on the dietary preferences of the species utilizing the existing literature. To achieve the objectives, a comprehensive literature survey was performed from available direct and indirect sources. This was primarily done to accumulate the presence locations of the species. Total 170 presence locations were collected for nine NE states of India (Figure 1). These presence locations were used for species distribution modelling (SDM) in Maximum Entropy (MaXent) model. Total 57 predictor variables grouped under four categories viz. topographic, vegetation, climatic, and anthropogenic variables were utilized to develop SDM for clouded leopard. After performing multi-colinearity (>0.7), only 24 variables were retained. In order to prevent the clustering of presence locations, the study area was divided into different grid sizes, including 1 x 1 km, 2 x 2 km, 3 x 3 km, and 5 x 5 km. For each grid size, a single random point location was selected. This resulted in the utilization of 138, 130, 124, and 108 presence locations for the respective grid sizes. The spatial distances used to quantify the region of bias were kept 2km, 5km and 10km. The analysis was conducted at each gird size using all the bias files and the model performance were evaluated for each instance with mean AUC and True Skill Statistic (TSS). 10-percentile training presence logistic threshold was applied to calculate TSS. Based on the best model statistics, three different models with combinations of regularization multipliers (Default, 1.5, and 2). It was also used to generate the species distribution maps. The final layer was classified into intervals (0–0.25, 0.25–0.50, >0.50) of three suitability areas-low, medium, and high.

Using FRAGSTAT, the percentage of the landscape occupied by each habitat quality class (PLAND), the total number of habitat patches, correlation length (extent) within habitat patches (GYRATE_AM), and largest patch index (LPI) of these classes were assessed. Further, to identify state level core patches of clouded leopard, the high suitability class (>0.5) were reclassified into low to high, and high to high quality habitats based on percentiles (>50th and >70th, respectively). The ranking of the most significant habitat patches within each state was determined based on their respective areas.

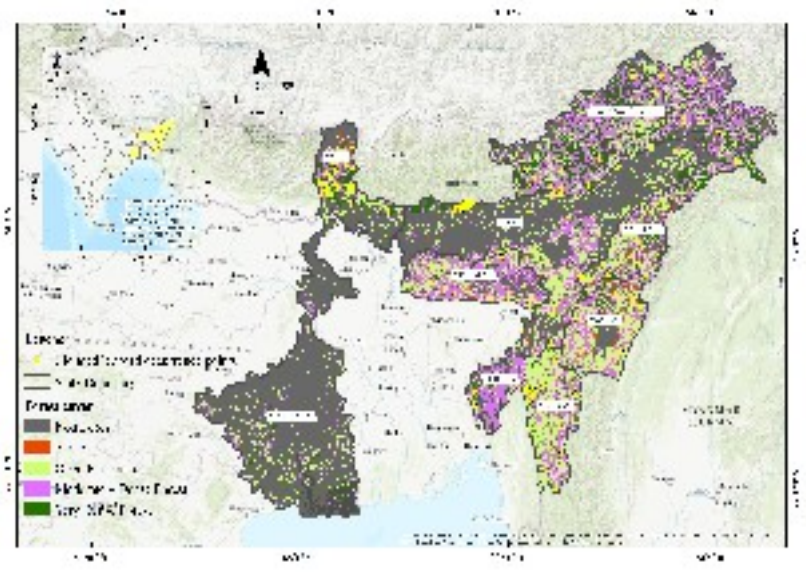


Figure 1: *Occurrence points of clouded leopard from North-East states of India*

Outputs and Outcomes: The review identified 130 articles worldwide, encompassing a diverse range of aspects concerning clouded leopard. This included data assortment from mammalian surveys, diet, activity pattern studies, questionnaire surveys, habitat-use, density and population estimations. Furthermore, these 130 articles were filtered resulting in 47 research publications, 7 news articles, and 5 web portals having information about clouded leopard presence in India. The review on the dietary preferences of the clouded leopard resulted in 30 publications originating from various range countries.

The best statistics were obtained at 3x3 grid size at 2km bias which was used to create the final habitat suitability map for clouded leopard. The TSS and AUC values were 0.833 and 0.926, respectively. Major variables impacting the distribution were distance from protected area, percent forest cover, forest loss, and human population density and normalized difference vegetation index.

The total area under high suitability class across the NE region was found to be ~7% (19,206 sq km). % area under high suitability was highest for Sikkim followed by West Bengal and Mizoram, whereas lowest was observed for Manipur. Manas, Namdapha, and Khangchendzonga NP were top three PAsshowing high habitat suitability for clouded leopard. However, there was no detection observed in Shingba (Rhododendron) WLS, Kyong WLS, Puliebadze WLS, Keibul-Lamjao NP, Orang NP, and Pobitora Wildlife Sanctuary.

The top most important patches within each state were ranked based on patch area under high habitat class. Total 30 patches were identified in nine states having area >50sq km and are above 70th percentile of the high suitability class. These high-quality patches are shown in Figure 3. The largest patch identified was from West Bengal and Sikkim which nearly formed a contiguous habitat network between both the states. In

Table 1: State wise area under high suitability class (>0.5)

	State	Total No. of Grids	Total Grid Area (sq km)	No. of Grids under High Suitability (>0.5)	Area under High Suitability (sq km)	% state area under high Suitability
1	Arunachal Pradesh	9120	82080	556	5004	6.09
2	Assam	8711	78399	516	4644	5.92
3	Manipur	2485	22365	13	117	0.52
4	Meghalaya	2485	22365	132	1188	5.31
5	Mizoram	2342	21078	236	2124	10.07
6	Nagaland	1841	16569	76	684	4.13
7	Sikkim	808	7272	295	2655	36.51
8	Tripura	1157	10413	25	225	2.16
9	West Bengal	1413	12717	285	2565	20.17

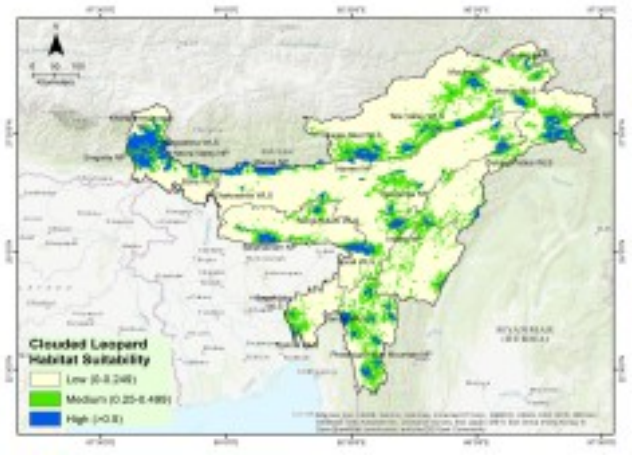


Figure 2: *Clouded leopard habitat suitability map of North-East India*

contrast, habitat patches in these categories were absent in Manipur and Tripura. These categories facilitated the comparison of best suitable patches w.r.t. total high suitability habitat and their configuration across the landscape in nine different states where presence of clouded leopard has been previously reported. The approach also facilitated an idea about the contribution of best suitable patches from different PAsof the states.

Studies pertaining to dietary analysis of the clouded leopard have been conducted in many countries across the globe, however, data from India is heavily scarce. Information on this species predominantly comes as by-product of the data from tiger-focused camera trap studies or other opportunistic data.

Out of the 62 prey species, 14 of the prey species i.e., 22.58 % were over 20 kg in average body mass which is higher than that of the average body mass of the clouded leopard (approx 17kg). This suggests that the clouded leopard does in fact hunt larger prey to meet energy requirements. However, it is important to note that in most of the cases, clouded leopard did not hunt adults of the very large prey i.e. >80 kg. Juveniles or infants of larger species were mainly targeted since the adult weight of the prey species is over 5 times that of the clouded leopard.

Ungulates comprise a majority of the diet while only a few prey species seem to be arboreal in nature. This suggests that the clouded leopard is quite terrestrial rather than arboreal since it needs to come to the ground in order to hunt majority of its prey.

Milestones: Comprehensive literature review on clouded leopard has been completed, from both local and global perspectives. Suitable habitat area of clouded leopard in the NE states of India has been modelled using SDM. State-wise potential habitat areas of clouded leopard have been identified. The draft report is prepared.

CONSULTANCY PROJECTS UNDER EIA

MITIGATION MEASURES FOR THE ELECTRIFICATION OF THE MAILANI–BANKEYGANJ SEGMENT OF THE RAILWAY LINE PASSING THROUGH DUDHWA TIGER RESERVE, UTTAR PRADESH

Funding Source
IUCN-IndiaRail Vikas Nigam Limited (RVNL)

Investigator
Dr Bilal Habib

Researchers
Akanksha Saxena, Adil Khan, Ankit Zorde, Sai Ganesh, Shaheer Khan and Zehidul Hussain

Date of Initiation
February 2022

Date of Completion
April 2022

Objectives: The objectives of the project are to (i) understand the use of habitat around railway lines by elephants and other wild animals, (ii) identify critical crossing-over zones for elephants and other wild animals, and (iii) suggest a mitigation plan concerning the electrification of the existing track.

Progress: Through an intensive field survey during February 2022, indirect signs for wild animals were searched on both sides of the railway track to assess potentially important wildlife crossing points. Natural features such as natural drainage and terrain were also recorded during the survey. Subsequently, maps with hotspots of animal signs were created using GIS tools.

Outputs and Outcomes: A report containing potential wildlife crossing zones on the railway line was prepared. To prevent the railway line from becoming a barrier to animal movement in the future, terrain flattening in the segments identified via analysis of drone imagery was recommended so as to ensure quick, hindrance-free movement of wild animals across the railway track.

Milestone: A drone survey was conducted to delineate railway line segments where animal movement could be made easier. High-resolution drone images were obtained and classified to create a DEM of 3 cm/pixel resolution. The resultant DEM was used to delineate potential crossing zones by conducting track slope difference analysis.

CONSULTANCY PROJECTS UNDER EIA

BIODIVERSITY IMPACT ASSESSMENT, WILDLIFE STUDY AND PREPARATION OF WILDLIFE PASSAGE PLAN FOR IMPROVEMENT AND UPGRADATION TO A 4-LANE CONFIGURATION OF MEERUT–NAZIBABAD SECTION OF NH 119, UTTAR PRADESH

Funding Source
National Highways Authority of India

Investigator
Dr Bilal Habib

Researchers
Akanksha Saxena, Adil Khan, Indushree Maharana

Date of Initiation
January 2022

Proposed Date of Completion
July 2022

Objectives: The objectives of the project are to (i) avoid, minimize and remedy the adverse impacts of the proposed upgradation to the 4-lane configuration of the Meerut-Nazibabad section of NH-119, Uttar Pradesh on biodiversity values of the protected area, reserve forests and maintain connectivity in the larger landscape through appropriate planning and mitigation measures. The objectives of the assessments are as follows: (a) to identify critical wildlife areas across the stretch of highway segment to be upgraded; (b) suggest mitigation measures considering animal movement and presence locations in the study area.

Progress: Two intensive site-surveys were carried out to look for direct sightings of live animals, the the presence of carcasses, and other signs such as pug/ hoof marks and scat/ pellet/ dung as evidence of animal presence. Regular animal crossing locations and important bird sites (including Haiderpur Wetland), were also recorded based on information from beat guards. All the spatial data was recorded, including GPS locations of the signs, sightings and crossing locations. The researchers also conducted GIS-based spatial characterization of the area around the proposed alignment to be upgraded to identify land use land cover types important in the context of wildlife and bird presence/movement.

Outputs and Outcomes: A consolidated map of land-use land cover classes was created with appropriate buffers along the stretch of the proposed alignment of National Highway 119.

Milestone: A detailed report titled "Mitigation measures for the improvement and up-gradation of Meerut-Nazibabad section of NH-119 passing through Hastinapur Wildlife Sanctuary, Uttar Pradesh" containing the proposed mitigation measures has been submitted to the user agency.

CONSULTANCY PROJECTS UNDER EIA

PROPOSAL FOR PREPARATION OF WILDLIFE MANAGEMENT PLAN AND IDENTIFICATION OF LOCATIONS FOR ANIMAL UNDERPASSES OF THE 3RD RAILWAY LINE FROM DAREKASA TO SALEKASA STATIONS, GONDIA DISTRICT, MAHARASHTRA

Funding Source
South-East Central Railway (Construction)

Researchers
Akanksha Saxena, Adil Khan, Indushree Maharana

Investigator
Dr Bilal Habib

Date of Initiation
October 2021

Date of Completion
October 2022

Objectives: The objectives of the project are to (i) prepare a scientific Wildlife Management Plan for ten years for the project; and (ii) assess the existing and proposed railway tracks to suggest locations for animal underpasses.

Progress: Two surveys were conducted in December 2021 and April 2022 to suggest structures for facilitating wildlife movement. An intensive field survey for preparing a wildlife management plan for the project was conducted in April-May 2022. The researchers surveyed a stretch of 6 km along the railway line and an additional 4 km stretch beyond the Darekasa railway station under the Tiger Corridor region. A detailed survey was conducted for plants, mammals and birds to estimate the region's biodiversity.

An area of approximately 45 sq km was systematically sampled. Over 50 tree species, close to 60 bird species, 17 mammals and three reptilian species were identified in the region using transact survey, point count and sign survey and opportunistic sightings, respectively. In addition to these, interviews were conducted with the concerned forest officials of the Forest Department of Maharashtra- Gondia division, Forest Development Corporation of Maharashtra (FDCM) and with the Joint Forest Management Committee, Nawatola, Gondia (Maharashtra), for the preparation of Wildlife Management Plan. Secondary data was collected from the respective departments regarding the human-animal conflict scenario in the region.

Outputs and Outcomes: A report containing details of mitigation structures proposed on the 3rd railway track

was prepared. A total of nineteen structures of different categories have been proposed on the basis of elevation profile, structures on the existing railway lines, the presence of streams and the target animals in mind.

Milestone: A detailed wildlife management plan has been prepared for the expansion project detailing potential wildlife concerns near the project area and activities and measures that can be undertaken to mitigate these impacts.

CONSULTANCY PROJECTS UNDER EIA

MITIGATION MEASURES FOR TRANSPORTATION NETWORK AND MINING ACTIVITIES FOR DINESH OPEN CAST PROJECT, UMRED, MAHARASHTRA

Funding Source
Western Coal Field Limited

Date of Initiation
September 2022

Investigators
Dr Bilal Habib and Dr Parag Nigam

Date of Completion
March 2023

Researchers
Dr Shivam Shrotriya, Zehidul Hussain and Ritesh Vishwakarma

Objectives: The objectives of the project are to (i) assess the presence of wildlife in and around the Dinesh OC mine; (ii) evaluate impacts of existing operational conveyor belt systems for coal transportation in other mines in the landscape to determine possible impacts of the proposed conveyor belt system in Dinesh OC; and (iii) suggest mitigation measures to alleviate impacts because of mining and transportation activities in the Dinesh OC mine.

Progress: The Vidarbha landscape of Maharashtra boasts some of the richest coal and mineral deposits and is economically important to subsidise the progressively large energy demands of the country. The Dinesh (Makardhokra-III) open cast (OC) mine is situated in the Umred Tehsil of Nagpur district in the Vidarbha landscape. This OC mine, operated by Western Coalfields Limited (WCL), is currently being operated at a rated capacity of 4 metric tonnes per year (MTY). WCL board and the Ministry of Coal, Government of India approved the increase in the production capacity of the Dinesh OC mine from 4 MTPA to 8 MTPA in August 2019. When the coal production is increased, there is high pressure of coal dispatch and its evacuation system. The existing Road cum Rail (RcR) mode of dispatch has a capacity of 5 to 6 rakes of coal to cater to the coal dispatch services for other mines of Umred Area (Umrer OC, Gokul OC, Makardhokda-I OC).

With this view, it was proposed to establish a rapid and faster coal loading system and its dispatch through the Mary Go Round (MGR) system of rail dispatch. This system involves the modification of the railway siding and construction of big coal bunkers called SILO located at the western side of the project at about 6-7 km. The total coal transportation will be handled by a conveyor belt system and rapid loading system into railway wagons at a rate of 4000 tonnes, loading only in an hour. The conveyor belt of linear length (5.394 km) transverses through forest land in the tiger corridor between Tadoba-Andhari Tiger Reserve, Bor Tiger Reserve and Umred-Karhandla Wildlife Sanctuary. Therefore, this study was conducted to understand the potential impacts on wildlife and suggest appropriate mitigation measures.

The intensive sign surveys (direct/indirect) for the presence of wild animals were carried out in the month of October 2022. The study area was divided into 100 m x 100 m grids covering the forest patches (Patch I and II) within the Dinesh mine. The researchers carried out trail surveys to record mammalian signs (e.g., scats, pellets, pug mark/hoof mark/footprint, scratch mark) along the trail in each of the grids. A total of 10.68 km was walked in the forest patches (2.08 km in SILO, 3.19 km in Patch I and 5.40 km in Patch II) to assess the presence of wildlife. The team also carried out replicates (n= 2) of each of the trails. The team also noted the tree cover, shrub cover, ground cover estimates and other factors influencing animal presence. The researchers also collected secondary data information recorded from camera trapping exercises in the nearby protected area of Umred-Karhandla Wildlife Sanctuary and the adjacent landscape.

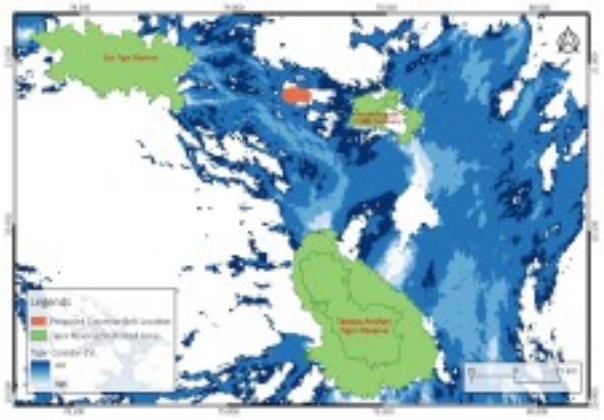


Figure 1. *Location of Dinesh open cast mine with respect to protected areas, i.e., Tadoba- Andhari Tiger Reserve, Bor Tiger Reserve and Umred-Karhandla Wildlife Sanctuary and tiger corridor connecting between the areas.*

The circular plots were laid in the forest areas along the conveyor belt of the transportation network for mining activities to understand habitat characteristics. The researchers laid circular plots of a 10 m radius to record the tree species, whereas vegetation structure of shrubs, herbs and grasses were recorded within a 5 m circular plot. The circular plots were laid at every 200 m distance on either side of the proposed conveyor belt in the forest patch of the Dinesh open-cast mining area. The researchers laid a total of 27 plots in the forest patches, of which six were laid in SILO, eight in Patch I and 13 in Patch II.

Anthropogenic and artificial noise persistently influences the behaviour of animals as it hinders, mimics, overlays, and alters natural sounds, affecting predator detection and perceived risk. The researchers recorded the sound levels of the existing conveyor belt in the Umred mining area to understand the sound disturbance from the conveyor belt.

Outputs and Outcomes: The trail length in each forest patch was walked twice with an average distance of 1.7 km. The presence of cattle, goats, and wild boar from indirect signs was recorded in Patch I. In Patch II, the researchers found a pugmark of jackal, the presence of nilgai, goat kill and a direct sighting of chinkara. The direct or indirect signs of animals present around the SILO area were observed. Moreover, the area in and around the SILO is mostly dominated by agricultural land.

Specific recommendations to enhance the permeability of the proposed structure for wildlife movement are pointed out below:

(1) At patch 1, the transportation belt is planned to be raised between the pillar 2+400 (20°53'57.25"N, 79°13'5.23"E) and 2+600 (20°53'58.41"N, 79°12'58.44"E) to let the existing road underpass. The road crossing can be developed as a multifunctional underpass to additionally support wildlife crossing during low vehicle movement. The passage under the raised conveyor should remain open and undisturbed to promote wildlife usage. The vehicle traffic should not be allowed to spill over beyond the ROW of the road. In addition, the habitat should resemble its natural counterpart. The artificial items, such as pillars, should be painted in camouflage colours like green and brown.

(2) In Patch 2, the conveyor belt covers about 900 meters long stretch in the forest patch. There are water streams on either end of the patch, which are natural passages for many wildlife species. Therefore, wildlife underpasses should be provided at both these sites (pillar- 3+600) and (pillar- 4+600 – 4+700). An underpass of 5 m height and 7 m width minimum should be planned around pillar 3+600 between (20°54'4.17"N, 79°12'23.79"E) and (20°54'4.22"N, 79°12'23.33"E).

(3). The waterbody around the pillar 4+600 - 4+700 between the start location (20°54'8.61"N, 79°11'49.84"E) and end location (20°54'7.61"N, 79°11'49.36"E) is a perennial water source. The conveyor belt and the service road along the stream should be raised to provide a 5-m high and 5-m wide passage away from stream banks on either side.

(4) Grassland species, such as wolf and Chinkara along with other group-living ungulate species, prefer openness and visibility. Close and narrow structures do not suit provisions for their movement. Additionally, the 900-meter-long Patch 2 has only two small structures available at the start and end of the patch. Therefore, a structure wide enough to ensure the open view and connectivity of the grassland habitat is required. Overpasses are the most preferred structures for ungulate species (WII, 2019; 2016). However, a suitable underpass can also be provided based on the assessment of structural feasibility for either overpass or underpass.

Two optional structures were recommended near pillar 4+200 between 20°54'7.60"N, 79°12'3.56"E and 20°54'8.12"N, 79°12'0.79"E. An overpass of 60-meter width at its narrowest point is optimal for wildlife crossings. For an overpass, the rise of the ramp for wildlife is recommended to be not more than 16.5°, and the structure should have a 3-meter-high fence on the edges to avoid accidental falls. The site has a natural ground elevation that can support such an elevated overpass. Further habitat landscaping, management and monitoring are required to ensure the wildlife-specific use of the crossing structure.

If the underpass is the choice, then the conveyor belt should be raised to provide a clear crossing path of 60 meters in width and 5 meters in height.

Any selected structure – overpass or underpass – would also require a funnelled opening, helping as a guide to the animals for the crossing approach.

(5) The median should be left open at all the underpasses to let the daylight in so that the wildlife crossing the structure during the day can clearly see inside the crossing structures. Available space between two conveyor belts can be used to provide an open vent.

(6) Noise pollution from the conveyor belt could lead to reduced wildlife movement near the structure. Therefore, a sufficient sound absorbing mechanism is required to keep the propagating sound level below 30 dB at the conveyor belt.

(7) The entire landscape around the structure and mine needs to be managed and restored as a habitat for local wildlife. Habitat restoration is a long-term commitment because native plant communities grow at a slower pace compared to ornamental and social forestry plantations. A minimum of 7 years' timeframe should be allotted to develop a research-backed habitat restoration plan and post-development monitoring for its successful use by wildlife. A separate report shall be submitted for recommendations on habitat restoration and management planning.

Figure 2. *Landscape at the proposed transportation conveyor belt system at Dinesh Open Cast mine, Umred, Maharashtra*

Milestones: The field survey and literature review for the wildlife use of the affected area was completed. Specific recommendations to mitigate the impacts of the conveyor belt on wildlife were prepared and communicated. Creating a total of 4 wildlife crossing structures along the conveyor belt within the wildlife habitat was suggested. Additional measures to reduce the impact of noise and air pollution were also recommended. Final report prepared and submitted.

CONSULTANCY PROJECTS UNDER EIA

DESIGNING CANOPY BRIDGE OVER RAILWAY LINE INSIDE HOLLONGAPAR GIBBON SANCTUARY, ASSAM

Funding Source
Department of Environment & Forests, Govt of Assam

Date of Initiation
October 2022

Proposed Date of Completion
May 2023

Investigator
Dr G.V. Gopi

Researchers
Rohit R.S. Jha and Stanzin Zangmo

Objectives: The objectives of the project are to (i) provide design inputs for canopy bridge over railway line to enable gibbon crossing; and (ii) provide suitable locations for installing artificial canopy bridges.

Progress: The DFO, Jorhat (Territorial) Division had requested the Wildlife Institute of India (WII) in August 2022 to provide design inputs for installing canopy bridges to help enable the Western Hoolock gibbon Hoolock hoolock cross over an existing railway line passing through the Hollongapar Gibbon Sanctuary in Assam. In October 2022, WII wrote back to the DFO stating that well-designed and regularly spaced artificial canopy bridges will be a useful conservation intervention in the short-term, while over the longer term, the canopy gap should be reforested with fast-growing native trees preferred by gibbons. In the same letter, it was also suggested that an all stakeholders' consultative meeting (including representation from the Indian Railways and gibbon experts/local conservationists) might be held for inputs along with a joint site-evaluation visit while finalising artificial canopy bridges' design. Consequently, the WII researchers visited the field during November-December 2022, attended and interacted with all

Basic illustrative design of an artificial canopy bridge (Credit: Vabesh Tripura)

A male Western Hoolock gibbon Hoolock hoolock at the Hollongapar Gibbon Sanctuary (credit: Rohit RS Jha)

stakeholders, and collected relevant field data to fulfil project objectives. The final report is being compiled and will be submitted to the Assam Forest Department in May 2023.

Outputs and Outcomes: Multi-stakeholder meeting suggested by WII was organised by the Assam Forest Department in November 2022 where knowledge was exchanged and insights gained, which will help provide design inputs for artificial canopy bridges acceptable to all. Brief but thorough field survey conducted during November-December 2022 to finalise specific sites within the Sanctuary along the railway track that will be chosen to install canopy bridges.

Milestones: All stakeholders' meeting and joint site-evaluation visit attended by WII researchers on 29 November 2022 at Meleng/Hollongapar Gibbon Sanctuary to interact with and gain insight from different perspectives to finalise canopy bridges design. WII team suggested artificial canopy bridges' illustrative design/ graphic finalized on 2 January 2023.

CONSULTANCY PROJECTS UNDER EIA

SCIENTIFIC ANIMAL PASSAGE AND MITIGATION PLAN FOR 62 KM STRETCH OF MYAJLAR-JAISALMER ROAD (NH-11) PASSING THROUGH DESERT NATIONAL PARK, RAJASTHAN

Funding Source
National Highway Authority of India (NHAI)

Investigators
Dr Sutirtha Dutta and Dr Malvika Onial

Researchers
Ashish Kumar Jangid and Devendradutta Pandey

Date of Initiation
August 2022

Proposed Date of Completion
June 2023

Objectives: The objectives of the project are to (i) develop an animal passage plan / mitigation plan for the proposed Myajlar-Jaisalmer NH-11 highway upgradation and extension through Desert National Park; and (ii) evaluate the impact of proposed upgradation on existing wildlife in the landscape.

Progress: Draft report has submitted to the funding agency after a rigorous field of four months (September-December 2022) and intensive analytical inputs to identify the potential animal passages.

Outputs and Outcomes: The report suggested nine longer underpasses (250 m long), two shorter underpasses (150 m long), 19 box culverts, 107 pipe culverts, 86 km fencing on the road and 5.1 km railing around underpasses.

Milestone: The draft report has been submitted to the funding agency (NHAI).

CONSULTANCY PROJECTS UNDER EIA

PREPARATION OF WILDLIFE MANAGEMENT PLAN WITH SPECIAL EMPHASIS ON ELEPHANTS FOR THE PROPOSED NAINI OPENCAST COAL MINING PROJECT IN ANGUL FOREST DIVISION, ODISHA

Funding Source
Singareni Collieries Company Limited (SCCL)

Researchers
Dr D. Frank Sadrack Jabaraj and S. Karthy

Investigator
Dr G.V. Gopi

Date of Initiation
January 2023

Proposed Date of Completion
October 2023

Objectives: The objective of the project is to prepare the elephant management plan for the Naini Coal Block Area, Chennidipada, Angul.

Progress: The field work was started in the month of February 2023 in Angul, district of Odisha. Vegetation sampling questionnaire survey along with field survey was conducted in two divisions (Angul and Deogarh) and four ranges (Chenndipada, Jarapada, Reamal and Kaniha) from March to June. Secondary data pertaining to Elephant were collected from all the four ranges.

Outputs and Outcomes: The primary data collected related to the forest vegetation will provide important information regarding the plant species diversity, abundance, density, frequency, important value index. The survey also focuses on the food plants of elephants in the upcoming coal mine area. The opportunistically collected mammal signs data will be useful to understand the other important mammals in the area thereby focusing on the management. The secondary data collected from the forest department on elephant movement and human-wildlife conflict will be used for assessing the habitat use of elephants over time. By using all the above outputs, the mitigation measures will be suggested including habitat improvement for the elephants.

CONSULTANCY PROJECTS UNDER EIA

INTEGRATED WILDLIFE ACTION PLAN COMPRISING OF MITIGATION AND COMPENSATING MEASURES WITH LANDSCAPE APPROACH FOR THE ENTIRE FOREST AREA IN HAZARIBAGH WILDLIFE FOREST DIVISION, HAZARIBAGH WEST FOREST DIVISION AND KODERMA FOREST DIVISION IN THE IMPACT ZONE OF KODERMA DETOUR OF DFCCIL PROJECT

Funding Source
DFCCIL (Dedicated Freight Corridor Corporation of India Limited)
Investigators
Dr G.V. Gopi, Dr J.A. Johnson, Dr Abhijit Das, Dr Navendu Page and Dr Lallianpuii Kawlni
Researchers
Dipak Anand, Rohit R.S. Jha, Priyanka Das, Ajit Sahu, Abhin N., Aruna K. Rath, Avinash Yadav, Swastik Pritam, Suvam Kanungo, Chirag Vassa and Abhishek Kumar
Date of Initiation
October 2021
Proposed Date of Completion
October 2023

Objectives: The objectives of the project are to (i) understand the effects of the proposed dedicated rail alignment on the nearby flora and fauna in the study area and to suggest suitable mitigation measures for dealing with the problems; (ii) evaluate the floral and faunal composition in the study area and their habitat use; and (iii) formulation of an Integrated Wildlife Action Plan for the Immediate Impact Zone, taking into account all the relevant factors in the study area.

Progress: Data collection exercise from the study area has been completed. Various capacity building programmes also organized for the frontline forest staff in the study area.

Outputs and Outcomes: Indicative Plan based on rapid study of the proposed Koderma detour alignment in Koderma and Hazaribagh West Forest Divisions and Hazaribagh Wildlife Division, has been prepared and submitted. The submitted Indicative Plan has been approved by the Chief Wildlife Warden, Government of Jharkhand. All the proposed mitigation structures and their respective locations on the proposed railway alignment has been received from the user agency. Based on the ecological information gathered during the field survey, WII will further suggest their respective mitigation structures. All the basic ecological parameters in terms of floral and faunal diversity and abundance have been calculated. Forest patch, prioritized for soil water conservation and other area for habitat improvement has been identified. Route for seasonal movement of elephants has also been demarcated.

Milestone: Camera trapping was used for the first time in this landscape to estimate the population of wild animals, and it was successful in capturing the Rusty-spotted Cat and the Indian Grey wolf from the study area for the first time. An intensive sign survey in the study area also recorded some amphibian species for the first time.

CONSULTANCY PROJECTS UNDER EIA

CUMULATIVE ENVIRONMENT IMPACT ASSESSMENT ON WILDLIFE HABITAT AND ECOLOGICAL VALUES DUE TO PROPOSED DOUBLING OF RAILWAY TRACK FROM TINAIGHAT TO KULEM IN THE NORTHERN WESTERN GHATS

Funding Source
Rail Vikas Nigam Limited (RVNL)
Investigators
Dr Bilal Habib, Dr Parag Nigam, Dr Gopi G.V., Dr Abhijit Das and Dr Navendu Page
Consultant: Dr S.P. Goyal
Researchers
Dr Indranil Mondal, Dr Jins, VJ., Dr Nikhil Modak, Dr Mayur Nandikar, Dr Sudip Banerjee, Dr Sharfaa Hussain, Dr Pooja Thathola, Vijay Babu Nandwanshi, Niket Nilesh Alashi and Sonia, KB.
Date of Initiation
October 2022
Proposed Date of Completion
October 2023

Objectives: The objectives of the project are to (i) Assess fine-scale composition and configuration of habitat characteristics, viz. vegetation configuration, terrain characteristics, seasonal and perennial water bodies; (ii) Examine the spatial profile and extent of railway noise and vibration due to existing track and predict changes in these parameters due to doubling of track and construction processes in relation to terrain complexity and vegetation characteristics; (iii) Determine distribution and abundance status of key terrestrial and arboreal mammal species and herpeto fauna with particular emphasis on Western Ghat Endemics and IUCN red-listed species in relation to habitat characteristics; (iv) Assess species composition and conservation values of trees identified for felling and determine the impact due to forest cover opening on habitat, probability of invasive species proliferation and wildlife species in Protected (Bhagwan Mahaveer Wildlife sanctuary and Anshi-Dandeli Tiger Reserve) and non-protected areas; (v) Assess train transport-related soil contamination and determine the impact on vegetation; (vi) Determine the hotspot of wildlife-train collision in relation habitat and wildlife species distribution patterns; (vii) Determine the effectiveness of existing railway track as habitat, dispersal and barrier to the movement of crucial wildlife species by assessing the extent of the corridor connectivity across the track; (viii) Assess the likely impact of noise, vibration, muck generated due to Tunnel Boring Machine and piled places, construction sites for labour and machinery, mobility of transport material on habitat, soil stability and erosion, microenvironment, water sources (seasonal and perennial) and wildlife in protected and non-protected areas; (ix) Determine the land use land cover and assess the extent of connectivity for movement of tiger and elephant under pre and post-construction scenarios considering suggested mitigation measures in northern Western Ghat; (x) Identification and mapping of the critical wildlife habitats, especially for breeding, foraging, resting, nesting, roosting or refugees along the railway track; (xi) Determine the extent of disaster due to doubling of railway track in terrain having sharp curves and gradient; (xii) Suggest appropriate measures to minimize the likely impacts due to different railway track construction processes such as labour camping sites, work sites, machinery noise and vibration during track laying and tunnel construction, disposal of waste on habitat and key faunal species; (xiii) Determine cumulative environment impact assessment and suggest relevant mitigation measures along the railway track from Castlerock to Kulum for retaining ecological processes within the northern Western Ghats; (xiv) Prepare "Environmental Management and Monitoring Plan" during construction and operation to assess the efficacy of suggested mitigation measures in retaining the ecological integrity of northern Western Ghat due to the doubling of railway track between Castlerock and Kulem.

Placement of camera traps along the existing railway track

Progress and Outcomes: Avifaunal survey: A winter survey for avian diversity was carried out along the rail track in the months of December 2022 and January 2023. The point-count method was used in this study, with 10-minutes observation recorded at a distance of 500m between the points along the 38 kms rail track, from Kulem in Goa to Tinaighat in Karnataka. A total of 75 points were recorded during the study. During the study, the researchers could document 109 avian species along the rail track, with species richness ranging between 1-12 species. Along with this, a total 137 avian species were observed in the study area.

Rail Kill: Dedicated surveys (two replicates) to record faunal kills from trains were conducted. Amphibians, reptiles, mammals and birds that were found dead on and aside railway tracks with certain signs (lacerations, desiccation etc.) were considered to be killed due to railway track and associated movements. All findings of dead fauna were photographed and georeferenced. During rail kill survey from Tinaighat to Kulem several species were found killed near or on the railway track, which mainly includes Duttaphrynus sp. (5), Ahaetulla cf. borealis (10), Calotes versicolor (5), Lycodon travancoricus (6), Bandicota spp. (2), Sus scrofa (1), Hydrophylax Bahuvistara (3), Eutropis macularia (4), Indirana spp. (4), Gegeneophis spp. (1), Hypnale hypnale (1), Eryx spp. (2), Cyrtodactylus albofasciatus (1), Hemidactylus spp. (1).

Pollution sampling and sample processing: The multi-aspect evaluation of the degree of toxicity in soil, plants, and water bodies from the railway will be estimated using point sampling per kilometre along the track and at 50m interval (0m, 50m, 100m, 150m etc.) and upto a distance of 1km perpendicularly away from the track (depending on the accessibility of the area) from Tinaighat to Kulem in the Northern Western Ghats. Along with sampling the physicochemical analysis of soil and water will also be done. For soil sampling, the topsoil (0-20 cm) was collected after removing the litter (organic matter, dry and fresh leaves, stones etc.) from

the upper part of the soil. For water sampling, all types of water bodies present in the grids were sampled. For plant sampling, dominant shrub and tree species present in the entire stretch were selected for the sampling. The collected samples were further processed for the analysis of heavy metal and polyaromatic hydrocarbons (PAHs). To date, 201 samples of soil, 99 samples of water, and 963 samples of plants (root, shoot/stem, and leaves) have been collected.

The drying and grinding for all the samples have been completed, and the pre-processing of samples has been started. Contaminant extraction from samples is ongoing after which the samples will be analysed for heavy metals (ICP), and Polyaromatic hydrocarbons (GC-MS).

Camera trap sampling: The project proposes an objective to monitor the terrestrial biodiversity of the area between Kulem (Goa) and Tinaighat (Karnataka) through which the railway track passes. A non-invasive camera-trap sampling using 128 IR-based Cuddeback camera traps was carried out during February and March, 2023. The camera traps were deployed alternatively on the right and left sides of the track at 250 meters intervals between two locations, in order to representatively sample both sides. The cameras were deployed at a distance of 10-50 meters away from the track inside the forest. Camera traps captured the presence of large to medium carnivores like the tiger, leopard, wild dog and jackal as well as omnivores like sloth bears in multiple locations. Among smaller carnivores, the stripe-necked mongoose, Indian Grey mongoose and Asian small-clawed otter have been captured in several locations. Camera traps also captured herbivores such as gaur, sambar, spotted deer, barking deer, wild pig and mouse deer. Primates such as the common langur and bonnet macaque have been captured. Brown palm civet, small Indian civet, and Indian porcupine are among the other important species captured in the camera traps.

Vegetation sampling: Vegetation sampling has been conducted along the existing railway track between Kulem (Goa) and Castlerock (Karnataka), covering 25 km. A general enumeration, mainly focusing on the endemic species along the railway track has been done with the help of field visits, personal observations, and available literature and flora. The Point-Centred Quarter Method (PCQM) was used along railway tracks starting in January 2023 for the vegetation analysis. At least two PCQ plots were laid every 100m of railway track. Where the terrain was accessible, more plots were laid per 100m. Sampling plots were laid 15– 20 m of the forest along the railway track. Each plot was divided into four imaginary quadrants by choosing a center point, and eight trees (4 with above 30 cm GBH and 4 with below 30 cm GBH) were measured in distance from their places. The researchers recorded the GPS location of each plot's centroid and their chainage number, forest/ habitat type, canopy, shrub or grass cover, and individual tree height. More than 115 PCQs along the stretch of 10 km has been completed. The data was collected through ArcGIS Survey123 mobile application. In addition, to understand the diversity and important habitats, separate chainage wise (every 100 m) enumeration for herbs, shrubs, climbers, lianas, and trees has been made. The species that could not be identified on field were photographed, collected, and processed for the herbarium. Till date the chainage-wise enumeration has been done for seven km, where around 200 species have been recorded.

Herpetofauna Sampling: The researchers surveyed reptiles and amphibians during the period January 2023 to March 2023 using time constrained visual encounter surveys (TCVES) at every 250m of the track between Kulem and Tinaighat. At each point, the team surveyed two person hours (search by two people for one hour or four people for half an hour) to document herpetofaunal diversity along the railway track and nearby habitats. The method includes searching for a limited time (time-constrained) exploring all possible microhabitats such as leaf litter, rocks, fallen logs, trees, understorey vegetation etc. To better represent the habitat of the specific site, the researchers restricted the surveys within a 50mx20m plot (1000 square metre) area at each sampling site. The team also quantified habitat characteristics of herpetofauna at every site using a 10mx10m plot. In each plot, the team quantified the number of trees, canopy cover and other ground cover characteristics.

The team completed a total of 86 sites which resulted in 172 person hours of sampling across the Kulem-Tinaighat stretch. The researchers collected habitat correlates for all 86 sites where the team conducted VES. In addition to the VES plots the team also recorded opportunistic observations and rail kills to document all herpetofauna species in the region.

Including opportunistic sightings and VES, the team observed a total of 45 species of herpetofauna including 16 species of amphibians and 29 species of reptiles. The 29 species of reptiles include 13 lizards, 15 snakes and one turtle species. The 16 species of amphibians include 15 anurans and one species of caecilian.

Passive Acoustic monitoring: The team installed Passive Acoustic monitoring devices (Audiomoths) at three different locations to monitor the impact of railway noise on faunal elements. The installation of PAMs were always assisted with Hobos to monitor the temperature and light intensity. As of now the team collected data from 3 sites such as Sonalium, Dhudsagar and Castle rock. At each site PAMs and Hobos were installed at 0m, 75m, 150m, 300m and 500 m distance from the railway track and the recordings were done for 5 days. The installation of PAMs at different distances from track will help us to understand the impact of railway sounds on the natural soundscapes with respect to wildlife.

Characterization of the rail track and suggestion of mitigation measures: Detailed characterization of the railway track between Tinaighat (12/000) and Kulem (50/000) was conducted to suggest possible mitigation measures on the existing track to reduce impacts on the sensitive wildlife habitats and species. The entire stretch of 38 km was divided into 1 km segments, within which terrain, vegetation, presence of water bodies and animal trails, crossing zones, and existing structures (both for animal crossing and water drainage) were assessed. The type, dimension, number, and current efficiency of the structures for facilitating animal movement were assessed. Dimensions of the existing structures were measured, as precisely as possible, using manual and electronic devices. Based on this fine-resolution ground-level characterization the researchers suggest possible mitigation measures on the existing as well as proposed track. The assessment was critically focused on the possibility of track-use by various fauna, and its potential to act as connectivity structures across the habitats. Modification or addition of structures was suggested after a thorough technical evaluation of all the parameters mentioned above.

Report on Mitigation Measure for doubling of railway line between Tinaighat and Kulem was prepared.

Milestones: A winter survey for avian diversity was carried out. Dedicated surveys (two replicates) to record faunal kills from trains were conducted. A total of 201 samples of soil, 99 samples of water, and 963 samples of plants (root, shoot/stem, and leaves) have been collected to evaluate the levels toxicity from railways. In all, 128 IR-based camera traps were deployed to detect terrestrial mammals. A total of 115 Point-Centred Quarter Method (PCQM) plots covering 10 km and 200 species have been recorded in the enumeration exercise for trees identified for felling. Time constrained visual encounter surveys (TCVES) for herpetofauna was completed coversing total of 86 sites which resulted in 172 person hours of sampling across the Kulem-Tinaighat stretch. Passive Acoustic monitoring devices (Audiomoths) were deployed at three different locations to monitor the impact of railway noise on faunal elements. Detailed characterization of the railway track between Tinaighat (12/000) and Kulem (50/000) was conducted to suggest possible mitigation measures on the existing track to reduce impacts on the sensitive wildlife habitats and species.

CONSULTANCY PROJECTS UNDER EIA

ASSESSMENT OF WILDLIFE HAZARADS IN AND AROUND JOLLY GRANT AIRPORT, DEHRADUN AND SUGGEST MITIGATION MEASURES

Funding Source
Airport Authority of India Dehradun

Date of Initiation
November 2022

Investigator
Dr R. Suresh Kumar

Proposed Date of Completion
May 2023

Researcher
Rajdeep Mitra

Objectives: The objectives of the project are to (i) document the wildlife, both mammalian and avian species that occur in and around the airport that pose risk to air operations; (ii) map and monitor garbage dumping sites in a 10 km radius of the airport to document the use by scavenging birds and their population; and (iii) assess the current measures taken up with regard to vegetation management within the airport premises and develop suitable management plan.

Progress: The fieldwork of the project was completed by the end of the April 2023 and the draft project report was submitted to the Airport Authority of India Dehradun by 15th of May. Subsequently, upon review the final report was submitted to the Airport Authority by the end of June.

Outputs and Outcomes: The habitat composition inside the airport as well the vegetation in the adjoining areas especially the agricultural activity was found to be one of the primary factors influencing the wildlife and bird activity inside the airport premises. Two major garbage disposal sites and one carcass dumping site in the 10km radius from the airport was found to attract a high number of large bodied soaring birds in the landscape. Based on the comprehensive field assessments, a series of management interventions is recommended to be taken up by the Jolly Grant airport authority to mitigate

the risk of wildlife hazard. These interventions encompass a range of measures, including habitat management strategies, implementation of various bird hazing techniques, and structural modifications within the airport infrastructure itself.

Milestone: This study represents the pioneering endeavor by the Wildlife Institute of India in assessing the wildlife hazards at airports. Based on the information gathered specific mitigation measures have been suggested in managing the issue of wildlife hazards at the Dehradun airport.

CONSULTANCY PROJECTS UNDER EIA

EVALUATION OF ECOLOGICAL IMPACT OF PROPOSED JAMRANI DAM MULTIPURPOSE PROJECT BY IRRIGATION DEPARTMENT, UTTARAKHAND

Funding Source
Jamrani Dam Construction Division-2, Damuadhunga, Haldwani, Uttarakhand (Irrigation Department, Uttarakhand)

Researchers
Dr Kausik Banerjee, Dr Swati Saini, Deb Ranjan, Dr Sumit K Arya, Avinash Yadav and Stanzin Zangmo

Investigator
Dr Gopi.G.V.

Date of Initiation
March 2023

Proposed Date of Completion
December 2023

Objectives: The objectives of the project are to (i) Assessment of the possible ecological impacts of proposed Jamrani Multipurpose Dam Project; (ii) Assessment of possible impact on the connectivity of the Dudwa-Lagga Tiger Corridor; and (iii) Rare, threatened and endangered mammalian species distribution and abundance in the submergence area of the proposed Dam.

Progress: The NTCA requested Wildlife Institute of India, Dehradun (WII) on 2 December 2022 vide letter no. 7-23/2021-NTCA, to assess the ecological impacts of the proposed dam at the cost of user agency and submit the assessment report to NTCA. The proposed project falls within the Dudwa-Lagga Tiger Corridor, which is an important corridor for tigers in the Terai Arc Landscape. Subsequent to this, a committee was constituted at WII with the members of EIA cell and Tiger cell. The WII team prepared plan to visit the field site and collect primary field data, have meetings with the stakeholders such as Irrigation department, Haldwani, Uttarakhand, Forest Department, Nainital, Uttarakhand and collect the necessary secondary information pertaining to this project between April to May 2023. The methodology is being developed for collecting the primary data from the field in and around the submergence zone of the proposed dam site.

Outputs and Outcomes: A committee was constituted including the members of EIA Cell and Tiger Cell of the Wildlife Institute of India.

Milestone: The Wildlife Institute of India formed a committee consisting of members from its EIA Cell and Tiger Cell. Research methods have been developed to assess the ecological impact on the submerged and surrounding areas of the proposed dam.

ACADEMICS & TRAINING ACTIVITIES

ACADEMIC PROGRAMME

18th M.Sc. Wildlife Science Course

The 18th Batch of the MSc in Wildlife Science commenced their course on 24th August 2022. A total of 20 Indian students representing 9 states of India were selected for the course based on a rigorous national level written test followed by a personality and aptitude test. The course work as part of their Semester I include three theory papers that cover all the foundational topics and courses in the field of ecology, evolution, forestry and wildlife science.

The batch went on their first tour which was the Orientation Tour to Lansdowne Forest Division in September. During this week long, the students were oriented to natural history, jungle reading, observing and interpreting wildlife signs and field identification of plants, birds, mammals, fish and invertebrates.

The second tour of the first semester was the Techniques tour, which was conducted in Pench Tiger Reserve in Maharashtra. During this 15-day long tour, the students learnt the theory and practice of various wildlife monitoring and census techniquesThe first semester ended with the theory and practical exam held in the last week of January 2023.

After a 15-day semester break, the course resumed on 14 February 2023. The batch visited Bhitarkanika, Rushikulya in Odisha and Chambal NP as part of their Wetlands tour.

M.Sc. Dissertation Topics

Nimisha Thomas (2022). **Genetic characterization of Clarias gariepinus in the selected stretch of river Yamuna**. Amity Institute of Forestry and Wildlife (AIFW), Amity University, Noida (Uttar Pradesh). Supervisor: Dr. S. K. Gupta.

Priya Arya (2022). **Isolation, Identification Characterization of zoonotic bacteria from Testudines.** Graphic Era Deemed to be University, Dehradun. Supervisor: Dr Lallianpuii Kawlni.

Swapnil Kiren (2022). **An assessment of Human-Wildlife Conflict in India and Future Perspective on Conflict Management.** M.Sc Thesis awarded by Indian Institute of Science Education and Research, Bhopal. Supervisors: Dr C. Ramesh and Dr Anju Baroth.

Shraddha Thuwal (2022). **Ecological Reconnaissance and Geospatial Analysis of Bhimtal and Naukuchiatal Lakes in The Nainital District of Uttrakhand.** Submitted to School of Earth Sciences, Banasthali Vidyapith. Supervisor: Dr Gopi GV.

STATUS OF DOCTORAL RESEARCH IN WII

Degree Awarded

Alka Chaudhary (2022). **Distribution of major Alien Invasive Plants and Impact Assessment of *Ageratina adenophora* (Spreng.) in Kailash Sacred Landscape, Pithoragarh, Uttarakhand**. Forest Research Institute Deemed University. Supervisors: Dr B.S. Adhikari and Dr G.S. Rawat.

Dar SA (2022). **Ecology, Genetics and Conservation of Himalayan Brown bear in Western Himalaya.** Saurashtra University, Rajkot. Supervisor: Dr S. Sathyakumar.

Kaushik Mallick (2023). **Diversity and Distributional Pattern of Family Geometridae (Lepidoptera) in Great Himalayan National Park Conservation Area, Himachal Pradesh.** Saurashtra University, Rajkot. Supervisors: Dr. S.K. Gupta, Dr. V.P. Uniyal, and Dr. Kailash Chandra.

Pal R. (2022). **Responses of Mammals to Biotic and Abiotic Drivers, Upper Bhagirathi Basin, Uttarakhand, Western Himalaya.** Saurashtra University, Rajkot. Supervisor: Dr S. Sathyakumar.

Surya Prasad Sharma (2023). **Genetic Diversity, Gene-flow and Mating system in Sympatric Crocodylian Species in National Chambal Sanctuary, India.** Saurashtra University, Rajkot. Supervisors: Dr. S.A. Hussain, and Dr. S.K. Gupta.

Thesis Submitted

Rahul Kumar (2023). **Temporal changes in composition, patterns of biomass production and carbon sequestration potential of various alpine communities in Tungnath, Western Himalaya.** Saurashtra University, Rajkot. Supervisors: Dr B.S. Adhikari.

Registered

Manisha Mathela (2023). **Plant responses in terms of their functional traits, to change in climatic variables along an elevational gradient in Uttarakhand Himalayas.** Registered for her PhD with AcSIR. Supervisor: Dr NV Page.

Srabani Bose (2023). **Persistent organic pollutant in seagrass ecosystem of Palk Bay, Tamil Nadu and its effects on the associated fauna**. AcSIR. Co-supervisor: Dr Nehru P.

PH.D. Scholars Registered during 2022 -2023 at Wildlife Institute of India through AcSIR Universitry and FRI (Deemed to be) University

S.N	Name	Supervisor	University
1	Parul Sen	Dr. Y.V.Jhala	AcSIR
2	Manisha Mathela	Dr. Navendu Page	AcSIR
3	Priyanka Justa	Dr. Salvador Lyngdoh	AcSIR

4	J.Haritha	Dr. Gautam Talukdar	AcSIR
5	Vinita Sangela	Dr. V.P.Uniyal	AcSIR
6	Basavaraj	Dr. Bitapi C.Sinha	AcSIR
7	Tushar P. Parab	Dr. Salvador Lyngdoh	AcSIR
8	Ritesh Vishwakarma	Dr. Parag Nigam	AcSIR
9	Ashish Kumar Panda	Dr. Ruchi Badola	AcSIR
10	Swati Nawani	Dr. Samrat Mondol	AcSIR
11	Rohit Ravindra Jha	Dr. Gopi, G.V.	AcSIR
12	Shagun Thakur	Dr. S.Sathyakumar	AcSIR
13	Deepali Bansal	Dr. Gautam Talukdar	AcSIR
14	Advaita Ravindran	Dr. Bilal Habib	AcSIR
15	Srabani Bose	Dr. J.A.Johnson	AcSIR
16	Shrewshree Kumar	Dr. Samrat Mondol	AcSIR
17	Sultan	Dr. Y.V.Jhala	AcSIR
18	Bhawana Pant	Dr. Vishnupriya Kolipakam	AcSIR
19	Mohib Uddin	Dr. Sutirtha Dutta	AcSIR
20	Debranjan Laha	Dr. Y.V.Jhala	AcSIR
21	Alex Jacob S.S.	Dr. Gopi, G.V.	AcSIR
22	Kainat Latafat	Dr. Bitapi C.Sinha	AcSIR
23	Kumar Ankit	Dr. Bilal Habib	AcSIR
24	Amar Paul Singh	Dr. Salvador Lyngdoh	FRIDU
25	Indranil Paul	Dr. Sutirtha Dutta	FRIDU
26	Junngam Khiham	Dr. J.A.Johnson	FRIDU
27	Mariyam Nasir	Dr. Bitapi C.Sinha	FRIDU
28	Mujahid Ahamad	Dr. Ruchi Badola	FRIDU

CAPACITY BUILDING & PROFESSIONAL EXCHANGE

42nd Post-graduate Diploma Course in Advanced Wildlife Management Concluded, 31 August 2022.

The 10-month Post Graduate Diploma in Advanced Wildlife Management commended on 1 October 2021 at this Institute with ten officer trainees of the rank of Deputy Conservator of Forests/Assistant Conservator of Forests and equivalent levels. During the reporting period, an International Wildlife Management Study Tour to South Africa was organized during 17-30 August, 2022 for the trainees of the 41st & 42nd Batches of Post-Graduate Diploma Course in Advanced Wildlife Management at Wildlife Institute of India, Dehradun. The International Wildlife Management Study Tour of 41st PG Diploma could not be undertaken in 2021 due to worldwide pandemic COVID-19. The tour was attended by 27 Diploma trainee officers of both the batches and three faculty members. The Officers visited Johannesburg Zoo and the inputs were provided on Zoo Management. The Officers visited Letaba Camp in Kruger National Park (KNP) and received inputs on select African ungulates. During the travel, Elephant Hall Museum was also visited. Wildlife Pharmaceuticals facility, Mpumalanga was visited and inputs were received on immobilization drug manufacturing, packaging and shipment including legal provisions in the import of drugs. The officer trainees participated in a live demonstration of a de-horning exercise in White Rhino. The Officer trainees also visited Southern African Wildlife College (SAWC), Hoedspruit Endangered Breeding Center and Moholoholo Animal Rehabilitation Center and were exposed to various facilities.

The Management Tour (India Component) was taken to Kankaria Zoo, Wild Ass Sanctuary, Dhrangadhra, Gulf of Kutch Marine National Park and Gir National Park during 11-20 April, 2022. The High Altitude Techniques Tour was conducted at Kendarnath Wildfire Sanctuary and Nanda Devi Biosphere Reserve in Uttarakhand from 29 May to 4 June 2022. The 42nd PG Diploma course concluded on 31 August 2022. Shri Bharat Jyoti, IFS, Director, Indira Gandhi National Forest Academy was the Chief Guest of the valedictory function. He distributed the Diploma and awards to the passing out officer trainees. All the officer trainees successfully completed the course. The following medals and prizes were won by the participants:

Institute's Gold Medal for the Top Trainee and Silver Medal for the Best All Round Wildlifer were bagged by Shri N Jeykumaran. Wildlife Preservation Society Silver Medal for the Second in Merit; NR Nair Memorial Silver Medal for Best Management Plan; and Top Trainees in Wildlife Biology (Book Prize) were received by Shri Piraisoodan B. Shri Amarakshar VM won the Best Management Term Paper AK Chatterjee Silver Medal.

43rd Post Graduate Diploma in Advanced Wildlife Management, Dehradun, 1 October 2022 to 30 July 2023.

43rd Postgraduate Diploma Course in Advanced Wildlife Management commenced on 1 October 2022. A total of ten participants, i.e. two from Odisha, two from Uttar Pradesh, one each from Rajasthan, Meghalaya, Tripura, Mizoram and Madhya

Pradesh and one lady officer from Myanmar.

The following field tours were conducted out during the reporting period: (i) Orientation Tour to Lansdowne Forest Division (Kalagarh and Koluchaur) was carried out from 30 October 2022 to 4 November 2022; (ii) High Altitude Tour to Kedarnath Wildlife Sanctuary was carried out from 27 November 2022 to 3 December 2022; (iii) Techniques Tour to Rajaji Tiger Reserve was carried out from 2 to 15 January 2023; (iv) Wetland Tour to Odisha was carried out from 19 to 27 February 2023; and (v) Wildlife Management Tour to Assam was conducted from 20 March 2023 to 2 April 2023. The course will conclude on 31 July 2023.

37th Certificate Course in Wildlife Management, Dehradun, 1 December 2022 - 28 February 2023.

The 37th Certificate Course in Wildlife Management was conducted at WII for a period of three-month. In all, eleven officer trainees of the rank of Range Forest Officers, Deputy Range Forest officers & equivalent from different States within country participated in the course. The officer trainees represented different States within country with five trainees from Karnataka, one each from Himachal Pradesh, Maharashtra, Madhya Pradesh, Mizoram, Goa and one Veterinary Doctor form Assam.

During the course period, a major portion of the time was spent undertaking field study at various Protected Areas/National Parks, Zoos, Wildlife Sanctuaries and Institutions. More importantly, practical exercises with respect to Computer Applications, GPS and Map reading, CITES exercise, demonstration of drug delivery equipment, Identification of different wildlife parts and products, Crime Scene Investigation, filing of charge sheet, designing nature trails and other aspects which were important for practical management aspects were taught in depth.

Field components of the modules included Wildlife Orientation-cum-Technique Tour from 14 to 26 December 2022 to Rajaji Tiger Reserve, Uttarakhand; and Wildlife Management Tour from 2 to 21 February 2023 to Gujarat and Sri Lanka. The certificates were awarded to the officer trainees after successful completion of the Course. Three medals of honour were awarded to the following candidates: Wildlife Conservation Gold Medal for the Top Trainee was awarded to Mr. Somanagouda Patil. The Silver Medal for the Best All Round Wildlifer was bagged by Ms. Suma Haleholi. The Silver Medal for the `Best Performance in Wildlife Management Module' was won by Mr. Mahesh Marennavar.

WORKSHOPS, TRAINING PROGRAMMES, SHORT COURSES, SEMINARS, WEBINARS, CONFERENCES AND MEETINGS ORGANISED BY WII

Certificate Course on 'Wildlife Management using Geospatial Techniques' Under Green Skill Development Programme of the Ministry of Environment, Forest and Climate Change, Dehradun, 7 April 2022 to 4 May 2022.

ENVIS Resource Partner 'Wildlife and Protected Areas',

Wildlife Institute of India, Dehradun, Uttarakhand organised a residential course "Wildlife Management using Geospatial Techniques" under Green Skill Development Programme of Ministry of Environment, Forest and Climate Change, Government of India in Wildlife Institute of India from 7 April 2022 to 4 May 2022. It was four weeks course which included theory, practical and field visits. A total of 535 applications were received for the course and 20 people were shortlisted based on applications and interview. There were participants from the States of Uttarakhand, Chandigarh, Himachal Pradesh, Haryana, Jammu & Kashmir and Uttar Pradesh.

The main aim of the course was to skill participants in Wildlife

Management using the Geospatial techniques so that they can create employment opportunities and become self-dependent. It also prepares people for green jobs that contribute to preserving or restoring the quality of the environment, while simultaneously improving social equity and enhancing quality of life. The programme endeavours to develop green skilled workers having technical knowledge and commitment to sustainable development of the country which will help in the attainment of the Nationally Determined Contributions (NDCs), Sustainable Development Goals (SDGs) National Biodiversity Targets (NBTs), as well as Waste Management Rules (2016). The course is National Skill Development Authority approved with an NSQF Level 6.

World Heritage Day Celebrations at WII, Dehradun, 18 April 2022.

WII-C2C organized the celebration of World Heritage Day 2022. More than 100 students enthusiastically participated in the Art Competition based on themes of "Our Natural Heritage" and "Threats Associated with Natural Heritage" submitting creative artwork which amply conveyed the same. This was followed by a trivia quiz competition "World Heritage Around the World" centred on World Heritage Sites was organized. Four teams of five students representing Raja Rammohan Roy Academy, Graphic Era Global School, St. Paul's and St. Mary's school participated in the quiz.

One-week Compulsory Training Course on Addressing Challenges and Managing Human Wildlife – Conflict in India, Dehradun, 16-20 May 2022.

A five- day compulsory training course was organized for the capacity building of mid to senior level IFS officers from various state Forest Department on "Addressing Challenges and managing Human- Wildlife Conflict in India. The course aimed at developing capacity of participants in addressing various challenges associated with management of Human- Wildlife Conflict, viz., prevention, rapid response and mitigation verticals including understanding of species biology and species – specific use of modern technological and tools. The training comprised of a mix of classroom lectures and field-based activities. It was organised by Wildlife Institute of India and sponsored by the MoEFCC. A total of 16 participants from 14 Indian states attended the training course.

Webinar on Climate Vulnerability Index for World Heritage Sites, 20 May 2022.

WII-C2C in collaboration with James Cook University organized a webinar on "Climate Vulnerability Index: Addressing Climate Change in World Heritage Sites". The Climate Vulnerability Index (CVI) developed at the James Cook University is a novel rapid assessment tool for impact of climate change on World Heritage. Successfully applied in natural and cultural World

Heritage properties in a wide range of geographies from Nigeria to Norway, CVI's values-based, science-driven, and community-focused methods aim to identify and promote adaptive management of climate-related threats showing a new common way forward. About 35 participants joined in the webinar including attendees from Mexico and Australia.

International Day for Biological Diversity, 22 May 2022.

WII-C2C organized a tantalizing trivia quiz on natural/ mixed WHS from the Asia Pacific in the natural heritage quiz "At Home with Nature: Learning Biodiversity from the Biodiverse". The questions covered a broad spectrum of flora and fauna from all countries in the Asia Pacific with a natural/ mixed site. The quiz was featured on UNESCO's Home Page on World Heritage Day and about 450 participants completed the quiz with participation from across 8 countries including Egypt, Guatemala and the Philippines.

Awareness Programme for Students, Dehradun, 22 May 2022.

On International Day for Biological Diversity 2022, the Wildlife Institute of India - Category 2 Centre facilitated an inclusive and equal opportunity campus walk for a mixed group of students and interested visitors in WII. Students from the National Institute for the Empowerment of Persons with Visual Disabilities (Divyangjan) and the Bajaj Institute of Learning & Vocational Training for Deaf Children, Dehradun represented the student community, who interacted through their sign language interpretation. Accompanying the students were a small group of visitors representing the Been There Doon That (BTDT) community which has been pioneering heritage walks in the Doon Valley region. The total group size was 45.

Three days Training Course for Custom Inspectors and Superintendents on Identification of Wildlife products and Wildlife Forensic, 25-27 May 2022.

The objectives of the training was to train of Inspectors of Customs & GST, Rajasthan Zone. It was sponsored by NACIN, Jaipur. A total of 22 participants attended the course.

National Institute for the Empowerment of the Persons with Visual Disabilities (*Divyangjan*) NIEPVD radio show for 91.2 NIVH Hello Doon, 3 June 2022.

In observance of World Environment Day, WII-C2C participated in a panel discussion for a radio programme discussing the importance of environment conservation. The radio station 91.2 NIVH Hello Doon recorded the conversation which was further edited and broadcast to the visually challenged listeners who tuned in to listen and learn. The panel consisted of Dr Gautam Talukdar, Sc–E and Dr R. Suresh Kumar, Sc–E and Anuranjan Roy, World Heritage Assistant.

Awareness Programme on World Environment Day, Devalsari, 5 June 2022.

As part of a nationwide celebration of World Environment Day by various WII projects at a number of locations, a team from WII-C2C co-hosted a programme for a group of 100 participants at Devalsari, a site of great natural and cultural significance with dense deodar forests and a venerated Shiva temple amidst it. The Dehradun based walking group Been There Doon That (BTDT) had invited a selected group of walkers to the location. The talks given on the trail by Dr Gautam Talukdar, Sc-E and Dr Lokesh Ohri, CEO & Founder, BTDT. This year's theme was "Only One Earth".

Capacity Building Workshop on 'Management of Human-Leopard Conflict' for the Officers and Frontline Staff of Bhagirathi Circle, Uttarakhand Forest Department, Dehradun, 28-30 June 2022.

The workshop aimed at developing participants' capacity to address challenges associated with managing human-leopard conflict in the state of Uttarakhand. The training comprised a mix of classroom lectures and field-based activities. The participants gained knowledge through classroom learning on species biology and behaviour of large felids with an emphasis on managing conflicts. Senior forest managers and experts from civil society organisations were invited as resource persons. They shared their experiences in the field of human-wildlife conflict mitigation with an emphasis on leopards and talked about status and management actions taken for human-leopard conflict in Uttarakhand. The participants were also provided with hands-on training on various tools and techniques relevant to conflict mitigation. These included radio-telemetry, camera traps, fox light, ANIDERS, physical and chemical capture, remote drug delivery systems, dart preparation and crime scene investigation. The bird-watching session was organised on the nature trail of WII. The yoga sessions also were organised for the participants to make them aware of building physical and mental well-being. A total of 53 participants attended the workshop.

Natural Heritage Site Managers Workshop, Rishikesh, 4-5 July 2022.

With the objective of information exchange, experience sharing, and cross-learning, a Natural World Heritage Site Managers' Meeting was organised by WII-C2C in Rishikesh, Uttarakhand on 4-5 July, 2022. A total of 12 participants, including site managers and officials from 5 natural World Heritage Sites of India, viz. Great Himalayan National Park Conservation Area, Keoladeo National Park, Khangchendzonga National Park, Nanda Devi National Park and Sundarbans National Park, attended the consultation. Primary discussions were held on the roles, responsibilities, and partnerships between the sites and WII-C2C. Sessions were conducted on the

World Heritage system, India's members of the World Heritage Committee, updates on the Periodic Reporting exercise and State of Conservation reports. Valuable discussions were held on potential collaborations with the Forest Department of the natural World Heritage Sites of India.

State Level Spearhead Training Programme for Bal Ganga Praharis on Biodiversity Conservation of the Ganga River and its Tributaries', Dehradun, 12-14 July 2022

Under the Wildlife Institute of India - National Mission for Clean Ganga project 'Planning and management for aquatic species conservation and maintenance of ecosystem services in the Ganga River basin for Clean Ganga', a 'State level spearhead training programme for Bal Ganga Praharis on Biodiversity Conservation of the Ganga River and its Tributaries' was conducted at the Wildlife Institute of India. This Training programme was focused on developing knowledge and capacities regarding the Ganga River and its tributaries with the help of the 'National Mission for Clean Ganga' along with its objectives and goals. The purpose of this training mainly lies on to give the idea about the role of being a stakeholder for the conservation of our nature by means of 'Bal Ganga Prahari'. The participants were enlightened with the idea of the 'Knights of Nature' by which they can lead and can be engaged in various good deeds through

their works towards the conservation of nature and its resources.

The training was attended by a total of 85 school students along with 11 teachers from 8 different schools of four districts of Uttarakhand (Tehri Garhwal, Pauri Garhwal, Dehradun, Haridwar). The Programme's main focus was on interactive sessions and different conservation education programmes with the help of various indoor and outdoor activities. Other activities include hands-on sessions, quizzes, pre- and post-training evaluation through questionnaires, a visit to the WII nature trail, and a tour of different sites. FRI (Forest Research Institute), UCOST (Uttarakhand State Council for Science and Technologies), a cultural evening that finally ended with the distribution of tokens of appreciation and certificates. The students were enlightened about the Ganga River's biodiversity and its geographical, cultural, ecological and economic significance.

Trans-boundary Training Course on Diversified Agriculture for Farmers of Communities adjoining Protected Areas of India and Nepal, Pantnagar, 4-6 August 2022.

A three-day training workshop was organized for selected community members from the adjoining villages of protected areas of India and Nepal at G.B. Pant University of Agriculture and Technology (GBPUAT) under the aegis of the WII-UKFD-ZSL collaborative project entitled "Supporting Trans-boundary Tiger Recovery in India and Nepal". The workshop was attended by 20 participants from Nepal belonging to four national park adjoining area villages, including seven females and thirteen males, and 14 participants from India belonging to three villages adjoining Nandhaur Wildlife Sanctuary (NWLS). The three Indian villages are also located in the Boom-Bramdeo corridor connecting NWLS to Suklaphanta National Park, Nepal. The training for community members aimed at enhancing and strengthening their capability and capacity for livelihood and income generation to decrease their vulnerability towards Human-Wildlife Conflict and resource dependency of communities on forest habitats.

The farmers were provided basic training on diversified agriculture and productivity enhancement through modern practices and methods. It was aimed at providing farmers with new practices, tools and methods, models used in farming to increase the profit in agriculture sector activities. It focused on enabling the existing and working farmers to better understand the issues and problems related to their farms and how to address those issues. It provided a basic platform for specialized training in any particular agriculture and allied activities per the farmers' needs. The three-day training course was conducted in the GBPUAT visiting ten departments of the university. It was to provide field-based demonstrative learning for farmers through classroom learning, field visits, and hands-on training. The topics and subjects included various agricultural and horticultural crops, diseases, precautions, farming systems, dairy, poultry, apiculture, food processing, and disease control.

Trans-Boundary Training Course in Wildlife Conservation & Management for Protected Area Managers of India and Nepal, Dehradun, 8-12 August 2022.

Under the collaborative Project WII-UKFD-ZSL, a Project entitled "Supporting Trans-boundary Tiger recovery in India and Nepal", A five days training workshop course entitled "Trans-boundary training course and management for protected area managers for India and Nepal" was organized by the Wildlife Institute of India, Dehradun. The training course was aimed at training officers from both the country from India and Nepal. The protected areas of the Terai arc landscape in India and Nepal were primarily focused on meeting the challenges of Biodiversity conservation, Habitat Management, Human-Wildlife conservation, etc. The workshop was attended by 21 Forest officers from India and 11 Forest officers from Nepal.

Five days training workshop concluded with both technical and practical sessions. The technical session broadly covered the topics of Wildlife Habitats, An overview of the Terai Arc Landscape, Wildlife health & Wildlife Restraint, Protected area management, wildlife forensics, wildlife management planning, communities & conservation, Tools and Techniques for wildlife monitoring, and Applications of new tools and techniques in law enforcement monitoring using M-STrIES, whereas practical sessions and field exercises were focused on the Introduction and demonstration of wild animal captures and techniques. A two-day field

visit to Rajaji Tiger Reserve and Dehradun Zoo was also organized during the workshop. During the field visit to Rajaji Tiger Reserve, trainees were briefed about the implementation of different mitigation strategies for Human-Wildlife Conflict, visitor and tourist management, interpretation, and environmental education.

Capacity Building workshop for Nature Guides of Nandhaur landscape, Dehradun, 24-30 August 2022.

Under the collaborative Project WII-UKFD-ZSL, a Project entitled "Supporting Trans-boundary Tiger recovery in India and Nepal", A Seven days training workshop course entitled "Capacity Building workshop for Nature Guides of Nandhaur landscape" was organized by the Wildlife Institute of India, Dehradun on 24 August to 30 August 2022. The training course was aimed at training nature guides from Nandhaur landscape, Uttarakhand. A total of 42 candidates from the Nandhaur landscape participated in the course.

The training course aimed to develop skills required for a successful nature guide, to provide basic knowledge of biodiversity, geology, and vegetation types of Nandhaur

Landscape, and to train them about "Safety and Health" and management of a medical emergency. The course also included First Aid course level 1 training provided by the Indian Red Cross Society to train nature guides to enable them to assist guests in case of medical emergencies. The course led to an increase in depth knowledge of participants about Wildlife in Terai Arc Landscape, trained them to deliver engaging tours to guests, improved their personality and communication skills, developed skills to use various interpretation techniques to attract guests, and learned to perform First Aid in an emergency.

Workshop on Managing Human-Wildlife Conflict in Multiuse Landscape of Jharkhand for Forest Guards & Veterinary Officers of Jharkhand Forest Department, 5- 9 September 2022

The one-week training workshop included both theoretical as well as field insights covering diverse aspects of managing human-wildlife conflict for the forest department staff of Jharkhand. It was organised by Wildlife Institute of India and sponsored by Jharkhand Forest Department. The workshop was attended by 31 Forest Guards and three Veterinary Officers.

National Spearhead Training Workshop for Ganga Task Force & Eco Task Force on Conservation & Management of the Gangetic Dolphins & Other Aquatic Macro Fauna of the Ganga Basin, 21-26 September 2022

Under the Wildlife Institute of India - National Mission for Clean Ganga project 'Planning and management for aquatic species conservation and maintenance of ecosystem services in the Ganga River basin for Clean Ganga', National Spearhead Training Workshop for Ganga Task Force & Eco Task Force (ETF) on Conservation & Management of the Gangetic Dolphin & Other Aquatic Macro Fauna of the Ganga Basin was conducted at the Wildlife Institute of India, Dehradun. The Ganga Task Force (GTF) is a unit of the Territorial Army, a volunteer force of ex-servicemen deployed in the services to keep the Ganga River clean and spread awareness to stop people and industry from polluting the river.

The purpose of this training was to develop the capacity of the GTF & ETF to the ecological profile of the Gangetic Dolphin and other Aquatic Macro Fauna of the Ganga River and its tributaries, to understand the significance of their conservation and how to rescue and rehabilitate the aquatic species of the Ganga River and its tributaries and to engage local communities and trained them for the conservation of the aquatic species found in the river.

The training comprises presentations followed by interactive sessions and hands-on sessions like bird monitoring, collection and analysis techniques. The training programme was attended by 20 Ganga Task Force from Uttarakhand & Eco Task Force from Uttar Pradesh, 6 Forest Officials from Uttar Pradesh, 3 Junior Engineers and 2 Executive Engineers from irrigation department Bijnor, Uttar Pradesh, 15 Ganga Praharis from Uttarakhand and Uttar Pradesh. A total of 46 participants were present in the Programme.

Hindi fortnight Celebrations at Wildlife Institute of India

The closing ceremony of the Hindi Fortnight was held on 30 September 2022 at the Wildlife Institute of India. The Hindi essay competition was organised during the fortnight. Faculty members and researchers participated in the closing ceremony of Hindi Fortnight. They recited poetry and gave messages in Hindi. The prizes were given to the winners at the end of the programme. The use of Hindi in the Institute was discussed by the Chairman and Registrar. The issues related to the implementation of the Official Language were also discussed.

Smt. Baljit Kaur, Finance Officer and Smt. Alka Agarwal, Assistant Director (Official Language), were sent from the

Institute to attend the Hindi Diwas Programme and Second All India Official Language Conference held in Surat from 14-15 September 2022 Under the chairmanship of the honourable Union Minister of Home Affairs and Cooperation.

During the fortnight, instructions issued from time to time by the Department of Official Language, Ministry of Home Affairs were informed to all and requested to comply with the orders related to the Official Language and urged that Hindi month should be celebrated with energy and enthusiasm through the use, promotion, awareness and promotion of Hindi and through their participation.

Special Course in Wildlife Protection, Law & Forensic Sciences for probationers of Indian Customs & Central Excise Service Group A. 73rd Batch, 3-8 October 2022

The objective of the special course was to train the probationers of Indian Customs & Central Excise Service Group A. The course was sponsored by NACIN, Faridabad. A total of 32 of participants attended the course.

Training Programme on Monitoring of OUV for Western Ghats – Talacauvery Sub-Cluster, Madikeri, 10-11 October 2022

WII-C2C organized a "Training Programme on Monitoring of Outstanding Universal Value of Natural World Heritage Sites: Western Ghats – Talacauvery Sub-Cluster" at Madikeri, Karnataka in cooperation with the Karnataka Forest Department. The purpose of this workshop was to build capacity and sensitize frontline staff of the World Heritage property about the Outstanding Universal Values of the site and assess its current status. The workshop held interactive discussions with forest frontline staff on the current status of OUVs of the heritage site and explored monitoring, planning and management strategies. The programme had sessions on the World Heritage Convention, Western Ghats Serial Sites, India's role in the World Heritage Committee, reporting obligations, OUV assessment and SWOT exercise. The OUV analysis revealed overall condition of criteria ix and x as stable and well conserved; the integrity of the sites is well maintained albeit facing some development and human population pressure; and the protection and management regime as being robust with active role of the Karnataka Forest Department. 28 forest frontline staff participated in the programme.

First-ever Marine Mammal Stranding Response Workshop in Tamil Nadu, Rameswaram, 17-20 October 2022

The Wildlife Institute of India, with the support of CAMPA, Ministry of Environment, Forest and Climate Change (MoEFCC), Govt. of India, has organized the first-ever national training workshop on Marine Mammal Stranding Response at Gulf of Mannar, Rameswaram. This training workshop was organized as a part of the CAMPA-Dugong Recovery Programme in partnership with the Tamil Nadu Forest Department, Central Marine Fisheries Research Institute (CMFRI), and Central Zoo Authority (CZA) with inputs from the Pondicherry University, Wildlife Conservation Society-India, OMCAR Foundation, Reefwatch Marine Conservation, Karnataka. A total of 18 participants from the coastal states/UTs of India participated in the four-day training program. The main objectives of the workshop are to train the officers towards the rescue and rehabilitation of stranded live marine mammals and post-mortem of stranded dead mammals as per the guidelines of the MoEFCC. The participants were mostly Range Forest Officers and Veterinary Officers nominated by the concerned state governments.

Panel participant in webinar, 'The Directions of Heritage Interpretation in World Heritage Policy', Republic of Korea, 10 November 2022

WII-C2C was a panel participant in a webinar on heritage interpretation at World Heritage Sites providing future pathways for WH Interpretation particularly in context of natural heritage. It was organised by International Centre for the Interpretation and Presentation of World Heritage Sites under the auspices of UNESCO (WHIPIC), Republic

of Korea Since interpretation is key to making visitors care for heritage and take back life-long memories, it was suggested that it may need to be explicitly mentioned and explained in documents like the WH Convention and Operational Guidelines as the will to save is strongly linked to an emotional connection with the place. WII-C2C was represented by Dr Gautam Talukdar, Faculty In-Charge where he brought forward some unique requirements of natural heritage interpretation and what should be prioritized in future heritage interpretation and presentation policies.

Madhya Pradesh Tourism Board Nomination Dossier Workshop, Jabalpur, 12-13 November 2022

As part of the nomination dossier preparation of Bhedaghat-Lametaghat in Narmada Valley, a stakeholder workshop was organized in Jabalpur, Madhya Pradesh. Key organisations including the Madhya Pradesh Tourism Board, Geological Survey of India, Archaeological Survey of India and other local authorities participated in the programme. The workshop highlighted the potential World Heritage values of the site, deliberated on the geological criteria in particular and further took the participants on a tour of the site. The objective was to bring the related agencies on the same platform towards the purpose of documentation of the nomination dossier.

National Training Workshop on Bio-diversity Conservation for Women Scientists and Technologists Working in Government Sector, Dehradun, 14-18 November 2022

The Department of Science and Technology (DST) has launched a scheme called "National Training Programme for Women Scientists and Technologists working in Government Sector". As a part of this scheme, the DST has initiated training programmes exclusively for women scientists/ technologists. Under this scheme, the WII organized a one-week training workshop on Biodiversity Conservation. A total of nineteen women scientists and technologists working in the Government sectors participated in this workshop.

The main objective of the workshop was to enable the participants to be aware of approaches in biodiversity conservation, causes of decline in natural resources, habitat and species, as well as conservation issues in the field. The workshop was inaugurated by Dr Renu Singh, Director of Forest Research Institute. Prominent resource persons from the Institute and outside were invited to deliver lectures and deliberate on the various aspects of wildlife conservation. The participants greatly valued their interactions with Dr Ruchi Badola, Scientist-G and Registrar and other women resource persons who had excelled in different fields. The participants visited the Forensic, GIS and Eco-toxicology labs in the Institute. A field visit to Rajaji National Park was organized wherein they were sensitized to the field techniques related to conservation Science. The participants also visited HESCO and Asan Conservation Reserve (Ramsar Site) to get a preliminary experience of water quality monitoring, bird watching and the ecology of migratory and resident water birds. The participants also had an interaction with Ganga Praharis at Chandi ghat, Haridwar, where they learned how the community is involved in Ganga biodiversity conservation.

GIS Day 2022 Celebrations: Workshop on Natural Heritage and Geoinformatics, Dehradun, 16-17 November 2022

The objective of the workshop was to encourage the use of GIS technologies to answer ecological Questions. It was organised by Wildlife Institute of India - Category 2 Centre for World Heritage Management and Training for Asia and the Pacific Region under the auspicious of UNESCO. One hundred participants attended the workshop.

The event began with Dr Gautam Talukdar encouraging young participants to explore cutting-edge technologies like GIS and Remote Sensing. Mr. Niraj Kakati explained the concepts of natural heritage and World Heritage. A captivating discussion followed, featuring Dr Ruchi Badola, Dr Salvador Lyngdoh, and Dr Hitendra S Padalia, reminiscing about the early days of computerization and GIS while emphasizing the importance of AI and ML in the future. Dr Hitendra Padalia presented the latest GIS developments for quantifying ecosystem services. The day also included presentations on aesthetic mapping, open-source GIS, LULC classification, and Google Earth

Engine. Day 2 featured a drone flying demonstration and insights on obtaining permissions for flying drones in protected areas.

Training Programme on Monitoring of OUV for Khangchendzonga National Park, Sikkim, Yuksom, Sikkim, 21-22 November 2022

WII-C2C organized a "Training Programme on Monitoring of Outstanding Universal Value of Natural World Heritage Sites: Khangchendzonga National Park" in cooperation with the Sikkim Forest Department. The purpose of this workshop was to build capacity and

sensitize frontline staff, communities, and other stakeholders living around the World Heritage property about the Outstanding Universal Values of the site and assess its current status. The workshop held an interactive discussion with forest frontline staff and other stakeholders on the current status of OUVs of the heritage site and explored monitoring, planning and management strategies. As per the respondents, the natural beauty remains unspoiled. It was reported that the OUVs (in terms of habitat, species and diversity) were essentially intact. Authenticity and integrity of the site is well maintained. The park enjoys strong legal protection along with its sacred values. Nearly 67 participants included forest frontline staff and local community representatives like Himal Rakshaks and Eco-Development Committee members.

Seventh Meeting of the Monitoring Committee of NMCG-WII Project, 29 November 2022

The seventh meeting of the Monitoring Committee of the NMCG-WII project, sponsored by the National Mission for Clean Ganga (NMCG) under the Namami Gange programme, was held at the Wildlife Institute of India, Dehra Dun on 29 November 2022 under the chairmanship of Shri G. Asok Kumar, Director General, NMCG. Dr Anil P. Joshi, Padma Bhushan & founder HESCO, Prof. Rajiv Sinha, IIT Kanpur, Prof. Jamal A. Khan, AMU, Aligarh participated in the meeting as a member of the Committee. Shri G. Asok Kumar and members of the Committee released the brochures on the six small tributaries of the Ganga River, namely Asan, Chandan, Solani, Garra, Song and Suswa, brochures in Hindi on 11 major tributaries of the Ganga River, brochure on amphibians and reptiles of Ganga River, and brochure on the satellite telemetry of birds. Progress of the project from April to October 2022 was presented to the Committee by Dr Ruchi Badola, Scientist G and PI, NMCG-WII project. The Committee appreciated the work progress and encouraged WII to carry forward the activities in collaboration with other agencies to achieve better results.

Three-day Compulsory Training Course for Indian Forest Service (IFS) Officers on International Conventions and their Synergies with respect to Climate Change, Forestry, Wildlife and Biodiversity Conservation, Dehradun, 7-9 December 2022

The objective of the workshop was to encourage the use of GIS technologies to answer ecological Questions. It was organised by the Ministry of Environment, Forest and Climate Change, Government of India and Wildlife Institute of India. In all twelve participants attended the workshop.

The course was organized in an interactive manner and focused on key issues. Panel Discussion and General

Discussion sessions were organized to facilitate the interaction and exchange of ideas between participants and Resource Persons.

Three day training course for Custom Inspectors and Superintendents on Identification of Wildlife products and Wildlife Forensic, 2-4 November 2022

The objectives of the traiing was to train of Inspectors of Customs & GST, Rajasthan Zone. It was sponsored by the NACIN, Jaipur. A total of 39 participants attended the course.

International Heritage Symposium on Nature Culture Linkages and Eco-Disaster Risk Reduction Strengthening Bonds, Building Resilience, Dehradun, 8–10 December 2022.

The objective of the symposium was to enhancing nature-culture connections and solutions for reduced disaster risks. The symposium was organised by Wildlife Institute of India-Category 2 Centre for World Heritage Management and Training for Asia and the Pacific Region under the auspicious of UNESCO. A total of 70 participants attended the symposium.

A symposium on enhancing nature-culture connections and reducing disaster risks commenced with an address

by Dr Gautam Talukdar and opening remarks by Dr Y. V. Jhala and Dr Ruchi Badola. Dr Shikha Jain discussed the weakened relationship between humans and nature, while Dr Erach Bharucha introduced the concept of 'biophilia' for rewilding and eco-restoration. Day 2 featured a panel discussion on strengthening bonds and building resilience, and Day 3 included a visit to Rajaji National Park.

MoU between Export Promotion Council for Handicrafts (EPCH) and WII in setting up a 'Pashmina Certification Centre' in WII, Dehradun, 5 January 2023.

Dr S.P. Yadav, Director, Wildlife Institute of India (WII), Dehradun, and Shri R.K. Verma, Executive Director, EPCH, New Delhi, signed a 'Memorandum of Understanding' (MoU) on 5 January 2023 for setting up a 'Pashmina Certification Centre' in WII in the presence of the Shri Bivash Ranjan, Additional Director General (Wildlife), Ministry of Environment, Forest and Climate Change, New Delhi at WII, Dehradun. Through this MoU, the EPCH collaborated with WII to establish a Pashmina Testing Laboratory for its associated members involved in Pashmina Trade. In concurrence with the Central Government's policy, it will be a facility based on the Public-Private Partnerships (PPP) model for assisting the Pashmina traders in obtaining authenticity certificates for selling certified and genuine Pashmina products. Under this MoU, the advanced technologies will be housed in a single facility to support the Pashmina test procedures. It will be an example of a self-sustaining and revenue-generating facility in a government organisation supporting associated exporters and traders on a payment basis.

The purpose of signing this MoU was to streamline the Pashmina Trade and to provide a one-stop testing facility to certify the genuine Pashmina Product free from any prohibited fibres to the associated manufacturers, exporters, and traders. All the tested products will be labelled with a traceable unique id tag with individual certificates, enabling a seamless trade of such products in national and international markets. The Pashmina Test Facility at WII, Dehradun, will assist honest exporters and traders involved in the trade of genuine Pashmina products.

Two-day Meeting on "World Heritage: Making Regional Heritage Global: Focus on the Future, Sundarbans National Park", Dehradun, 17-20 January, 2023

WII-C2C organized a 2-day meeting "World Heritage: Making Regional Heritage Global - Focus on the Future" at the World Heritage Site of Sundarbans National Park in West Bengal, India in association with the West Bengal Forest Department. The meeting was attended by senior administrative and Forest Department representatives of the states of Himachal Pradesh, Uttarakhand, Sikkim, Madhya Pradesh, West Bengal, and Karnataka. Dr Gautam Talukdar, Faculty In-Charge, WII-C2C; Dr Bhumesh Singh Bhadouria, Technical Officer, WII-C2C; and Sh. Niraj Kakati, Technical Officer, WII-C2C presented to the attendees on the World Heritage Convention, the role & experience of WII-C2C and its capabilities before opening the meeting to comments and clarifications sought by the attendees. The attendees further deliberated on strategies for developing and promoting the Convention Concerning the Protection of the World Cultural and Natural Heritage (commonly known as the World Heritage Convention) with a particular focus on possible collaborations with respect to Natural and Mixed World Heritage Sites. The advantages of being listed as a World Heritage Site and the prospective challenges of the same were discussed in detail with multiple ways forward which were documented as part of the outcomes.

State Level Spearhead Training Programme for NCC (National Cadet Corps) on Biodiversity Conservation of Ganga River and its Tributaries, 18-20 January 2023

Under the Wildlife Institute of India - National Mission for Clean Ganga project, the Institute conducted a 'State Level Spearhead Training Programme at the Institute for NCC (National Cadet Corps) on Biodiversity Conservation

of the Ganga River & its Tributaries. This training aimed to develop the capacity of NCC officers and volunteers about the ecological profile of aquatic fauna and the significance of biodiversity conservation of the Ganga River and its tributaries.

The main focus of the training was on interactive sessions, Hands-on sessions, pre- and post-training evaluation through questionnaires, Forensic Lab visit, Bird watching, a tour of Spring Sanctuary, Police Training College and different sites outside the campus, which finally ended with distribution of token of appreciation and certificates. Forty-one participants (40 NCC volunteers and one NCC officer in charge) from three different colleges participated in the training workshop.

Conference on "Current Research and Management Interventions in Natural and Mixed World Heritage Sites of the Asia and Pacific Region", Bharatpur, 2-3 February 2023

Natural and Mixed heritage sites in lndia have been facing many challenges in recent years due to extreme pressure exerted on natural ecosystems. These pressures are a consequence of the high density of the population, risk of catastrophic disasters, constant economic growth, and persistent poverty. World Heritage properties are exposed to Natural (flood, drought, earthquake, and Tsunami) and manmade (forest fires, arm conflicts, industrial accidents, mass refugee movements), threatening the integrity and may compromise natural values. Therefore, it is necessary to understand the current status and ongoing management interventions of WHSS in Asia and Pacific region. This conference brought together knowledge and experience of site managers, researchers, educational institutes, NGOS and various other stakeholders associated with the heritage site management and conservation of Natural and Mixed World Heritage Sites in the Asia and Pacific region. ln addition, this workshop was also attended by eminent national experts and agencies to discuss, deliberate strategies to be adopted for the long-term conservation of World Heritage Sites in the Asia and Pacific Region. Presentations were made on OUVs-Flora, Fauna and Threats; Change and Disaster Risk Reduction; Local Communities & Heritage and WHS Management Practices. The outcomes of the conference were of relevance for the scientists, policy makers, NGOS to develop appropriate strategies to improve management of WHSs and ensure ecosystem services.

One-week Compulsory Course for IFS officers on “Conservation of Coastal and Marine Biodiversity: Challenges and Prospects”, Port Blair, 6-10 February 2023

One-week Compulsory Course for IFS officers on "Conservation of Coastal and Marine Biodiversity: Challenges and Prospects", Port Blair, 6-10 February 2023 and the course was fully funded by MoEFCC. A total of 30 in-service Indian Forests Officers participated this course. The objective of the course was to sensitize in-service officer trainees towards conservation of coastal and marine biodiversity. This course was designed to address the following issues: i) how effective are administrative/ governance/ legal frameworks for management of coastal and marine Protected Areas and are these frameworks promoting integration of biodiversity conservation and livelihood enhancement? ii) What are the existing and potential threats for conservation of biodiversity? iii) What are the current policy and governance challenges to Protected Areas? And iv) What is the role of community in the governance and management of protected areas and ecologically sensitive areas? The course was conducted in a participatory mode. Two days in-house session comprises of experts presentations and discussions and three days exposure field visits to well managed Marine Protected Areas in Andaman and Nicobar Islands. As part of field learning they visited Mahatma Gandhi Marine National Park, Wandoor, Biological Park at Chidiyatapu, and Rani Jhansi Marine National Park, Havelock. The officers were fully involved in the course and whole-heartedly participated in discussions and interactions during different sessions of the course. They related the learning with their own experience and shared relevant examples from field for the benefit of the entire group. Further, they had ample opportunity to interact with Protected Area Managers and discussed about issues related to Marine Protected Area Management.

International Conference on "Biodiversity; Exploration, Exploitation and Conservation for Sustainable Development (ICB-02)," Behali, Assam, 10-11 February 2023

The objective of the conference was to understand how to protect nature while still meeting our needs today and for the future. It was organised by the Department of Botany, Pandit Deendayal Upadhyaya Adarsha Mahavidyalaya Mr. Vishnu. C.S. has presented a paper on the thermal biology of Indian rock pythons, Python molurus in Sathyamangalam and Mudumalai Tiger Reserves, Tamil Nadu, India.

SWISS Conference on Organismal Biology, University of Geneva, 16-17 February 2023

It was organised by SWISS Conference on Organismal Biology. Musk deer species are poorly studied throughout their distribution range due to their elusive nature and occurrence in inhospitable habitats of high-

altitude Himalayas (>2500m). Amira Sharief presented a paper on 'One or Three: Empirical data facilitates conservation of musk deer suggesting only one species of musk deer in Western Himalayas', which was presented in the conference.

Course on Intervention in Wild Animal Health-2023, 17 February to 5 March 2023

As part of the Wildlife Health Bridge, the course was jointly organized by Wildlife Institute of India, Zoological Society of London (ZSL), University of Edinburgh (UoE) and University of Melbourne and Royal Veterinary College. The course was intended towards developing skills among field veterinarians in human-wildlife conflict, management, translocation techniques, disease outbreak investigation and the monitoring of the health of declining species.

The course was organized at Sariska Tiger Reserve and field inputs included field demonstration of techniques for field monitoring of wildlife, visual health monitoring of free-living animals, sampling techniques for infectious disease, pathological examination in the field, disease surveillance scenarios, physical and chemical restraint procedures, and live demonstration of immobilization techniques in two free ranging Sambar, Rusa unicolor and two Cheetal, Axis axis. A total of 21 veterinarians both national and international underwent the field course.

Training on Linkage between River Conservation and Livelihood, Dehradun, 28 February - 3 March 2023

Four-day national training programme entitled "Linkage between river conservation and livelihood" for Ganga praharis, the Guardians of the Ganga, was conducted under the Wildlife Institute of India - National Mission for Clean Ganga project "JALAJ- Connecting River and People to Realize Arth Ganga", at Wildlife Institute of India. The primary aim of the training program was to enhance the capacity of the participants to manage the livelihood initiatives established in their respective areas while boosting their conservation endeavours.

During the workshop, the participants were oriented on different topics like managing homestays and eco-tourism activities, café management, hospitality management, business management and waste management. Exposure visits and practical sessions at the Institute of hotel management and Chani Churani Homestay gave them practical knowledge about starting and managing an enterprise. 58 selected Ganga praharis from Uttarakhand, Uttar Pradesh, Madhya Pradesh, Jharkhand, Bihar and West Bengal participated in this training programme.

World Wildlife Day Celebration at HNB Garhwal University, Srinagar, Pauri Garhwal, Uttarakhand, 3 March 2023

On the occasion of World Wildlife Day, WII-NMCG Team organised a quiz competition on the theme 'Partnerships for Wildlife Conservation' for the students of HNB

Garhwal University, Srinagar, Uttarakhand. Seventy-eight students from various departments participated in the quiz competition.

Certificate Course in Paralegal Practices: Forestry Acts and Policies under Green Skill Development Programme, Dehradun, 9-20 March 2023

EIACP Programme Centre Resource Partner at the Wildlife Institute of India organized a two-week Certificate Course in Paralegal Practices: Forestry Acts and Policies under Green Skill Development Programme (GSDP) for the first time. The purpose of conducting this course is to develop and ensure the livelihood in alignment with legislations, policies, and regulatory bodies relating to environment, forest, and wildlife protection, and suggest legal solutions and recommendations on various environmental issues. This

training will prepare a base for their further skill enhancement in their respective fields. The trainees would have knowledge of all the codal requirements (digital & document) for online submission of the project proposals and for obtaining clearances. Making a critical analysis of policies and laws, understanding and analysing the work of regulatory bodies, preparation of drafts for necessary suggestions. They will be able to collect information & organize the same logically for presentation/ uploading the project proposal of the user agency. For this course, the researchers has received 236 applications throughout the country, out of which 62 candidates were selected for interviews. Finally, 20 participants were selected for this course, including 2 nominations from Satpura Tiger Reserves, Madhya Pradesh.

These participants belong to Jharkhand, Madhya Pradesh, Maharashtra, Rajasthan, Uttar Pradesh, Kerala, and Uttarakhand, respectively. The Certificate Course was conducted at Wildlife Institute of India from 9-13 March 2023 and from 14-20 March 2023 at field station Panna Tiger Reserve, Madhya Pradesh. The course was structured as a modularised curriculum, where modules will be delivered using different training methods over the required time periods. The modularised structure provides flexibility to adapt the contents, methods, and duration of different topics based on the training needs of the participants. The course used a mix of field-based and classroom training sessions, in almost equal proportions, to facilitate the participants in applying the information from classroom sessions to the field conditions, and to understand the field-level phenomena and actions in a broader development context. The aim of conducting this Green Skill Programme course is to enhance the skill of the lower-income group, unemployed educated youth so that they could get good employment opportunities or generate alternate livelihoods for themselves.

Workshop on "Illegal Wildlife Trade, Wildlife Forensics and Safe Handling of Confiscated Wildlife for Mizoram Forest Department," Chief Wildlife Warden Conference Hall, Aizawl, Mizoram, 10-21 March 2023.

The workshop was organised by Mizoram Forest Department and Wildlife Institute of India. The objectives of the workshop were to (i) provide basic introduction regarding principles of restraint, handling and rescue and rehabilitation of commonly encountered species of wildlife in the state; (ii) enhance skills in handling rescued animals in distress or seized wildlife consignments; and (iii) enhanced preparedness for wildlife emergencies.

Mizoram, because of strategic location in Indo-Malayan region and undulated and inhospitable terrain resulted as a favorite transit area for transnational criminals dealing in illegal trade in wildlife contrabands, especially for live exotic species for pet trade. Therefore, a workshop for frontline staff of Mizoram Forest Department was envisaged to enhance capabilities of the frontline forest staff in dealing with wildlife offenses, illegal trade in exotic species, safe handling and bio-safety measures to be followed, especially in the context of the new amendment made in Wildlife (Protection) Act, 1972 passed by Parliament and notified through gazette notification dated 20 December 2022. A total of 38 participants from Department of Environment, Forest and Climate Change, Govt. Of Mizoram attended the workshop.

Workshop on "Capacity Building of Youth for Monitoring of Climate Change Impacts on Wildlife and their Habitats in the Himalaya," Dehradun, 13-16 March 2023

The objective of the workshop was to build the capacity of youth for monitoring of climate change impacts. It was organised by DST-NMSHE Phase II Project, WII. A total of 50 participants took part in the workshop. The workshop aimed to disseminate knowledge and build capacity on monitoring the biodiversity of the Himalayan region amidst climate change challenges. The workshop involved a series of talks and hands-on sessions by the faculty and researchers of WII.

Celebration of 'International Day of Action for Rivers', Haridwar and Kalsi, 14 March 2023

The 'International Day of Action for Rivers' was celebrated by the WII-NMCG team at two sites, Haridwar and Kalsi, Uttarakhand, with Rajkiya Inter College students of Govt. Girls Higher Secondary School,

Kharkhari, Haridwar and Govt. High School, Kalsi at Chandi Ghat, Haridwar and by organising a river rally and storytelling competition on 'Our Rivers' was also organised for the students.

WII-NMCG Team has initiated a series of exposure visits on the theme 'Learning Outside the Classroom' at the Wildlife Institute of India, Dehradun and other selected educational sites for Bal Ganga Praharis. A total of 100 students visited the WII-Nature Trail and Forensic Lab. An educational visit to Ganga Avlokan, Chandi Ghat and an educational site UCOST (The Science City), Premnagar, Dehradun, Uttarakhand, was also arranged for the students.

"Monitoring Himalayan Rivers in a Changing World" – An event celebrated on the 26th Anniversary of the International Day of Action for Rivers, Dehradun, 14-15 March 2023

The objective of the training programme was to build the capacity of young learners and disseminate knowledge on monitoring the rivers of Himalaya under the challenges posed by climate change. It was organised by DST-NMSHE Phase II Project, WII. In all 40 participants attended the training programme. The training aimed to build the capacity of young learners and disseminate knowledge on monitoring the rivers of Himalaya under the challenges posed by climate change. The participants were trained to monitor stream health using benthic macroinvertebrates as a biomonitoring tool, and were briefed on the Ephemeroptera, Plecoptera and Trichoptera (EPT) index, as well as the Biotic index.

National Level Spearhead Training Workshop for Veterinary College Students on 'Handling of Aquatic Species in Distress', Dehradun, 21-23 March 2023

The Wildlife Institute of India organised a workshop for veterinary college students on 'Handling of Aquatic Species in Distress' under the National Mission for Clean Ganga project in the Wildlife Institute of India, Dehra Dun. The objective of this training was to develop the capacity of veterinary college students about the ecological attributes of aquatic species of the Ganga River and its tributaries and to understand the significance of their conservation. The training comprises interactive sessions, hands-on sessions, field visits, and pre- and post-training evaluation through a questionnaire.

Seventy veterinary college students, doctors and scholars from various states and UTs such as Haryana, Uttar Pradesh, Uttarakhand, Himachal Pradesh, Rajasthan, Gujarat, Maharashtra, Tamil Nadu, Puducherry and Assam participated in the training workshop.

ATTENDED BY WII PERSONNEL

Smithsonian Conservation Biology Institute, USA and Montana Tech, USA, 13 May to 2 June 2022

Dr Parag Nigam, Sc-G visited Smithsonian Conservation Biology Institute, USA and Montana Tech, USA as part of the faculty exchange program under the Indo-US joint program supported by the Indo-US Science and Technology Forum (IUSSTF). Dr. Nigam provided technical inputs on animal capture techniques, establishment of ex situ breeding programs, animal care, translocation essentials relevant for Hangul, Cervus hanglu hanglu conservation in Kashmir. The US counterparts also provided technical inputs during the discussion. Discussions were held on the possible collaboration with the Smithsonian Conservation Biology Institute as well as with Montana tech University.

Participation in the International Webinar, 3 July 2022

Dr R Badola, Sc-G and Dean, FWS delivered a talk on "Wildlife Resources of Oriental Region: Conservation Challenges". This International seminar was organized by AMIST University, Malaysia (through webinar). The objective of the seminar was to sensitize graduate and post-graduate students of AMIST University, Malaysia towards Wildlife Conservation.

APN Mangrove Final Validation Workshop, Kanagawa, Japan, 17-18 August 2022

It was organized by the Institute for Global Environmental Strategies, Japan. Dr Gautam Talukdar attended the workshop.

8th International Conference on Environment and Ecology, Coimbatore, Tamil Nadu, 22-24 August 2022

The (Theme) objective of the international conference was "Make India Clean as well as Cleaning up Technologies". It was organised by the Department of Environmental Sciences, Bharathiar University. Mr. Vishnu. C.S. has presented a paper titled 'Spatial ecology of Indian Rock Pythons, Python molurus, in Sathyamangalam and Mudumalai Tiger Reserves, Tamil Nadu' in the conference.

Heritage Leadership Forum, Bergen, Norway, 21-22 September 2022

It was organized by the World Heritage Leadership Programme (WHLP) / ICCROM. Dr Gautam Talukdar, Sc-F attended the meeting.

Webiner Series during Wildlife Week, Dehradun, 2-8 October 2022

Dr R Badola, Sc-G and Dean, FWS delivered a talk on 'Freshwater Resources of Indian: Conservation Challenges' in Webiner Series in WII. The objective of the webinar was to sensitize students and researchers towards Wildlife Conservation.

International Conference on Young Systematists Forum, Virtual Conference, The Natural History Museum, SW7 5BD London UK, 11 November 2022

The objective of the forum was the taxonomic delineation of musk deer species in the Western Himalaya, India. The Young Systematists Forum, a Virtual Conference, organised it. Amira Sharief presented a paper on 'Taxonomic delineation of musk deer species in Western Himalaya, India' and presented it at the conference.

Meeting for Construction of Canopy Bridge over Railway Line, Meleng Beat under Mariani Range, 29 November 2022

Dr. Gopi G.V. provided technical inputs to Assam Forest Department by participating in the stakeholder meeting for construction of canopy bridge over railway line at Hoolongapar Gibbon Sanctuary held at Meleng Beat under Mariani Range.

Workshop on e-GOV Products and Services, Dehradun, 13 December 2022

The workshop was organized by C-DAC, Mumbai on eGOV Products and Services at Information Technology Development Agency (ITDA), Dehradun. The workshop was attended by Shri Dinesh Singh Pundir, STO and Shri Harendra Kumar, STO. The objective of the workshop was to aware the participants about C-DAC e-gov solutions and services demonstration. The awareness was given on e-Gov Solution and demonstration of e-Pramaan, Aadhaar data vault, aadhaar eco-system, mSeva appstore, Mobile seva.

National Conference for Zoo Directors, Mysuru, 18-19 January 2023

The Central Zoo Authority (CZA) organized a two-day conference jointly with Sri Chamarajendra Zoological Garden, Mysuru to discuss various issues relating to master planning and building the national capacity for species management and conservation breeding. The conference was attended by the senior ministers and officials from the Central and State Governments, subject matter experts, and zoo directors. Dr. Bitapi C. Sinha, Sc-G participated in the conference and gave a talk on 'Role of conservation education in zoos: A tool for eliciting public support'. Dr Parag Nigam, Sc-G also participated in the conference and provided invited talk on "Disease surveillance and preventive measures in captive animals".

Planning workshop for Asia Protected Area Partnership (APAP) technical meeting, Bangkok, Japan, 23–24 January 2023

It was organized by the IUCN - APAP Secretariat. Dr Gautam Talukdar, Sc-F attended the workshop.

Compulsory Training Workshop for IFS Officers on "Urban Forestry- Concept to Increase the Green Cover and Biodiversity", Dehradun, 25 January 2023.

Dr Gopi GV, Sc-F participated in three-day compulsory training workshop for IFS Officers organized at Forest Research Institute, Dehradun and provided professional inputs on "Wetland Biodiversity in Urban Spaces".

Conference on Current Research and Management Interventions in Natural and Mixed World Heritage Sites of the Asia and Pacific Region, Keoladeo National Park, Bharatpur, 2-3 February 2023

The objective of the project is to spread awareness about research and management interventions for long term conservation of Natural and Mixed World Heritage Sites of the Asia and Pacific Region. It was organised by WII-C2C.

The conference brought together site managers, researchers, educational institutions, NGOs and various other stakeholders associated with world heritage site management. There were 4 technical sessions covering 4 thematic areas of conservation of World Heritage Sites (WHS), viz. OUVs – Flora, Fauna & Threat, Climate Change and Disaster Risk Reduction, Local Communities & Heritage, and World Heritage Site Management Practices. The participants discussed strategies and shared their experiences. The outcome of the conference

could benefit scientists, policy makers, and site managers for better research in the WHSs. Dr Gautam Talukdar, Sc-F attended the conference.

Brooke India organized a Workshop on "Role of CSOs in the Promotion of One Health in India: A Futuristic Perspective", NASC Complex, Pusa, New Delhi, 14 February 2023.

The program is part of the activities planned by Brooke's India as an Action for Animal Health event supported both by ILRI and NAVS India. A session on 'Environmental aspects of One Health' was delivered by Dr P. Nigam, Scientist - G.

3rd International Workshop on Biodiversity and Climate Change – Sustainable Development Perspective (BDCC 2023), Kharagpur, 16-19 February 2023

The workshop has the objective of understanding feedbacks between biosphere and climate change, and exploring future prospects with space technology and advanced modelling to achieve net-zero targets. It was organised by the Centre for Ocean, River, Atmosphere and Land Sciences (CORAL), IIT Kharagpur.

The conference brought together eminent scientists, researchers, educational institutions, government officials associated with climate change research in this country. The conference had close to 200 research studies covering 5 thematic areas related to biodiversity & climate change, agriculture, biogeochemistry, global cryosphere and nature-based solutions to achieve net zero. The outcome of the conference could benefit scientists, researchers and policy makers to conduct multidisciplinary research in the field of biodiversity and climate change. Dr Gautam Talukdar, Sc-F attended the workshop.

Workshop on Enhancing your Practical Skills to Predict Species Distribution across Space and Time using Niche Theory, ICCON, Mysuru, 14-15 March 2023.

Dr S. Sathyakumar, Sc-G and Registrar conducted the ecological forecasting workshop at the Indian Conservation Conference (ICCON), Mysuru. The objective of the workshop was to enhance practical skills to predict species distribution across space and time using niche theory. It was organised and sponsored by the MoEFCC. The hand-on training was provided to the participants on species distribution modeling, mapping and climate change scenarios development. The workshop gave hands-on training to 40 students from environmental/zoological sciences background.

Hindi Workshop, Dehradun, 29 March 2023

Smt. Alka Aggarwal, STO participated in the Hindi workshop organized by the Indira Gandhi National Forest Academy, Dehradun. Issues related to use of official language in the office work and official language acts and rules were discussed. It was emphasized to increase the use of official language in offices.

ACTIVITIES & PROFESSIONAL SUPPORT

COMPLETED

MANAGEMENT EFFECTIVENESS EVALUATION OF NATIONAL PARKS AND WILDLIFE SANCTUARIES IN INDIA 2022-23

Funding Source
Ministry of Environment Forest and Climate Change

Date of Initiation
April 2022

Date of Completion
March 2023

Investigator
Dr Gautam Talukdar

Researchers
Dr Nasim Ahmad Ansari and Ananya Das

Objectives: The project aims to assess the management efficacy of 150 National Parks and Wildlife Sanctuaries in the country and provide valuable insights into their management systems and practices.

Progress: The constitution of Independent Regional Expert Committees and communication with Chief Wildlife Wardens were done. An inception cum planning workshop with Regional Expert Committees was organized on 13 August 2022 at India International Centre, Delhi. Active field visits began in September and lasted till February. WII provided regular support and coordinated with the chairpersons and members of the Independent Regional Expert Committees in terms of provision of old MEE reports, booking of air tickets through Balmer Lawrie Ltd., processing of travel claims, providing necessary logistic support and overall coordination. WII was involved in data compilation, analysis and review of strengths, weaknesses, and immediate actionable points.

Outputs and Outcomes: A proposal was submitted to carry out the MEE exercise for the rest of the 116 PAs of the repeat cycle.

Milestone: A draft technical report was submitted to MoEFCC.

ONGOING

FIFTH CYCLE OF MANAGEMENT EFFECTIVENESS EVALUATION (MEE) FOR 51 TIGER RESERVES IN INDIA DURING 2022-23

Funding Source
National Tiger Conservation Authority

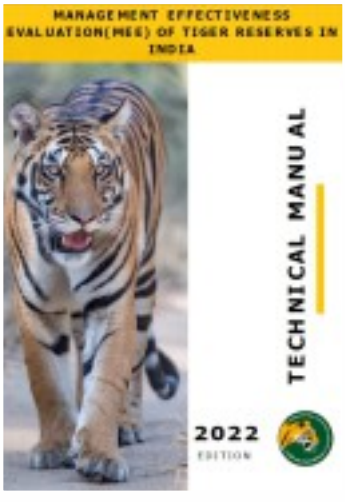
Date of Initiation
August 2022

Investigator
Dr Gautam Talukdar

Proposed Date of Completion
April 2023

Researchers
Dr Nasim Ahmad Ansari and
Aqsa Rehman

Objectives: The objectives of the project are to assess the management efficacy of 51 Tiger Reserves (TRs) of the country and to provide valuable insights into their management systems and practices.



Progress: After the inception meeting in June 2022, chairpersons started planning field visits. REC Committees or MEE teams (two teams in each cluster) were constituted for evaluation of 51 Tiger Reserves. Each team comprised of a chairperson, 2-3 members and one WII faculty representative and five TRs were allocated to evaluate.

After the workshop, scientific inputs were provided to REC MEE teams to initiate field visits, especially the process of MEE on how to conduct evaluation, and provided necessary documents, such as a technical manual, previous MEE reports, assessment criteria form, scoring matrix etc. as reference documents.

Most of the teams have undertaken field visits during August to October 2022. In December 2022, field visits of all TRs were completed. After completion of field visits, Chairpersons submitted reports to WII along with supporting documents.

WII was involved in the compilation of the reports received, creation of a database for all the supporting documents received, entry of raw data, analysis of scores of individual TRs, writing the summary report and the final report.

Outputs and Outcomes: A meeting to take stock of report preparations of the MEE exercise for Tiger Reserves of the country was held on 9th March 2023 at NTCA Conference Hall, New Delhi. A consultative meeting was held on 15th March 2023 at Scope Complex, New Delhi, wherein, Field Directors, evaluators and scientific experts from WII deliberated upon the outputs of the MEE exercise before finalization of the summary report. A draft technical report was submitted to NTCA.

Milestones: The MEE TR summary report was released by the Hon'ble Prime Minister, Shri Narendra Modi on 9 April 2023 at Indian Conservation Conference 2023, Mysuru, Bengaluru.

CELL

Information Technology and Remote Sensing & GIS Facility

Information Technology, Remote Sensing, and Geographic Information System facility is part of almost all wildlife research projects, education, and training. The facility is available 24x7 to the faculty members, trainees, researchers, students, and collaborators working with the Institute. Many desktop computers configured with MS Windows, Linux, and specialized analytical software for data processing are available in the dedicated laboratories.

The computer facility is provided by a wide array of hardware setups connected to the Local Area Network (LAN). Intel Xeon servers have Storage Area Network (SAN) and Network Attached Storage (NAS) systems for the Internet, Intranet, database management, and library automation services. There are more than 400 nodes and 700 users on WII LAN. Wi-Fi connectivity is provided in Hostels, Guest Houses, Classrooms, auditoriums, Board Room and Porta Cabin. The Institute has dedicated and unshared 500 Mbps (fibre) internet leased line connectivity through BSNL.

The Geoinformatics laboratory caters to the research and training program of the Institute. The laboratory is equipped with several high-end workstations, A0 scanner-cum-plotter, and software packages viz. ArcGIS, ERDAS Imagine/Drone image processing software for landscape-level analysis. A dedicated team provides support and training in IT and Geoinformatics. A Remote Sensing, GIS, and Landscape Ecology module is conducted for students of M.Sc. in Wildlife Science and Officer Trainees of Advanced PG Diploma and Certificate Courses in Wildlife Management conducted by the Institute. Hands-on training is also provided to other graduates, post-graduate students, and interns. Open-source software viz. QGIS, GRASS, and R are also used for teaching and training. The following activities were undertaken by the Cell during the reporting period:

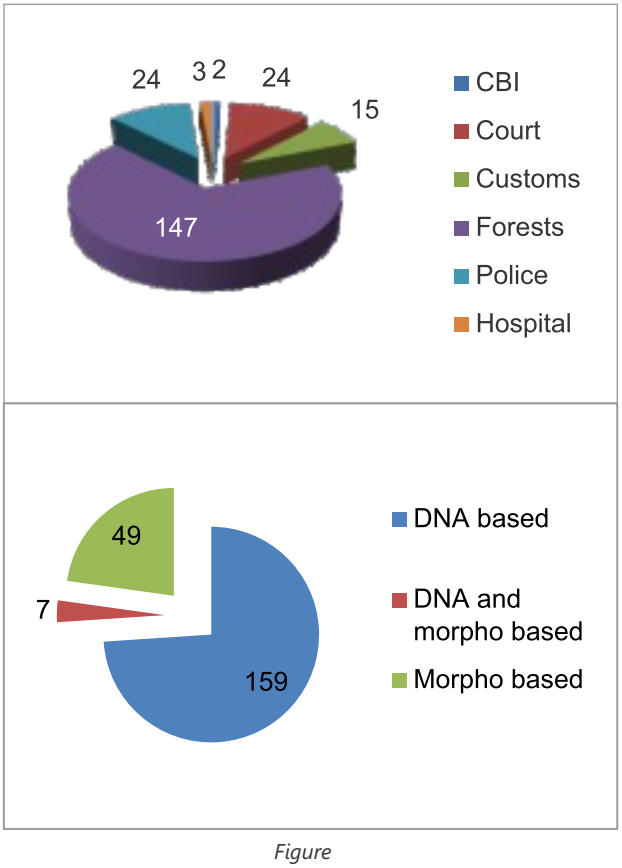
(IThe IT and RS/ GIS Cell is regularly providing a facility for conducting online meetings, workshops, webinars,

and lectures in the Board Room, Auditorium, Porta Cabin and in the users' office desktops of the Institute using online communication software viz. Microsoft Team, Webex, Video Conferencing Facility. (ii) The unshared internet leased line connection of the Institute has been upgraded from 350 to 500 Mbps by BSNL. (iii) The new Internet Communication and email Service on Linux-based Server has been installed with secured and limited Spamming/Spoofing emails and daily Anti-spam report to all email users. The new email service on the new mail server provides 50 GB of space to each user. (iv) As per the mandate of the Institute to implement e-Office for efficient and effective correspondences among all the Department/Cells of the Institute and external offices, viz. sister organization and MoEFCC, etc. In this regard, the email Ids on the "gov. in" domain for all permanent employees has been created in consultation with NIC, and a different process has been initiated to make VPN connections for all to use the e-Office portal of MoEFCC. (v) As per the e-governance mandate, WII implemented the SPARROW portal for appraisal reports of Indian Forest Service Officers (IFS) serving in WII and participating in different training courses conducted by WII. (vi) As per the e-governance mandate and time-to-time instruction by the Bureau of Immigration (BOI), WII regularly provides information through BOI portals about foreign nationals who enrol in different training courses conducted by WII. (vii) As per the e-governance mandate regarding the government land information system, WII regularly updates all WII's land and building details on the GLIS portal. (viii) WII hosts all the GOI e-procurement portal tenders and provides technical support in the GeM portal. (ix) A facility was added to the Institute website for auto conversion of web content into Hindi. (x) Institute has official social media handles (viz. Twitter, Facebook, Koo, Instagram, and YouTube). Ministry has asked to proactively share the Institute's research and academic activity on these social media platforms and upload/share the statistics to the ministry. (xi) A blue tick (verified account) was awarded to the Institute's Twitter account, letting people know that an account of public interest is authentic. (xii) Microsoft Teams is being used as a workspace for real-time collaboration, screen sharing, and communication for online webinars, interviews, and virtual meetings. (xiii) National and essential events were live-streamed on the Institute's website and social media platforms. (xiv) As per the e-governance mandate, all permanent/contractual employees and researchers are enrolled in the Biometric Attendance system at WII. Daily attendance, Leave, and Tours are managed through web-based software (LAMS). Presently there are 745 Employees and Researchers enrolled in LAMS. (xv) Network Area Storage (NAS) of 240 TB capacity (Dell EMC NX3240) has been installed in this Cell for the MEE Project database. (xvi) To contain the spread of the Noval Corona Virus, a user policy is implemented to keep safe distancing in the Computer

and GIS laboratory. Also, a strategy is in place for staying safe in the computer user facility. (xvii) In the GIS domain, the researchers maintain a spatial database of the Protected Area Network of India (PAs) and Biogeographic zones/provinces and disseminate it within Institute and MoEFCC. (xviii) GIS, RS, GPS, and Mobile apps are being used in most of the research projects of the Institute for wildlife research and Conservation. Work is in progress on developing a spatial database on the boundaries of the country's national parks, wildlife sanctuaries, conservation reserves, and community reserves.

Wildlife Forensic and Conservation Genetics Cell

The Wildlife Forensic and Conservation Genetics (WFCG) Cell was established to strengthen the enforcement of Wildlife (Protection) Act, 1972 of India. The main functions of the Cell include identification of species from variety of wildlife parts and products for forensic investigation, along with expanding an already available repository of wildlife reference samples and R&D on newer forensic tools. It is now a recognized laboratory for conducting the wildlife forensic research and casework for supporting the judiciary process. Besides these, the WFCG Cell plays a role in sensitizing enforcement agencies in crime scene examination and proper collection of evidence through regular training and workshops. Being a focal agency in Southeast Asian region, it also provides advanced training for wildlife crime analysis to the scientific organizations of the



Figure

neighboring countries. The WFCG cell provides services related to molecular ecology to various ongoing research projects that involve phylogeny, population genetics, genomics and endocrinology.

During 2022-23, the cell received a total of 215 wildlife offence cases from enforcement agencies across the country, of which 2 from CBI, 24 from honorable Courts, 15 from Customs, 147 from Forest Department, 3 from hospital and 24 from the Police (Fig. 1). An assortment of biological products was received for species identification and of these, 159 cases contained tissue samples requiring DNA based techniques, 49 cases requiring morphometric technique and 07 cases requiring both DNA and morphometric techniques for species identification. The Cell provided reports on species identification for 237 cases and a further 03 summons were received from Hon'ble courts for appearances as an expert scientific witness during this period.

Specialized inputs were provided in various visiting classes at WFCG Cell. Experts of WFCG Cell's were also provided inputs in the workshops organized by the TRAFFIC-India, Wildlife Crime Control Bureau (WCCB) and regional office of National Academy of Customs, Indirect Taxes and Narcotics (NACIN) for the training of forests and custom officers in controlling illegal wildlife trade.

The WFGC Cell is involved in conducting research in the field of 'Conservation Genetics' and 'Wildlife Endocrinology', where cutting-edge molecular tools are being used to understand species biology. The conservation genomics laboratory also contributes to the objectives of several projects at the institute. Besides, WFCG Cell published peer reviewed articles for the genetic studies of wild animals.

New initiative through WFCG Cell for setting up of Pashmina Certification Centre: Wildlife Institute of India (WII), Dehradun, signed an 'Memorandum of Understanding (MoU) with the Export Promotion Council for Handicrafts (EPCH), New Delhi, for setting up a 'Pashmina Certification Centre' in WII on 5 January 2023. Through this MoU, the EPCH collaborated with WII to

establish a Pashmina Certification Center (PCC) for its associated members involved in Pashmina Trade.

The purpose of setting up this laboratory is to streamline the Pashmina Trade and to provide a one-stop testing facility to certify genuine Pashmina Product that is free from any prohibited fibers to the associated manufacturers, exporters, and traders. All the tested products will be labeled with a traceable unique id tag with individual e-certificates, enabling a seamless trade of such products in national and international markets. In the absence of such a facility in the country, commercial woolen products get under scrutiny to rule out the presence of prohibited fibers at the exit points of the country, which causes delays in clearance and associated demurrage charges and financial/business loss to the exporters and traders. The PCC at WII, Dehradun, will assist honest exporters and traders involved in the trade of genuine Pashmina products. Setting up such a facility in India will be a game changer for the seamless trade of genuine Pashmina products with authentic certification.

In concurrence with the Central Government's policy, it is a kind of facility based on the Public-Private Partnerships (PPP) model for assisting the Pashmina traders in obtaining authenticity certificates for selling certified and genuine Pashmina products. Under this MoU, the advanced technologies have been housed in a single facility supporting Pashmina test procedures. It is an example of a self-sustaining and revenue-generating facility in a government organization supporting associated exporters and traders on a payment basis. This facility has also generated employment opportunities for budding professionals on the PPP model. This certification will help buyer to procure authenticated and certified Pashmina products. Further, this will discourage use of prohibited fiber thereby resulting in conservation of Chiru in their habitat.

Library & Documentation Centre

The Library and Documentation Centre (L&DC) of WII plays a vital role in dissemination of information to a wide range of users including scientists, researchers and wildlife managers. It was established in line with WII's mission as multidisciplinary information and learning resource centre on biodiversity conservation and management. It has the following objectives: (i) To serve as a repository of all wildlife related literature published in India; (ii) To acquire, organize and disseminate all relevant literature on biodiversity conservation and related fields; (iii) To serve the user readership through normal and special library & information services; (iv) To establish and maintain links with other national information systems in India and other countries to ensure free flow of information at national and international levels; (vi) To serve as a training center for information personnel and users; and (vii) To bring out periodic updates/bulletins on Current content of

periodicals, Research in progress, unpublished research literature i.e. dissertations, thesis, Compilation of bibliographies on various themes for ENVIS bulletins and database for WII publications.

The L&DC now holds approximately 30,000 books, 8,800 maps/toposheets, more than 7,500 bound volumes of old and rare journals. The library also maintains good collection of scientific paper number to 11,400. The L&DC is fully automated using automation software i.e. Web centric LIBSYS 10 (Library Management Software) and RFID technology. All library users i.e. researchers, officer trainees and faculties can access Online journals and online databases subscribed by the L&DC through Intranet. Being connected to the library facility, the users have privileged to access all in-house databases like books, reprints, Indian wildlife abstract, map/toposheet collection, press clippings, specialized bibliographic databases on Musk Deer, Application of Telemetry in Wildlife, Wildlife and Protected Area Management in Madhya Pradesh, Mountain Ungulates, Rainforests Conservation in India, Ungulates of India, Rajaji National Park, Galliformes of India, Freshwater Turtles of India, Telemetry in Wildlife Science, Coastal and Marine Protected Areas of India, Waterbirds of India and Ecology and Management of Grassland Habitats in India, Bibliography on the Fauna and Microflora of the Indian Himalayan Region. The L&DC provides a variety of Library & Information Services to its user.

Infrastructure and physical environment of L&DC is reorganized. RFID technology is implemented in Library & Documentation Centre. Library documents tagged with RFID chips and RFID gate is installed to restrict unauthorized access of library documents. During this period, approximately 15,000 documents were issued and consulted. Value Added Service/ Ready Reference Service was provided to approx. 800 users. More than 100 queries were attended from outside users and more than 2,000 bibliographic references were provided to the users. E-Document delivery service was also provided to outside users during this period. In-house databases were regularly updated during the reporting period. The WII publication database was updated by adding the research papers, thesis, reports, popular articles, paper

presented and other categories in this period. Specialized bibliographies were also compiled for different courses and on user request.

Environment Impact Assessment Cell

The Environment Impact Assessment (EIA) Cell at WII was established in 1993 with the broad objective to address conservation challenges amidst India's rapid economic development. Its mandate is to integrate environment and biodiversity concerns into developmental planning and appraisal of developmental projects. The EIA Cell also engages in building capacity of various stakeholders through courses and workshops. Through development of innovative methodologies and tools, it provides science-backed advisory support for decision-making to statutory bodies at the State and Union levels as well as to various courts of judicature, whenever called upon.

During the period of 2022-23, the EIA Cell has initiated and/or completed several projects. On the directions of the Standing Committee of the National Board for Wild Life (SC-NBWL) and at MoEFCC (Wildlife Division) request in April 2022, the EIA Cell compiled and submitted a 'Holistic Plan' for a 10 km-radius landscape area around Rajaji Tiger Reserve in Uttarakhand towards identifying critical zones for wildlife and ensuring sustainable River Bed Material (RBM) mining practices. The Final Report was submitted to the SC-NBWL in November 2022. In November 2022, a similar 'Cumulative Impact Study' was requested by the SC-NBWL and MoEFCC (Wildlife Division) for a 10 km-radius landscape around Ranthambhore Tiger Reserve in Rajasthan towards identifying critical zones for wildlife and other areas. The Final Report was submitted to the SC-NBWL in March 2023.

Upon a request from the Madhya Pradesh Forest Department and after fund transfer required for the study in May 2022, a technical and fact-finding report with mitigation and monitoring measures for the proposed high level bridge project passing through Son Gharial Sanctuary on Bahri-Hanumana SH-52 near Jogdah was submitted in November 2022. The Cell's ongoing project in Jharkhand entails the preparation of an 'Integrated Wildlife Action Plan' on the request of the user agency DFCCIL (a SPV under the Ministry of Railways). A rapid study was conducted and an 'Indicative Plan/Framework' with financial projections was submitted to the Jharkhand Forest Department in August 2022. The Final Plan will be submitted in December 2023.

Upon NTCA's request in December 2022, the EIA and Tiger Cells have been jointly assigned the task of assessing the ecological impacts of the proposed Jamrani Multipurpose Dam project in the Nainital district of Uttarakhand. Upon directions of the MoEFCC (Forest Conservation Division), the PCCF (WL), Govt. of Odisha approached WII to undertake the preparation of a 'Wildlife Management Plan' with special emphasis on elephants as part of Stage-I Forest Clearance compliance condition for the proposed Naini opencast coal mining project in the Angul district of Odisha. The EIA Cell research team has begun fieldwork, including primary and secondary data collection.

The EIA Cell provided inputs to a starred question (no. 267) on western hoolock gibbon conservation at Hollongapar Gibbon Sanctuary asked during the seventh session of the 17th Lok Sabha. The Cell also provided technical inputs to Primate Research Centre, North East India's proposal towards establishment of artificial canopy bridges to facilitate movement of golden langur over a road in Assam's Kokrajhar district.

In summary, four technical reports and several site-inspection and other Committee reports/observations were submitted through the WII's EIA Cell to relevant decision-making authorities during the reporting period. The EIA Cell continues to grow in stature and experience while staying true to its mandate in line with the wider Institutional aims, objectives and mission.

Environmental Information Awareness Capacity Building and Livelihood Programme (EIACP)

EIACP Programme Centre Resource Partner "Wildlife & Protected Areas", Wildlife Institute of India, Dehradun formerly known as ENVIS was established as the 23rd Environmental Information System (ENVIS) Centre in India in September 1997. EIACP Programme Centre conducted various Outreach Activities by celebrating various Green National & International Environment Days in which total outreach through various social media platform was recorded to 1,16,901. The activities were namely (i) International Day for Biological Diversity, 22 May 2022; (ii) World Environment Day, 5 June 2022; (iii) On the Spot Painting and Drawing Competition 'Draw your Women Role Model' on 9 June 2022; (iv) Hariayli Saptah, 1-9 July 2022; (v) International Day for the Conservation of the Mangrove Ecosystem, 26 July 2022; (vi) International Tiger Day, 29 July 2022; (vii) International Vulture Awareness Day, 5 September, 2022;

(viii) World Ozone Day, 16 September, 2022; (ix) National Wildlife Week 2-8 October 2022; (x) International Mountain Day, 11 December 2022; (xi) Promotion and Awareness on Mission Lifestyle for Environment (LiFE); (xii) International Year of Millets 2023; (xiii) Great Backyard Bird Count, 18-21 February 2023; and (xiv) World Wildlife Day, 3 March 2023.

To celebrate above Green National & International Environment Days the WII-EIACP Programme Centre conducted a total of 20 activities in which a total of 70,758 participants participated through online/ offline mode. The outreach activities conducted were namely Online Photography Contest; Painting & Drawing Contest; Poster Making Contest; Online Quiz Contest; Online Short Poem Contest; Webinar series on Cheetah Reintroduction; Webinar Series on National Wildlife Week; Bird Count Activity (GBBC).

EIACP Programme Centre published 39 various publications namely Infographics; Posters; Galliformes of India; Special Publication on LiFE; Photo of The Day; EIACP "Wildlife & Protected Areas" Quarterly Newsletters; Short video documentaries etc. The total outreach of these publication through social media platforms was recorded to 93,137.

Wildlife Extension & Audio Visual

The Cell caters to the needs of various requirements of academic activities. It maintains 16 mm films, video films, CDs/DVDs, and a photo library. During the reporting period, the Cell supported all the workshops, seminars, meetings and courses; visiting classes; guest lectures and celebrations of important days or events.

As part of its information dissemination activities, the Institute prepared four quarterly issues of the e-newsletter of WII during the reporting period. The issues were uploaded in the website of the Institute during the reporting period.

The Hon'ble Minister, Shri Bhupender Yadav and other senior officials from the MoEFCC visited WII on 29 April 2022. It was an excellent opportunity to showcase the Institute and its work before the dignitaries. During the earlier part of the day, the meeting was conducted in the Board room, where the invited teams interacted with the dignitaries. Dr S.P. Yadav, Director, WII, felicitated the Hon'ble Minister. A presentation on "Blue print to make WII a World Class Institution - Way Forward" was given by Dr Y.V. Jhala, Dean, Faculty of Wildlife Sciences. A number of research and other posters were displayed, and the researchers were present to describe the posters. The Hon'ble Minister also visited other facilities of the Institute and inaugurated a newly constructed laboratory. Director General & Special Secretary, MoEFCC, Government of India; and other senior officials have also accompanied the Hon'ble Minister. Shri Yadav also released a film on Sangai.

The Hon'ble Minister, Shri Bhupender Yadav, visited WII, Dehradun, 29 April 2022.

Founders Day of the Institute Celebrated, Dehradun, 23 May 2022

The Wildlife Institute of India was founded on 22 May 1982 at the FRI Campus by amalgamating the then existing Directorate of Wildlife Research and Training of FRI and the Central Crocodile Breeding and Management Training Institute. The Founders Day of the Institute was celebrated on Monday, 23 May 2022 (as 22 May 2022 was Sunday).

Shri B.C. Choudhury, Retired Scientist-G, delivered a talk on the 'History of WII and its contribution to wildlife science' on this occasion. Shri S.K. Mukherjee, Former Director, Dr Ruchi Badola, Registrar, faculty members and staff participated in the celebration.

World Bicycle Day Celebrated at WII, Dehradun, 3 June 2022.

The Department of Youth Affairs, Ministry of Youth Affairs & Sports, Government of India celebrated World

Bicycle Day on 3 June 2022 as a part of Azadi Ka Amrit Mahotsav. The Institute also celebrated the event with full fervour. A Cycle Rally was organised in the Institute Campus area. The faculty members, staff and researchers voluntarily participated in the event to celebrate 75 years of India's Independence.

World Environment Day Celebration at Wildlife Institute of India, Dehradun, 5 June 2022.

The World Environment Day Celebration at Wildlife Institute of India was held at WII Auditorium on 5 June 2022. At the outset, Dr Ruchi Badola, Registrar, welcomed the Chief Guest, Shri Ashok Kumar, IPS, DG Police, Uttarakhand. He released documentary films & posters prepared by WII (ENVIS partner) and also addressed the gathering. The faculty members, staff, researchers and students attended the event.

World Environment Day Celebrations, Mount Abu, 5 June 2022.

This year's theme for World Environment Day 2022 was 'Only One Earth'. An awareness workshop was conducted for the students. Various interactive sessions related to water ecosystem, rainwater harvesting, and distribution of biodiversity were held with the students of Nursing College, Abu Road. In the awareness program, around 225 students and 6 teachers participated.

An interactive online session on water solutions for the future generation was held with the National and International summer camp students of 'Brahma Kumaris' at the studio of Brahma Kumaris headquarters at Mount Abu. A total of 300 student participated

through zoom meeting and more than 500 people participated through live YouTube session.

The Institute participated in the 'Arogya Van Initiative' inaugurated by the Hon'ble Governor of Rajasthan at Brahmkumaris Headquarter, Mount Abu on the occasion of WED 2022. A talk on 'Harmony between humans &

Nature and water conservation' was also given by Dr Bitapi C. Sinha to the participants of the event. The mission of the initiative is to plant 75 species and care for them for 75 days. A total number of 150 people participated in the event.

An awareness workshop was held with the students of 'Aadarsh Vidya Mandir', Mount Abu. Students were sensitized about the importance of wildlife in an ecosystem. An origami session was also conducted with the students to aware them about different species. In the awareness program, around 180 students and 6 teachers participated.

An awareness workshop was conducted with the school students of 'St. Sophies School' at Mount Abu. The students were sensitized through various games and web of life activity and awareness material was distributed. A total number of 200 students participated in the program.

Poster Making Contest for School Children, Arya Inter College, Dehradun

A poster making contest was organized for the students of Arya Inter College Subhash Nagar Dehradun. The theme of the contest was “Only One Earth”, and a total of

26 students participated in the contest by drawing some of the wonderful posters related to the theme. On the recommendation of selection committee, a total of eight students were awarded cash prizes and appreciation prizes to all the 26 students.

Yoga Day 2022 Celebrated at WII, Dehradun, 21 June 2022.

Awareness regarding Drug Abuse among Youths, Dehradun, 17 March 2023.

The Narcotics Control Bureau organised a drug awareness campaign at the Wildlife Institute of India. The event aimed to educate the employees, researchers, and faculty about the negative impact of drug abuse on individuals and society. Junior Intelligence Officers Shri Ashu Sharma and Shri Kavindra Dhami led the campaign by highlighting drug addiction's legal, social, and health-related consequences. The initiative was an essential step towards promoting drug-free environments and creating awareness about the hazards of substance abuse among the academic and research communities.

The drug awareness campaign at the Wildlife Institute of India also focused on providing information about the various types of drugs and their effects on the human body. The officers highlighted the importance of seeking professional help for addiction and emphasised the need for a supportive environment for recovery. The campaign aimed to empower individuals to make informed decisions and avoid the pitfalls of drug abuse, ultimately promoting a healthier and safer society.

Tiger Cell

In order to achieve the goal of tiger conservation through a holistic approach based on science, the Tiger Cell (in collaboration with the National Tiger Conservation Authority – NTCA) was initiated at WII in April, 2016. The main mandates of the Cell include (i) periodic, country-wide assessment of tigers, co-predators, prey and their habitat, (ii) ecological monitoring of the Tiger Reserves, (iii) implementation of MSTrIPES in Tiger Reserves, (iv) site appraisals and evaluation of development projects vis-à-vis tiger distribution, dispersal and corridor network, (v) maintain National Tiger Photo Database for controlling illegal wildlife trade related to tigers, and (vi) provide training as and when required for ecological monitoring, research and management.

Major activities of the Cell during past one year include:

Countrywide assessment of tigers, co-predators, prey and their habitat – 5th Cycle: The Cell coordinated with the States and provided scientific and technical inputs to conduct Phase I & Phase III/IV surveys in all potential tiger habitats of tiger range states of the country, Goa and Nagaland.

Monitoring System for Tigers: Intensive Protection and Ecological Status (MSTrIPES): The Cell provided regular inputs in conceptualization, design and customization of multilingual android mobile applications for MSTrIPES patrol, ecological and polygon search modules. Development of Polygon Search Riparian module for Sundarbans. The Cell joined development of CaTRAT (Camera Trap Data Repository and Analysis Tool) in collaboration with IIIT, Delhi for processing camera trap data.

Management Effectiveness Evaluation (MEE) of Tiger Reserves: The Cell completed the analysis and compilation of documents and drafting reports.

National Repository for Camera Trap Photographs of Tigers (NRCTPT): Over 100,000 tiger photographs maintained under National tiger photo database library at the Cell. New tiger photographs obtained as a part of national tiger assessment 2022 are being archived. Matching done with the photographs of the tiger carcasses, tiger skins seized and snared tigers to ascertain the identity of the individuals and their photo-capture histories and information shared with the NTCA and State Forest Departments.

Tiger Conservation Plans: Review of Tiger Conservation Plans for Kamlang, Indravati, Periyar, Parambikulam and Ranthambhore Tiger Reserves.

Assessment of developmental proposals: Assessment of developmental project proposals and comments submitted to NTCA for further submission to NBWL and MoEFCC.

Evaluation of Eco-Sensitive Zones: Assessment of eco-sensitive zones around tiger reserves tiger reserves.

Training and Capacity Building: (i) Training and capacity building done on all India tiger estimation using MSTrIPES ecological module & polygon search method for approximately 3,000 personnel belonging to state forest departments and conservation partners across India; (ii) Training of biologists recruited for All India Tiger Estimation project. (iii) Conducted training of IFS Probationers. (iv) Conducted introductory class on All India Tiger Estimation and use of MSTrIPES for IFS Officers at IGNFA.

Development of proposals: (i) Corridor assessment in and around Palamau Tiger Reserve. (ii) Tiger carrying capacity in Corbett and Rajaji Tiger Reserves. (iii) MSTrIPES implementation in Jammu and Kashmir.

Research and technical assistance to NTCA, Government of India and State Forest Departments: (i) Publication of water atlas of tiger reserves in India. (ii) Publication of fire audit protocol for tiger reserves in India. (iii) Drafting a Vision Plan for tiger conservation in India – 2022-2032. (iv) Part of NTCA Committees on proposals for declaring Kumbhalgarh and Dholpur Tiger Reserves in Rajasthan. (v) Part of NTCA Committee for assessment of management effectiveness and biodiversity value of Palamau tiger reserve in compliance to order of Honorable High Court of Jharkhand. (vi) Part of NTCA Committee to assess the suitability for reintroducing tiger(s) in Seljhar area, Mukundara Hills Tiger Reserve, Rajasthan. (vii) Part of NTCA Committee for investigating tiger mortality in Ranthambhore Tiger Reserve, Rajasthan. (viii) Part of MoEFCC Technical Committee for making recommendations for development of alternate potential sites for lions in Gujarat. (ix) Review of Vision Plan for Palamau Tiger Reserve. (x) Technical assistance to NTCA for 4th Asia Ministerial Conference for tiger conservation held at Malaysia and 2nd International Tiger Summit held at Vladivostok, Russia. (xi) Inputs to NTCA for assessing FSI report on change in forest covers in Tiger Reserves. (xii) Inputs to NTCA for Bagh Rakshak Award. (xiii) Inputs to NTCA for workshop on Impact of Eco-tourism/ tourism on Protected Areas: Challenges and, Issues. (xiv) Regular inputs in review meetings, Technical Committee Meetings, Chief Wildlife Warden and Field Directors' meetings organized by NTCA. (xv) Regular inputs in PG Diploma, Certificate, M.Sc., PhD courses of WII. (xvi) Regular inputs for visiting classes at WII.

National Wildlife Database Cell

The objectives of the computer-based National Wildlife Database are to: (i) Provide readily accessible and comprehensive information on the conservation status of biogeographic regions, habitat types, individual animal species and the network of protected areas in the country; (ii) Establish linkages with researchers, protected area managers and planners; and also with other data centres; and (iii) Facilitate research and training activities in wildlife by providing bibliographic references on protected areas, habitat types and animal species.

During 2022-23, the main thrust of the activities has been on the updation of the databases on Protected Areas, Species and Wildlife Bibliography, based on the collection of current information from various published/unpublished sources during above mentioned period. The Protected Area Database of the country has been updated and presently there are 1002 Protected Areas including 106 National Parks, 567 Wildlife Sanctuaries, 220 Community Reserves and 109 Conservation Reserves in the country, covering 1,73,767.29 sq km which is 5.28% of the total geographical area of the country. Species Database was corrected and updated by adding information on the distribution of mammalian species in various protected areas. Bibliographic Database was updated by adding of current literatures published on Indian wildlife in various issues of journals/ periodicals during the said period. Protected Area Network report has been updated by incorporating latest information. Trainees Database has been updated further and now there are 748 Diploma and 654 Certificate officer trainees trained in various courses including 285 foreign nationals. Website of the national wildlife database has been updated further by incorporating the latest information. Nearly one hundred seventy queries were received and outputs were provided in various desired formats.

WII - Category 2 Centre (WII-C2C) for World Natural Heritage Management and Training for Asia and the Pacific Region

Mission and Objectives: The Centre's mission is to strengthen implementation of the World Heritage Convention in Asia and the Pacific Region by building the capacity of all those professionals and bodies involved with Natural Heritage site inscription, protection, conservation and management in Asia and the Pacific region, through training, research, dissemination of information and network building. The overall objective is to focus on Natural Heritage conservation issues with the aim to: (i) contribute to the strengthening of capacities in the management of Natural World Heritage in the region; (ii) contribute to achieving a more balanced representation of properties from Asia and the Pacific on the World Heritage List; (iii) raise awareness among the general public and the youth in particular of the importance of Natural World Heritage and the need to protect it; and (iv) foster international cooperation on Natural World Heritage initiatives.

WII-Governing Body Meeting

At the 71st Meeting of the Governing Body of WII held on 3 November 2022 at MoEFCC, New Delhi, the agenda of WII-C2C was considered. The Governing Body approved the proposal for C2C: (i) To resume the MSc Course in Heritage Conservation and Management from the next academic session, i.e., 2023-24; and (ii) The proposal of C2C to run as a regular cell of WII with allocation of budget under this head from MoEFCC.

Capacity Building Trainings and Workshops

(i) Webinar on Climate Vulnerability Index for World Heritage Sites; (ii) Natural Heritage Site Managers Workshop, Rishikesh; (iii) Training Programme on Monitoring of OUV for Western Ghats – Talacauvery Sub-Cluster, (iv) MPTB Nomination Dossier workshop, Jabalpur; (v) Workshop on Natural Heritage and Geo-Informatics on International GIS Day; (vi) Training Programme on Monitoring of OUV for Khangchendzonga National Park, Sikkim; (vii) "Strengthening Bonds, Building Resilience" International Heritage Symposium on Nature-Culture Linkages and Eco-Disaster Risk Reduction; (viii) Making Regional Heritage Global: Focus on the Future, Sundarbans National Park; (ix) Conference on Current Research and Management Interventions in Natural and Mixed World Heritage Sites of the Asia and Pacific Region, Keoladeo National Park, Bharatpur; (x) Classroom Sessions; (xi) Session on 'Natural Heritage Conservation' (Module –

Principles and Practices of Wildlife and Protected Area Management) for IFS Officers of WII PG Diploma Course in Advanced Wildlife Management, 7 Apr 2022; (xii) Session on 'Heritage Tourism' (Module – Visitor Use Management and Interpretive Planning) for IFS Officers of 43rd PG Diploma Course in Advanced Wildlife Management, 5 May 2022; (xiii) Session on 'Valuation of Carbon Ecosystem Services (Coastal and Terrestrial)' (Module – Ecosystem Services) for IFS Officers of PG Diploma Course in Advanced Wildlife Management, 24 May 2022; (xiv) Session on 'World Heritage and other Biodiversity-related Conventions' and on 'World Heritage Management' for MSc in Wildlife Science Course, 3-4 November 2022; (xv) Session on World Heritage Convention and Synergies with International Conventions for IFS Officers of Compulsory Training Workshop on 'International conventions and their synergies with respect to climate change, forestry, wildlife and biodiversity conservation', 8 December 2022; (xvi) Session on 'Natural Heritage Conservation' (Module – Principles and Practices of Wildlife and Protected Area Management) for IFS Officers of 43rd PG Diploma Course in Advanced Wildlife Management (2 Mar 2023).

Outreach: (i) World Heritage Day, 18 April 2022; (ii) International Day for Biological Diversity, 22 May 2022; (iii) Online Natural Heritage Quiz; (iv) Awareness programme for students – NIEPVD, Bajaj School for the Hearing Impaired, College of Education, UCBMSH, Dehradun; (v) National Institute for the Empowerment of the Persons with Visual Disabilities (Divyangjan) NIEPVD radio show for 91.2 NIVH Hello Doon, 3 June 2022; (vi) World Environment Day – Awareness – Devalsari, 5 June 2022; (vi) Publication – Monitoring OUV: An analysis of the status of Natural World Heritage Sites in India; and (vii) Panel participation in webinar, 'The Directions of Heritage Interpretation in World Heritage Policy' organised by International Centre for the Interpretation and Presentation of World Heritage Sites under the auspices of UNESCO (WHIPIC), Republic of Korea, 10 November 2022.

World Heritage Committee Working Group Meetings (2022-23); (ii) Meeting of the Open-ended working group of States Parties to the World Heritage Convention in conformity with Decision 44 COM 8, on 24 March 2022; and 5&10 May 2022; (iii) Meeting of the Open-ended working group of States Parties to the World Heritage Convention concerning World Heritage and Climate Change, 22 March 2022; 16 September 2022; 23 November 2022; 31 January 2023 and 21 March 2023; (iv) World Heritage Advisory Bodies Networking Activity, 11, 13, 18, 20 May 2022; (v) Feedback from National Focal Point - Final Framework Action Plan of the 3rd Cycle of Periodic Reporting for Asia-Pacific region, August 2022; (vi) World Heritage Leadership Forum – Future of Capacity Building for our shared World Heritage, Norway, 21-23 September 2022; (vii) State of Conservation Reports – Manas Wildlife Sanctuary, Keoladeo National Park, October 2022; (viii) Evaluation of State of Conservation Reports of Natural World Heritage Sites, November 2022; (ix) IUCN Reactive Monitoring Mission – Keoladeo National Park, February 2023.

Nomination/Dossiers:

(i) Bhedaghat-Lametaghat in Narmada Valley nomination dossier preparation: As part of the project under the aegis of Madhya Pradesh Tourism Board, WII-C2C has initiated preparation of documentation on the nomination dossier of Bhedaghat-Lametaghat in Narmada Valley.

(ii) Examination of Nomination Dossiers of Natural Sites, May 2022: As a part of India's membership to the World Heritage Committee, the WII-C2C through the Director Wildlife Institute of India as an expert (natural heritage) on India's delegation undertook review and examination of Nomination Dossiers of Natural World Heritage Sites considered by the World Heritage Committee. Comments were provided on the dossiers for (i) Major boundary modification of the trans-national serial property of the Hyrcanian Forests of the Republic of Azerbaijan and Islamic Republic of Iran; (ii) Minor boundary modification of the trans-national serial property of the Ancient and Primeval Beech Forests of the Carpathians and Other Regions of Europe; (iii) Major boundary modification of Ha Long Bay - Cat Ba Archipelago of Viet Nam. All the dossiers were recommended for inscription.

(iii) Analysis of Majuli, February 2023: Majuli River Island is a large land formation located in the mid-stream of the River Brahmaputra in Assam. This site was proposed to be nominated as a World Heritage Site and the nomination dossier under criteria (viii) under the Natural Category. It was submitted to WII-C2C for assessment and comments by the Archaeological Survey of India (ASI). The assessment of the dossier was that the proposal may be considered with appropriate revisions.

Classroom Sessions

(i) Session on 'Natural Heritage Conservation' for PG Diploma Course in Advanced Wildlife Management, 7 April 2022; (ii) Session on 'Heritage Tourism' for PG Diploma Course in Advanced Wildlife Management, 5 May 2022; (iii) Session on 'Valuation of Carbon Ecosystem Services (Coastal and Terrestrial)' for PG Diploma Course in Advanced Wildlife Management, 24 May 2022; (iv) Session on 'World Heritage and other Biodiversity-related Conventions' and on 'World Heritage Management' for MSc in Wildlife Science Course, 3-4 November 2022; (v) Session on World Heritage Convention and Synergies with International Conventions for IFS Officers of Compulsory Training Workshop on 'International conventions and their synergies with respect to climate change, forestry, wildlife and biodiversity conservation', 8 December 2022; (vi) Session on 'Natural Heritage Conservation' for PG Diploma Course in Advanced Wildlife Management, 2 March 2023; (vii) Session on 'Heritage Tourism' for PG Diploma Course in Advanced Wildlife Management

Advisory Services

The Centre offers advisory services and technical inputs on World Natural Heritage issues, including for conservation and management of World Heritage Sites, State of Conservation reports, State Party interventions at World Heritage Centre sessions among others to Central and State

Governments of India, other countries on request, UNESCO Advisory Bodies and other relevant institutions.

World Heritage Committee Working Group Meetings (2022-23): As a part of India's membership to the World Heritage Committee, the WII-C2C through the Director, Wildlife Institute of India as an expert (natural heritage) on India's delegation participated in the series of meetings of various thematic Working Groups of State Parties to the World Heritage Convention.

Meeting of the Open-ended working group of States Parties to the World Heritage Convention in conformity with Decision 44 COM 8, 5-10 May 2022: The meetings involved deliberations on 'Guiding Principles for the Preparation of Nominations Concerning Sites associated with Recent Conflicts'.

Meeting of the Open-ended working group of States Parties to the World Heritage Convention concerning World Heritage and Climate Change, 22 March, 16 September, 23 November, 31 January 2023, 21 March 2023: The meetings involved detailed discussions on the 'Updated Policy document on Climate Action for World Heritage', outlining recommendation for implementation by States Parties. The document is scheduled to be submitted for the next session of the World Heritage Committee in 2023.

World Heritage Advisory Bodies Networking Activity, 11, 13, 18, 20 May 2022: WII-C2C took part in the capacity-building activity for professionals within the network of Advisory Bodies to the World Heritage Convention. The focus was on the two upcoming revised guidance and tools - the Guidance and Tools on Impact Assessment in a World Heritage Context and the Enhancing Our Heritage Toolkit 2.0. It offered an overview of what has been revised, what is new and how they can be used in providing advice in key processes of the Convention, including Nominations and State of Conservation.

Feedback from National Focal Point - Final Framework Action Plan of the 3rd Cycle of Periodic Reporting for Asia-Pacific region, August 2022: As part of the Periodic Reporting 3rd Cycle for the Asia-Pacific Region, WII-C2C had coordinated the exercise for natural/mixed World Heritage Sites of India during the previous year. Subsequently, the Centre has been engaged in providing inputs for the Regional Action Plan in association with the World Heritage Centre and other related agencies. Comments and suggestions were provided as well for the Final Framework Action Plan which is scheduled to be submitted for the next session of the World Heritage Committee in 2023.

World Heritage Leadership Forum – Future of Capacity Building for our shared World Heritage, Norway, 21-23 September 2022: A high-level World Heritage Leadership Forum reviewed the results produced by the World Heritage Leadership (WHL) Programme in its first six-years, from 2016 to 2022. WII-C2C was represented by Faculty In-Charge, Dr Gautam Talukdar. The leaders also deliberated on how these results could have wider applications in different contexts. The aim of the WHL programme is to strengthen the capacity of heritage professionals of the next generation, looking beyond the 50th anniversary of the World Heritage Convention (1972-2022). The results of the forum included a complete review of what was achieved thus far, building on the achievements of the Programme. A plan to further strengthen capacity building through an ambitious new phase of the WHL was also documented.

State of Conservation Reports – Manas Wildlife Sanctuary, Keoladeo National Park October 2022: In the context of Decisions of the 44th Session of the World Heritage Committee 2021, the state of conservation of Manas Wildlife Sanctuary and Keoladeo National Park were examined. WII-C2C, through meetings and consultations, facilitated the preparation and subsequent submission of the State of Conservation Reports of the two natural heritage properties of India for consideration at the 46th Session of the Committee. l

Evaluation of State of Conservation Reports of Natural World Heritage Sites, November 2022: As a part of India's membership to the World Heritage Committee, the WII-C2C through the Director, Wildlife Institute of India as an expert (natural heritage) on India's delegation undertook review and evaluation of State of Conservation Reports of Natural World Heritage Sites considered by the World Heritage Committee. The reports of the following sites were evaluated:

(i) The Sundarbans, Bangladesh; (ii) Tropical Rainforests of Sumatra, Indonesia; (iii) Lorentz National Park, Indonesia; (iv) Komodo National Park, Indonesia; (v) Landscapes of Dauria, Mongolia and Russian Federation; (vi) Great Barrier Reef, Australia; (vii) Dong Phayayen, Khao Yai Forest Complex, Thailand; (viii) Ancient and Primeval Beech Forests of the Carpathians and Other Regions of Europe, Albania, Austria, Belgium, Bosnia and Herzegovina, Bulgaria, Croatia, Czechia, France, Germany, Italy, North Macedonia, Poland, Romania, Slovakia, Slovenia, Spain, Switzerland, Ukraine; (ix) Białowieża Forest, Belarus and Poland; (x) The Islands and Protected Areas of the Gulf of California, Mexico; (xi) iSimangaliso Wetland Park, South Africa; (xii) Volcanoes of Kamchatka, Russian Federation; (xiii) Lake Baikal, Russian Federation; (xiv) Western Caucasus, Russian Federation; (xv) Natural System of Wrangel Island Reserve, Russian Federation; (xvi) Lake Turkana National Parks, Kenya; (xvii) Río Plátano Biosphere Reserve, Honduras; (xviii) Selous Game Reserve, United Republic of Tanzania; (xix) Socotra Archipelago, Yemen; and (xx) Mosi-oa-Tunya/ Victoria Falls, Zambia and Zimbabwe.

Most of the SoC reports were found to be satisfactory.

IUCN Reactive Monitoring Mission – Keoladeo National Park (Feb 2023): At its 42nd session in Manama, Bahrain (June/July 2018), the World Heritage Committee requested the State Party of India to invite an IUCN Reactive Monitoring mission to Keoladeo National Park World Heritage property "to assess its state of conservation and progress made in addressing issues of water provision and invasive species" (Decision 42 COM 7B.68). Following delays to the Mission due to the pandemic, the Mission could finally visit the property from 14th-17th February, 2023 represented by experts Mr. Philip McGowan (UK) and Mr. Chimed-Ochir Bazarsad (Mongolia). WII-C2C

facilitated the Mission in India with Dr Bhumesh Singh Bhadouria, Technical Officer, WII-C2C designated as nodal person. The tour programme included necessary field visits to key locations related to the site; meetings with the Indian authorities at the national, regional and local levels; consultations with a range of relevant stakeholders, including representatives of the management authority, non-governmental organisations (NGOs), and relevant scientists and experts. In the process, WII-C2C also provided technical support to the Rajasthan Forest Department and Keloadeo National Park authorities in engaging with the mission. The IUCN Mission will now prepare and submit their report for consideration at the next Session of the World Heritage Committee in 2023.

Outreach

A basic objective of the Centre is to raise awareness among the general public and youth in particular, of the importance of natural World Heritage and the need to protect it. This includes development of outreach and communication tools to explain the key concepts and processes of the World Heritage Convention and ensuring all stakeholders are able to make the most effective use of the Convention to support world heritage conservation. During the reporting period, the following outreach activities were conducted: (i) World Heritage Day, 18 April 2022; (ii) International Day for Biological Diversity, 22 May 2022; (iii) Awareness programme for students, Dehradun, 22 May 2022; (iv) National Institute for the Empowerment of the Persons with Visual Disabilities (Divyangjan) NIEPVD radio show for 91.2 NIVH Hello Doon, 3 June 2022; (v) Awareness Programme on World Environment Day, Devalsari, 5 June 2022; and (vi) Panel participant in webinar, 'The Directions of Heritage Interpretation in World Heritage Policy', Republic of Korea, 10 November 2022.

Herbarium

During the reporting period, approximately 550 plant specimens were identified in the herbarium, which were collected from various protected areas, such as Kedarnath Wildlife Sanctuary, Rajaji National Park & Tiger Reserve, Churdhar Wildlife Sanctuary, Pakke Wildlife Sanctuary, Kanha Tiger Reserve and Nandhour Wildlife Sanctuary by research scholars of the Institute and faculty members.

Campus Development

The construction work of Stone Masonry Boundary wall with GI Chain link fencing in block III, Brick boundary wall in block IV, Construction of Scooter Shed in block I, Bituminous road surface carpeting work in block I, External finishing (painting) work in Type IV, V quarters, renovation of electrical wiring and street light in Type V quarters and development of WII Main Gate front area has been completed and the works Renovation of toilets in Institutional block and Construction of cement concrete road in front of Ganga Building are in progress.

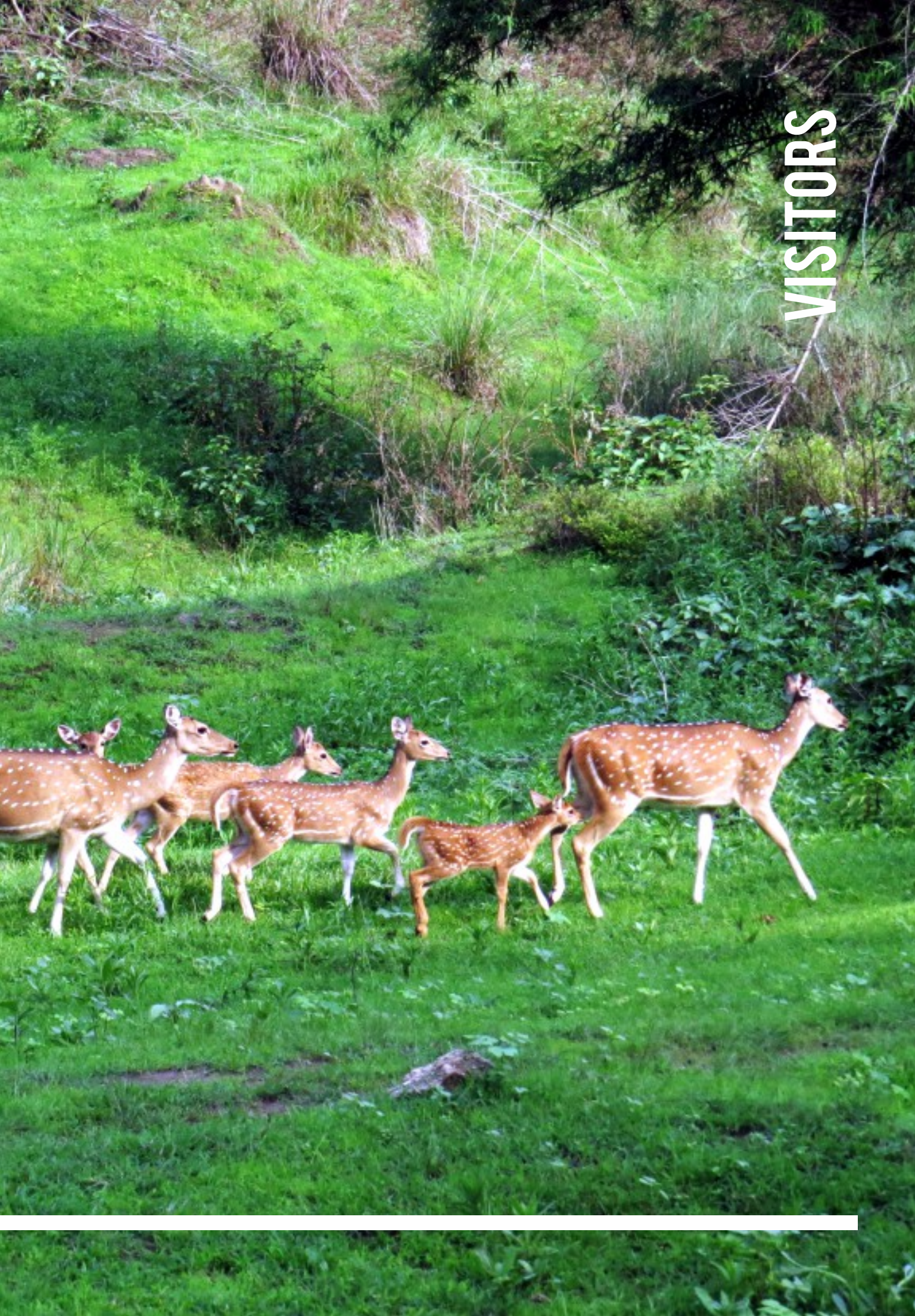
Information on Details of Vigilance Cases for the Year 2022-22 of Wildlife Institute of India, Dehradun

Vigilance Cases as on 01.04.2022	No. of vigilance cases added during the year	No. of vigilance cases pending as on 31.03.2023
0	0	0

Right to Information

RTI Cases	Opening Balance as on 1st April 2022	No. of new applications directly received from Indian Citizens during 2022-23	No. of new applications received as transferred from other Public Authorities during 2022-23	2019-20 No. of applications transferred to other Public Authorities during 2022-23	No. of applications as on 31.03.2023	No. of applications rejected during 2022-23	No. of applications disposed off during 2022-23	No. of applications not disposed off/rejected and hence carried forward to next year 2022-23
(a)	(b)	(c)	(d)	(e)	(f) (b+c+d)-(e)	(g)	(h)	(i) {f-(g+h)}
RTI Application	3	83	17	0	103	0	102	1
First	1	19	0	0	20	0	18	2
CIC	1	0	0	0	1	0	1	0
Cases								

CPIO (RTI)



VISITORS

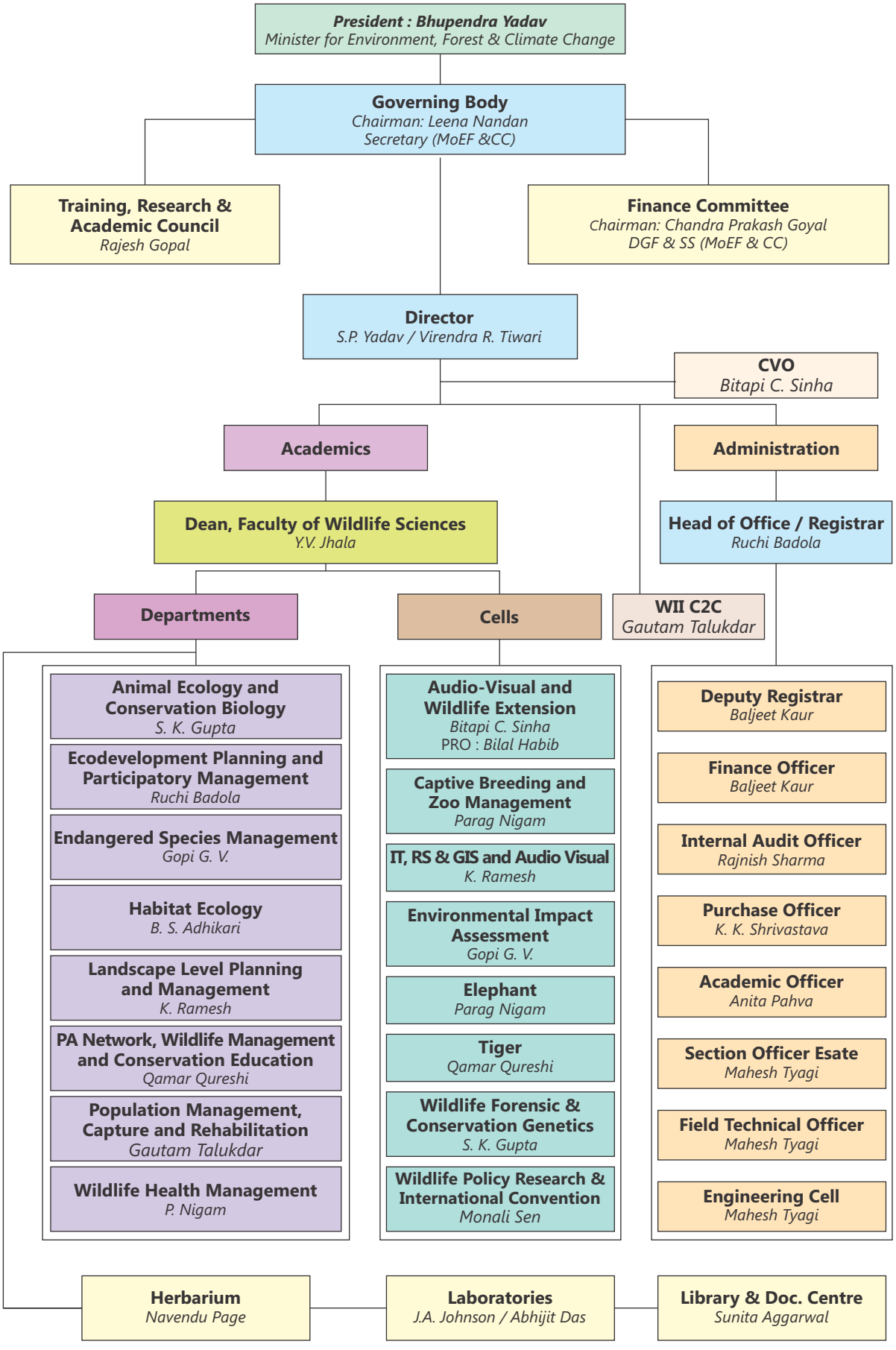
VISITORS

- Tamil Nadu Forest Academy (TNFA), Coimbatore, 7 October 2022.
- Tribhuvan Instutute of Forestry, Hetauda, Nepal, 13 October 2022.
- Tribhuvan Instutute of Forestry, Pokhra, Nepal, 14 October 2022.
- Tribhuvan Instutute of Forestry, Hetauda, Nepal, 17 October 2022.
- Little Stanford School, Turner Road, Dehradun, 19 October 2022.
- Tribhuvan Instutute of Forestry, Pokhra, Nepal, 20 October 2022.
- College of Veterinary and Animal Sciences, Mannuthy, Kerala, 26 October 2022.
- Corbett Wildlife Training Centre, Kalagarh, 3 November 2022.
- College of Veterinary and Animal Sciences, Wayanad, Kerala, 10 November 2022.
- B.Sc. Forestry, Kathmadu Forestry College, Nepal, 11 November 2022.
- FCRI - Mulugu, Hyderabad, Telangana, 22 November 2022.
- Corbett Wildlife Training Centre, Kalagarh, 23 November 2022.
- H & H.B. Kotak Institute of Science, Rajkot, Saurashtra, 24 November 2022.
- Senior Deputy Commandants of ITBP, Mussoories, 14 December 2022.
- IFS Probationers, 54 RR (2022-24), IGNFA, 19 December 2022.
- IFS Probationers, 54 RR (2022-24), IGNFA, 20 December 2022.
- College of Forestry, Navsari Agricultural University, Gujarat, 20 December 2022.
- Himachal Pradesh Forest Academy, Mandi, 17 January 2023.
- Sir Syed College, Kannur, Kerala, 17 January 2023.
- Haryana Forest Department - Forest Guards, 1 February 2023.
- Hazarimal Soman College of Arts & Science, Mumbai, 2 February 2023.
- Sumer Mahila Vishwavidyalaya, Jodhpur, 3 February 2023.
- Tamil Nadu Agricultural University (Dept. of Agricultural and Rural Management), Coimbatore, 8 February 2023.
- Tamil Nadu Agricultural University (Dept. of Agricultural and Rural Management), Mettupalayam, 21 February 2023.
- Rajiv Gandhi Institute of Veterinary Education & Research, Puducherry, 21 February 2023.
- Indian Institute of Remote Sensing, Dehradun, 27 February 2023.
- Jaya Agricultural Collge, TN Agricultural University, Tiruvallur, 7 March 2023.
- Mother Teresa College of Agriculture, Pudukkottai, Tamil Nadu, 10 March 2023.
- Department of Architecture, Jamia Millia Islamia University, 17 March 2023.

Doon University, Dehrdun

GOVERNANCE

ORGANISATIONAL STRUCTURE OF WII



WII-SOCIETY

President

1. Shri Bhupender Yadav,
   Minister of Environment, Forest & Climate Change
   Government of India,
   Indira ParyavaranBhavan
   Jor Bagh Road
   New Delhi -110003

2. Shri Ashwini Kumar Choubey
   Minister of State for Environment, Forest & Climate Change
   Government of India
   Indira Paryavaran Bhavan,
   Jor Bagh Road,
   New Delhi -110003

3. Shri Naresh Bansal
   Hon'ble Member of Parliament
   Rajya Sabha
   New Delhi

4. PCCF and CWLW
   Environment, Forests & Climate Change Department,
   Govt. of Mizoram,
   Environment Forest Complex
   Tuikhuahtlang,
   Aizawl, P.O. Aizwal – 796 001 (Mizoram)

5. PCCF (HoFF) and Chief Wildlife Warden,
   Dept. of Forest,
   Govt. of Manipur,
   Forest Headquarters,
   Sanjenthong,
   Imphal - 795001 (Manipur)

6. CWLW and APCCF (Wildlife)
   Dept. of Environment, Forest and Climate Change,
   Govt. of Nagaland,
   Office of the Principal Chief Conservator of Forests,
   Kohima – 797 001 (Nagaland)

7. The PCCF & CWLW
   Forest, Environment and Climate Change Department,
   Govt. of Orissa,
   State Wildlife Headquarters,
   Office of the PCCF and Chief Wildlife Warden,
   Prakruti Bhavan, Plot No. 1459
   Saheed Nagar,
   Bhubaneshwar – 751 007

8. Principal Chief Conservator of Forests Wildlife & CWLW, Department of Forests,
   Govt. of West Bengal,
   Bikash Bhawan, North Block,
   3rd Floor, Saltlake,
   Kolkata - 700 091 (West Bengal)

9. PCCF & Chief Wildlife Warden,
   Maharashtra Forest Department,
   Govt. of Maharashtra,
   3rd Floor, Van Bhawan,
   Civil Lines, Ramgiri Road,
   Nagpur – 440 001 (Mahrashtra)

10. PCCF and Chief Wildlife Warden,
    Forest Department,
    Govt. of Rajasthan,
    Van Bhawan, Vaniki Path,
    Jaipur – 302 005 (Rajasthan)

11. PCCF (Wildlife) & Chief Wildlife Warden,
    Kerala Forest and Wildlife Department,
    Govt. of Kerala,
    Van Laxmi Forest Headquarters
    Thiruvananthaprum – 695 014

12. PCCF & Chief Wildlife Warden
    Government of Tamil Nadu,
    No.1 Jeenis Road,
    Panagal Building, Saidapet,
    Chennai-600015

13. CCF & CWLW,
    Himachal Pradesh Forest Department,
    Govt. of Himachal Pradesh,
    Shimla

14. PCCF (HoFF) & Chief Wildlife Warden,
    Department of Wildlife Protection,
    U.T. of Jammu & Kashmir,
    Manda Hills, Near Hotel Ashok,
    Jammu, Jammu & Kashmir

15. Chief Wildlife Warden,
    Dept. of Environment, Forest and Climate Change,
    Government of Uttar Pradesh,
    17, Rana Pratap Marg,
    Lucknow – 226 001 (Uttar Pradesh)

16. Chief Wildlife Warden,
    Dept. of Forest,
    Government of Uttarakhand,
    85, Rajpur Road,
    Dehradun (Uttarakhand)

17. Prof MH Fulekar,
Prof & Dean,
School of Environment & Sustainable
Development Central University,
Gandhinagar (Gujarat)

18. Dr. Payal Mago,
Principal,
Shaheed Rajguru College of
Applied Sciences for Women (DU)
New Delhi- 110096

19. Dr. Ramakrishna,
Retd from ZSI
Bangalore

20. Dr. Himmat Singh Negi
Retired Forest Officer of MP
Shimla,
H**imachal Pradesh**

21. Dr. Gopal Singh Rawat,
Retd. Dean,
Wildlife Institute of India,
Doon Officers Enclave,
Dehradun (Uttarakhand)

22. Shri Kishan Singh Sugara,
PCCF &HoFF, (Retd)
Karnataka

23. Dr. Ranjana Gupta, IFS (Retd)
Flat No A-203 Plot-C-58/20
PMO Cooperative Housing Society
Sector 62, Noida
Gautam Budha Nagar – 201 309 (Uttar Pradesh)

24. Prof. Sanjeev Puri,
Biotechnology Branch,
University Institute of Engineering & Technology
(UIET),
Punjab University,
Chandigarh – 160 014

25. Prof. K Sivakumar,
Dept. of Ecology and Environment
Sciences, Pondicherry University,
Pondicherry

26. Dr. H.S Singh
Former Principal Chief Conservator of Forests,
Government of Gujarat
Plot 44, Sector- 8
Gandhinagar – 382 010 (Gujarat)

27. Bombay Natural History Society (BNHS)
Hornbil House,
Dr. Salim Ali Chowk,
Shaheed Bhagat Singh Road,

28. World Wide Fund for Nature-India (WWF),
"Secretariat"
172-Lodhi Estate,
New Delhi – 110 003

29. Wildlife Preservation Society of India,
7, Astley Hall,
Dehradun – 248 001

30. Centre for Environment Education,
Nehru Foundation for Development,
Thaltej Tekra,
Ahmadabad (Gujarat)

31. Dr. Ravi Singh
"Secretary General & CEO,
WWF India,
172 B, Lodhi Estate
New Delhi - 110003

32. Secretary to the Govt. of India,
Ministry of Environment, Forest & Climate Change
Indira Paryavaran Bhavan
Jor Bagh Road,
New Delhi - 110003

33. Secretary
Government of India,
Ministry of Finance,
North Block,
New Delhi - 110001

34. Secretary,
Government of India
Department of Science and Technology,
Technology Bhavan,
New Mehrauli Road,
New Delhi - 110001

35. Secretary,
Government of India
Department of Education,
Ministry of Human Resource Development,
Shastri Bhavan,
New Delhi – 110 001

36. Representative of
Niti Aayog
Yojana Bhavan,
Sansad Marg,
New Delhi

37. Representative of the University Grant Commission
(UGC)
Bahadur Shah Zafar Marg,
New Delhi

38. Chief Secretary,
Govt. of Uttarakhand

"Sachivalaya"
Dehradun

39. Director General of Forest & Member
Special Secretary to the Government of India,
Ministry of Environment, Forest & Climate Change
Indira ParyavaranBhavan
Jor Bagh Road,
New Delhi – 110 003

40. Director of Wildlife Preservation,
Government of India,
Ministry of Environment, Forest & Climate Change
Indira Paryavaran Bhavan
Jor Bagh Road,
New Delhi – 110 003

41. Additional Secretary (Finance Advisor),
Ministry of Environment, Forest & Climate Change
Indira Paryavaran Bhavan,
Jor Bagh Road,
New Delhi -110003

42. Director General
Indian Council of Forestry Research & Education,
P.O New Forest,
Dehradun

43. Director
Zoological Survey of India
M-Block, New Alipore,
Kolkata – 700 053 (West Bengal)

44. Director
Botanical Survey of India,
CGO Complex, 3 MSO Building,
Block F, 5th& 6th Floor,
DF Block,
Sector-I, Salt Lak City
Kolkata – 700 064 (West Bengal)

45. Dean
Faculty of Wildlife Sciences
Wildlife Institute of India
Dehradun – 248 001

46. Registrar
Wildlife Institute of India
Dehradun – 248 001

47. Director,
Wildlife Institute of India
Dehradun – 248 001

48. Inspector General of Forest (WL)
Ministry of Environment, Forest & Climate Change,
Indira Paryavaran Bhavan,
Jor Bagh Road, Ali Ganj,
New Delhi – 110 003

49. Member Secretary
National Tiger Conservation Authority
B-1 Wing, 7th Floor
ParyavaranBhavan
CGO Complex,
New Delhi - 110003

50. Director (Project Elephant)
Ministry of Environment, Forest & Climate Change,
Indira Paryavaran Bhavan,
Jor Bagh Road, Ali Ganj,
New Delhi – 110 003

WII-GOVERNING BODY

1. Secretary to the Govt. of India
Ministry of Environment, Forest & Climate Change
Indira Paryavaran Bhavan
Jor Bagh Road, Ali Ganj,
New Delhi – 110 003

2. Director General of Forest &
Special Secretary to the Government of India,
Ministry of Environment, Forest & Climate Change
Indira Paryavaran Bhavan
Jor Bagh Road, Ali Ganj,
New Delhi - 110003

3. Dr. H.S Singh
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Government of Gujarat
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Gandhinagar – 382 010 (Gujarat)

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Gandhinagar (Gujarat)

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7. Dr. Himmat Singh Negi,
Retired Forest Officer of MP
Shimla,
Himachal Pradesh

8. Dr. Gopal Singh Rawat,
Retd. Dean,
Wildlife Institute of India,
Doon Officers Enclave,
Dehradun (Uttarakhand)

9. Financial Advisor & Additional Secretary,
Ministry of Environment, Forest & Climate Change
Indira Paryavaran Bhavan,
Jor Bagh Road, Ali Ganj,
New Delhi – 110003

10. Chief Secretary,
Govt. of Uttarakhand
"Sachivalaya",
Dehradun (Uttarakhand)

11. North Eastern Region- Manipur

12. Eastern Region - Odisha

13. Northern Region - Himachal Pradesh

14. Western Region - Gujarat

15. Southern Region - Karnataka

16. Permanent Member - Uttarakhand

17. Director
Wildlife Preservation,
Ministry of Environment, Forest & Climate Change
Indira Paryavaran Bhavan, Jor Bagh Road,
New Delhi – 110003

18. Director General
Indian Council of Forestry Research and Education,
PO New Forest,
Dehradun (Uttarakhand)

19. Dr. Rajesh Gopal
Chairman, WII-TRAC &
Secretary, General, Global Tiger Forum
New Delhi

20. Registrar,
Wildlife Institute of India,
Wildlife Institute of India
Dehradun (Uttarakhand)

21. Director,
Wildlife Institute of India
Dehradun – 248001 (Uttarakhand)

22. Inspector General of Forests (WL)
Ministry of Environment, Forest & Climate Change
Indira Paryavaran Bhavan,
Jor Bagh Road, Ali Ganj,
New Delhi -110 003

23. Member Secretary
National Tiger Conservation Authority
B-1 Wing, 7th Floor,
Paryavaran Bhavan, CGO Complex,
New Delhi – 110 003

24. Director (Project Elephant)
Ministry of Environment, Forest & Climate Change
Indira Paryavaran Bhavan, Jor Bagh Road
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6.	Western Region (2 Representatives)	Rajasthan Goa
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    C.G.O Complex, 3 M.S.O Building
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    Sector –I Salt Lake City,
    Kolkata (West Bengal)

16. Director,
    Zoological Survey of India,
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    M-Block, New Alipore,
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19. Prof. K. Sivakumar
    Department of Ecology and
    Environment, Science
    Pondicherry University
    Puducherry

Three eminent Scientist/Conservationists/ Socio-economists/ Professional wildlife with experience relevant to wildlife science

20. Dr Gopal Singh Rawat
    Retd. Dean
    Wildlife Institute of India,
    Doon Officers Enclave,
    Dehradun (Uttarakhand)

21. Dr Himmat Singh Negi
    E3/ 20 Floor
    DLF Valley
    Panchkula, Haryana – 134 103

22. Prof. Madhusudan Hiraram Fulekar
    Prof. & Dean, School of Environment
    & Sustainable Development
    Central University,
    Gandhinagar, Gujarat

23. A Representative of the Indian
    Council of Forest, Research &
    Education (ICFRE)
    P.O. New Forest
    Dehradun – 248006 (Uttarakhand)

24. Dean,
    Faculty of Wildlife Sciences
    Wildlife Institute of India
    Chandrabani
    Dehradun – 248 001 (Uttarakhand)

25-26 Two senior most Head of Departments

25. Dr Ruchi Badola
Head of Eco-Development Planning
& Participatory Management
Wildlife Institute of India
Chandrabani,
Dehradun – 248 001 (Uttarakhand)

26. Dr B. S. Adhikari
Head of Habitat Ecology
Wildlife Institute of India
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Dehradun – 248 001 (Uttarakhand)

Faculty Member (In-Charge of Research Coordination)

27. Dr Bitapi C Sinha
Scientist-G
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Member- Secretary

28. Director
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Haiderpur Wetland. Ganga Aqualife Conservation Monitoring Centre, Wildlife Institute of India, Dehradun, Uttarakhand, India.

Jalaj Dolphin Safari. Ganga Aqualife Conservation Monitoring Centre, Wildlife Institute of India, Dehradun, Uttarakhand, India.

Kosi River: The Sorrow of Bihar. Ganga Aqualife Conservation Monitoring Centre, Wildlife Institute of India, Dehradun, Uttarakhand, India. (Bilingual).

Life in Song River. Ganga Aqualife Conservation Monitoring Centre, Wildlife Institute of India, Dehradun, Uttarakhand, India.

Millets for life, LifeStyle for Environment. Ganga Aqualife Conservation Monitoring Centre, Wildlife Institute of India, Dehradun, Uttarakhand, India.

Ramganga River: The Cradle of Corbett. Ganga Aqualife Conservation Monitoring Centre, Wildlife Institute of India, Dehradun, Uttarakhand, India. (Bilingual).

Rupnarayan River: The River of Divinity. Ganga Aqualife Conservation Monitoring Centre, Wildlife Institute of India, Dehradun, Uttarakhand, India. (Bilingual)

Son River: The Stream of Gold. Ganga Aqualife Conservation Monitoring Centre, Wildlife Institute of India, Dehradun, Uttarakhand, India. (Bilingual)

Tracking of Indian Skimmer, *Rynchops albicollis* and Sarus crane, *Grus antigone* through satellite and GSM Telemetry in the Ganga Basin.

ACCOUNTS

SEPARATE AUDIT REPORT ON THE ACCOUNTS OF WILDLIFE INSTITUTE OF INDIA, DEHRADUN FOR THE YEAR 2022-23

1. We have audited the attached Balance Sheet of the Wildlife Institute of India, Dehradun (WII) as at 31 March 2023 and the Income and Expenditure Account and Receipt and Payment Account for the year ended on that date under Section 20 (1) of the Comptroller and Auditor General's (Duties, Powers and Conditions of Service) Act 1971. These financial statements are the responsibility of the WII Management. Our responsibility is to express an opinion on these financial statements based on our audit.
2. This separate audit report contains the comments of the Comptroller and Auditor General of India (CAG) on the accounting treatment only with regard to classification, conformity with the best accounting practices, accounting standards and disclosure norms, etc. Audit observations on financial transactions with regard to compliance with the Laws, Rules and regulations (Propriety and Regularity) and efficiency - cum - performance aspects, etc. if any, are reported through Inspection Reports / CAG's Audit Reports separately.
3. We have conducted our audit in accordance with auditing standards generally accepted in India. These standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free from material misstatements. An audit includes examining, on a test basis, evidences supporting the amounts and disclosures in the financial statements. An audit also includes assessing the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of financial statements. We believe that our audit provides a reasonable basis for our opinion.
4. Based on our audit, we report that:

i) We have obtained all the information and explanations, which to the best of our knowledge and belief were necessary for the purposes of our audit;

ii) The Balance Sheet, Income and Expenditure Account and Receipt and Payment Account dealt with by this report are drawn up in the format as prescribed by the Ministry of Finance, Government of India.

iii) In our opinion, proper books of accounts and other relevant records have been maintained by WII in so far as it appears from our examination of such books.

iv) We further report that:

A. INCOME AND EXPENDITURE ACCOUNT

1. Expenditure ₹ 17901.06 lakhs

1.1 Other Administrative Expenses (Schedule - 21): ₹ 1050.66 lakhs

1.1.1 Overstatement of Expenditure

WII, Dehradun had booked expenditure of ₹ 53.48 lakh in FY 2022-23 in current year towards Other Administrative Expenses (Telephone, Counsel fees, Electricity, POL, Internet lease, Newspaper etc.) instead of prior period expenditure. This had resulted in overstatement of current year expenditure by ₹ 53.48 lakh besides understatement of Prior - period Expenses by the same amount.

B. GRANT-IN-AID:

WII received Grants in Aid of ₹ 3060.00 lakhs besides opening balance of ₹ 0.008 lakhs and other receipts of ₹ 1263.30 lakhs. Out of total available amount of ₹ 4323.30 lakhs, WII made payments of ₹ 4320.14 and an amount of ₹ 3.16 lakhs were closing balance as on 31 March 2023.

C. GENERAL

1. Static balances

Audit observed the following static balances under various schedules of the Balance Sheet as on 31 March 2023.

S.No.	Schedule / Head	Balance (in ₹) as 31.03.2023	Amount lying since year
1.	Sch. 7 - Current Liabilities and Provision- Hostel caution money	22000	2020-21
2.	Sch. 11 - Current Assets, Loans and Advances etc- Closing balance of WII publication	298412	2020-21
3.	Sch. 11 - Current Assets, Loans and Advances etc- Advance for expenses (research projects)	180713	2020-21
4.	Sch.11 - Current Assets, Loans and Advances etc- Advance for IIT Kanpur	1239000	2017-18
5.	Sch. 11 - Current Assets, Loans and Advances - Loan for World Environment Day (MoEF&CC)	280984	2011-12
6.	Sch. 11 - Current Assets, Loans and Advances- TDS to be refunded by the ITO (Pension Fund)	4389787	2017-18
7.	Sch. 11 - Current Assets, Loans and Advances- TDS to be refunded by the ITO (GPF)	2277757	2017-18

These static balances are long standing in the accounts. As these amounts were required to be released/recovered (as the case may be), efforts may be made by the Institute to settle these balances that were kept pending without any justification. Similar observation was pointed out in previous years ' reports also but no remedial action was taken.

2. Irregularities in maintenance of Employee Provident Fund

In Receipt & Payment A/c (General Provident Fund), WII has shown an amount of ₹ 197.95 lakh as GP Fund contribution for the year 2022-23. However, it was found that it includes GPF contribution as well as Employee Contribution Provident Fund amounting to ₹ 174.69 lakh and ₹ 23.26 lakh respectively. Depiction of GP fund contribution and EPF together in GP Fund account is not in order. Further, it was also evident that WII was not depositing the EPF contribution to Employee Provident Fund Organisation. In its reply (December 2023), WII accepted it and stated that the compliance would be done in future. Also, the matter of applicability of EPFO Act 1952 is sub-judice in the Central Government Industrial Tribunal Cum Labour Court, Lucknow, any further action is subject to the decision of the Court.

3. Pension Liabilities

As per actuarial valuation of the retirement benefits for the 169 employees & Pensioners / Family Pensioners of WII[1], a provision of ₹ 13427.68 lakh (as on 31 March 2023) was made in the accounts during 2022-23 towards pension scheme benefits (as per CCS- Pension Rules 1972 with 100 percent employer contribution). The entire amount of ₹ 13427.68 lakh (Schedule - 20) was taken as expense during 2022-23 along with creating liability for the same in ' Schedule - 7 Provisions '. As against a total liability of pension amounting to ₹ 13427.68 lakh crore, WII is holding funds amounting to ₹ 5365.81 lakh only under pension fund (Schedule - 7), this had resulted in a gap amounting to ₹ 8061.87 lakh to meet out the pension liability. Approval of MoEF&CC and MoF, criteria, connection with any retirement benefits schemes, calculation of estimated future revenue generation, road - map for managing funds for pension and correspondence made with MoEF&CC in regard of pension was called for.

Ministry in its reply stated that Pension is not connected with any scheme related to LIC etc. Revenue for Pension Corpus is mainly generated by levying Institutional charges from the projects.

D. EFFECT OF REVISION OF ACCOUNTS

Due to revision of accounts at the instance of audit, the overstatement of both assets and liability has been rectified and reduced by ₹ 151.50 lakh.

E. MANAGEMENT LETTER

Deficiencies which have not been included in the Audit Report have been brought to the notice of the Director, WII through a Management Letter issued separately for remedial / corrective action.

v) Subject to our observations in the preceding paragraphs, we report that the Balance Sheet, Income and Expenditure Account and Receipt and Payment Account dealt with by this report are in agreement with the books of accounts.

vi) In our opinion and to the best of our information and according to the explanations given to us, the said financial statements read together with the Accounting Policies and Notes on Accounts, and subject to the significant matters stated above and other matters mentioned in Annexure to this Audit Report give a true and fair view in conformity with accounting principles generally accepted in India.

a. In so far as it relates to the Balance Sheet of the state of affairs of the WII, as of 31 March 2023 and

b. In so far as it relates to Income and Expenditure Account of the deficit for the year ended on that date.

Place: New Delhi
Date: 09/01/2024

For and on behalf of the C & AG of India

Director General of Audit (ESD)

[1] 79 employees, 76 regular pensioners and 14 family pensioners

ANNEXURE – I

1. Adequacy of Internal Audit system

WII is audited by the Internal Audit Wing of MoEF&CC. The last Internal Audit was conducted in March 2022 by MOEFCC for the period 2018-19 to 2020-21. Thus, the internal audit of WII was not conducted for the period 2021-23.

2. Adequacy of internal control system

a. Register of Valuables as per GAR 5 not maintained and Stock Register of Consumables as per GFR 23 not maintained in prescribed format.

b. The signatures of the cashier had not been made on any of the entry in the Cash book. Further, no surprise checks of the cash balance had been conducted and certificate recorded by WII. This has been pointed out in previous years ' reports also however, no remedial action has been taken by the Institute.

c. Non - marking of identification mark on fixed items: For proper accounting, inventorization, physical verification, location, write off / auction etc., identification mark on each fixed item is a necessary requirement. However, it has been observed that identification marks have not been done by WII on its fixed assets.

d. As per rule an Autonomous institution must maintain CPF / NPS / EPF account, WII is maintaining GPF and NPS account.

3. System of physical verification of fixed assets.

a. The physical verification of fixed assets of WII was conducted for the period 2022-23.

b. Fixed Assets Register was not being maintained properly. The register was neither signed by higher authorities nor closes at the year end.

4. System of physical verification of inventory

a. Physical verification of consumable stores of WII was conducted for the period 2022-23.

b. WII in Feb. 2022 conducted physical verification of books upto 31 December 2021.

5. Regularity in payment of statutory dues

There are no statutory dues pending / outstanding for the financial year 2022-23.

Dy. Director (EA)

ANNEXURE - A

1. WII booked ₹ 41.53 lakh as ' Misc. Receipts ' under line item ' others ' in schedule 18 ' Other Income '. However, the detail of the same has not been specifically mentioned.

2. Non-Provisioning of Audit fee

3. WII did not make any provision for Audit fee payable to the CAG of India and no balance / figure was reflected in both Schedule - 7 ' Current Liabilities and Provisions ' and Schedule - 21 ' Other Administrative Expenses ' of the accounts. Therefore, liabilities as well as expenditure were understated to that extent. This has been pointed out in previous years reports also but no remedial action was taken.

Under 'Other Administrative Expenses - Schedule - 21', WII had shown two extra columns which are not according to uniform format of accounts.

4. Balance Sheet

Assets

Investment-Others (Schedule 10): ₹ 6944.43 lakh

WII did not include its investment to ₹ 2.92 lakhs (value as on 31.03.2023) in one Fixed Deposit Receipts (FDRS) reference number 518503030000483 under Assets in Schedule 10 'Investment-Others'. This had resulted in understatement of its Assets and consequents liabilities both by ₹ 2.92 lakh.

5. Liability

Current Liabilities and Provision (Schedule 7): ₹ 21872.46 lakhs

Understatement of liabilities

The details of EMD revealed that the Institute had a balance of ₹ 16.47 lakhs received from various agencies / firms on account of EMD / Security Deposits instead of ₹ 2.75 lakh shown in the account. This had resulted in understatement of current liabilities and overstatement of cash and bank balances both by ₹ 14.28 lakhs.

Dy. Director (EA)

RECEIPT & PAYMENT ACCOUNTS FOR THE YEAR 2022-23

Amount in Rs.

RECEIPT					PAYMENT				
Particulars	**Plan**	**Non Plan**	**Total**	**Previous Year**	**Particulars**	**Plan**	**Non Plan**	**Total**	**Previous Year**
(A) GRANT-IN-AID (General)	**Amount in Rs.**		**Amount in Rs.**	**Amount in Rs.**	**Expenses**	**Amount in Rs.**		**Amount in Rs.**	**Amount in Rs.**
To Opening Balance					By Salaries & Allowances	-	-	-	-
Cash in Bank	802.32	-	802.32	4,777,475.04	By Medical	-	-	-	-
Cash In Hand	-	-	-	-	By LTC	-	-	-	-
					By OTA	-	-	-	-
To Grant in Aid (Revenue)	57,500,000.00	-	57,500,000.00	50,105,000.00	By Honorarium	96,343.00	-	96,343.00	-
To Grant in Aid (Capital)	-	-	-	-	By Fellowship & Wages (R/Proj)	-	-	-	-
To Grant (other Projects)	-	-	-	-	By Stipend of MSc Students	-	-	-	-
To MSc Course Fee	-	-	-	-	By Leave encashment & Gratuity	164,970.00	-	164,970.00	-
To Bus Charges	-	-	-	-	By Bonus	-	-	-	-
To Building Rent+HLF	-	-	-	-	By Fellowship Forenis Cell	-	-	-	-
To WII Products	-	-	-	-	By Base Camp Exp.(Res Project)	-	-	-	-
To Misc Receipts	-	-	-	15,020.00	By Vehicle insurance	247,704.00	-	247,704.00	277,525.00
To Elect & Water	-	-	-	82,686.00	By Annual Res Seminar-ARS	-	-	-	-
To Interest on Saving A/c	824.00	-	824.00	802.00	By Estate Security	31,613,349.00	-	31,613,349.00	33,351,152.00
To Loan & Advance	-	-	-	-	By POL, Hiring of Veh (R/Proj)	79,995.00	-	79,995.00	-
To EMD Security Deposit	-	-	-	-	By Contingencies (Res Proj)	-	-	-	-
To Hostel Caution Money	-	-	-	-	By Travel Expenses (Res. Proj)	-	-	-	9,299.00
To Intt on HBA	-	-	-	-	By Lab Expenses-Forc Lab	22,539.00	-	22,539.00	249,733.00
To Travel/FA Adv.-GIA	-	-	-	3,277.00	By M.Sc Expenditure	24,900.00	-	24,900.00	1,249,428.00
To Travel Adv.(R/Proj)	-	-	-	-	By Elect and Water Charges	7,794,766.00	-	7,794,766.00	9,263,821.00
To FA (Research Project)	-	-	-	-	By Hospitality/Entertainment	437,570.00	-	437,570.00	244,759.00
To LTC Adv	-	-	-	-	By POL of WII Vehicle	363,376.00	-	363,376.00	609,739.00
To Medical Adv	-	-	-	-	By Postage & Telegram	91,206.00	-	91,206.00	207,681.00
To M.Sc-FA **& TA Advance**	**-**	**-**	**-**	**601,688.00**	**By Repair & Maint of Vehicle**	**290,837.00**	**-**	**290,837.00**	**298,756.00**

Amount in Rs.

RECEIPT					PAYMENT				
To Sundry Creditores	-	-	-	-	By Sport	79,030.00	-	79,030.00	16,350.00
To Expenses for Capitales	29,741.00	-	29,741.00	2,119,727.00	By Stationery & Consumables	54,682.00	-	54,682.00	454,649.00
To Opening Stock-Library	-	-	-	-	By Telephone & Trunk Calls	917,305.00	-	917,305.00	499,938.00
To GPF Recd	-	-	-	-	By Legal Expenses	635,913.00	-	635,913.00	660,879.00
To Adv payment CPWD	17,830,008.00	-	17,830,008.00	-	By Operational expenses	4,468,487.65	-	4,468,487.65	1,492,196.72
To Adv Payment CCU	15,271,531.00	-	15,271,531.00	-	By Printing & Binding	63,896.00	-	63,896.00	448,418.00
To Advance for Veh. Ins.	31,574.00	-	31,574.00	28,121.00	By Maint of WII Campus	6,947.00	-	6,947.00	759,190.00
To Campus Development-CPWD	-	-	-	-	By Repair of equip/furniture	-	-	-	100,302.00
To Telephone-Income	-	-	-	-	By Computer AMC & Cons.	995,331.00	-	995,331.00	1,021,132.00
To CGEGIS	-	-	-	-	By Maint. of Civil Work	508,068.00	-	508,068.00	785,918.00
To Library Books	-	-	-	-	By Misc. Receipt Previous Year	-	-	-	42,889.00
To Internal Loan	-	-	-	298,133.00	By Travel Expenses	977,532.00	-	977,532.00	438,349.00
To Medical	-	-	-	-	By Lib expenses	287,560.00	-	287,560.00	142,387.00
To Sub. of ECPF	-	-	-	-	By Computer/ Periphirel	-	-	-	928,622.00
To Expenses Payable	-	-	-	1,495,841.00	By Journals & Periodicals	-	-	-	3,370.00
To Director WII A/c No. 57945	-	-	-	46,625.00	By Lab Exp-Harberiam	-	-	-	-
To Loan:- D/WII A/c No. 54189	-	-	-	253,000.00	By Forest & Tour Adv-GIA	204,000.00	-	204,000.00	17,276.00
To Loan:- D/WII A/c No. 58146	25,000.00	-	25,000.00	-	By Adv. for Civil Work to CPWD	4,975,303.00	-	4,975,303.00	-
To Land Acquisition Charges-Deposit in High Court	18,000,000.00		-	18,000,000.00	By Forest advance R/Proj	-	-	-	-
To Loan for WCF Workshop	30,253.00	-	30,253.00		By Tour Advance -R/Proj	-	-	-	-
To TDS	616.00	-	616.00		By M.Sc. TA Advance	-	-	-	-
					By M.Sc. FA Advance	-	-	-	-

Amount in Rs.

RECEIPT					PAYMENT				
					By Forensic Lab.	-	-	-	596,285.00
					By CGEGIS	46.00	-	46.00	82,120.00
					By Office equipment	-	-	-	2,119,727.00
					By GST	1,172.00	-	1,172.00	468.00
					By Elect. Equipment	-	-	-	8,409.00
					By Sundry Creditors	15,548.00	-	15,548.00	2,631,954.00
					By New Salary Account(wages)	25,000.00	-	25,000.00	-
					By Loan:- D/WII A/c No. 58146	-	-	-	25,000.00
					By Loan:- D/WII A/c No. 54189	-	-	-	61,511.00
					By Library Software AMC	226,265.00	-	226,265.00	226,265.00
					By Software Renewal- Maintenance	-	-	-	501,095.00
					By Library Books	279,394.00	-	279,394.00	
					By Furniture & Fixture	28,968.00	-	28,968.00	
					By COMPUTER/ PERIPHERALS	508,221.00	-	508,221.00	
					By Plant & Machinery Equipment	7,104,729.00	-	7,104,729.00	
					By Office Building	25,019,016.00	-		25,019,016.00
					By Expenses Payable	1,495,841.00	-		1,495,841.00
					By Internal Loan	298,133.00	-		298,133.00
					By Prior Period Expenses	18,000,000.00	-		18,000,000.00
					In Bank	316,406.67	-		316,406.67
802.32									
					In Hand	-	-	-	-
A' Total	108,720,349.32	-	108,720,349.32	59,827,395.04	A' Total	108,720,349.32	-	108,720,349.32	59,827,395.04

RECEIPT & PAYMENT ACCOUNTS FOR THE YEAR 2022-23

Amount in Rs.

General Provident Fund

RECEIPT					PAYMENT				
Particulars	**Plan**	**Non Plan**	**Total**	**Previous Year**	**Particulars**	**Plan**	**Non Plan**	**Total**	**Previous Year**
(A) GRANT-IN-AID (General)	**Amount in Rs.**		**Amount in Rs.**	**Amount in Rs.**	**Expenses**	**Amount in Rs.**		**Amount in Rs.**	**Amount in Rs.**
To Opening Balance					By Advance for CED-II CCU,New Delhi	966,778.00	-	966,778.00	-
Cash in Bank	-	-	-	-	By Furniture Fixture	-	-	-	-
Cash In Hand	-	-	-	-	By Boundary Wall	837,729.00	-	837,729.00	-
					By Advance for CPWD	1,539,332.00	-	1,539,332.00	4,959,708.00
					By Misc Contingency	-	-	-	25,429.00
To Grant in Aid (Capital)	2,500,000.00	-	2,500,000.00	5,000,000.00	By Director WII A/c No. 01	-	-	-	14,000.00
To Interest (Saving A/c)	-	-	-	-	By Campus Development	1,696,857.00	-	1,696,857.00	-
To Advance for CPWD	4,829,113.00	-	4,829,113.00	86,000.00	By Interest (Saving A/c)	7,890.00	-	7,890.00	-
To Director WII A/c No. 01	14,000	-	14,000.00						
					In Bank	-	-	-	-
					In Hand	-	-	-	-
A' **Total**	**7,343,113.00**	**-**	**7,343,113.00**	**5,086,000.00**	**A' Total**	**7,343,113.00**	**-**	**7,343,113.00**	**5,086,000.00**

RECEIPT & PAYMENT ACCOUNTS FOR THE YEAR 2022-23

Amount in Rs.

RECEIPT					PAYMENT				
Particulars	**Plan**	**Non Plan**	**Total**	**Previous Year**	**Particulars**	**Plan**	**Non Plan**	**Total**	**Previous Year**
	Amount in Rs.		**Amount in Rs.**	**Amount in Rs.**	**Expenses**	**Amount in Rs.**		**Amount in Rs.**	**Amount in Rs.**
(A) GRANT-IN-AID (Salary)					By Salary	175,842,941.00	-	175,842,941.00	179,607,847.00
To Opening Balance					By Fellowship (Res. Project)	-	-	-	909,019.00
Cash in Bank	-	-	-	-	By LTC	2,774,942.00	-	2,774,942.00	362,516.00
Cash In Hand	-	-	-	-	By Medical	7,094,889.00	-	7,094,889.00	8,590,880.00
					By Gratuity	26,912,661.00	-	26,912,661.00	401,930.00
To Grant in Aid (Salary)	246,000,000.00	-	246,000,000.00	200,000,000.00	By Honorarium	53,000.00	-	53,000.00	123,500.00
To Bus Charges	97,250.00	-	97,250.00	82,541.00	By Stipend of MSc Students	-	-	-	240,000.00
To Electricity & Water	519,742.00	-	519,742.00	683,978.00	By Misc Expenses	538.00	-	538.00	-
To HBA Intereset	-	-	-	6,781.00	By Salary Payable	12,566,177.00		12,566,177.00	-
To House Licence Fee (HLF)	611,864.00	-	611,864.00	504,634.00					
To Loan Dir. A/c No. 4032	69,000,000.00	-	69,000,000.00	-	By Loan Dir. A/c No. 4032	91,021,918.00	-	91,021,918.00	6,978,082.00
To Loan Dir. A/c No. 58146	-	-	-	-	By Loan Dir. A/c No. 58146	-	-	-	4,034,435.00
To GPF	-	-	-	2,900.00	By Loan Dir. A/c No. 1	-	-	-	32,625.00
To Loan Dir. A/c No. 1	32,625.00	-	32,625.00	-	In Bank	-	-	-	-
To CGEGIS	5,585.00	-	5,585.00	-	In Hand	-	-	-	-
A' Total	**316,267,066.00**	**-**	**316,267,066.00**	**201,280,834.00**	**A' Total**	**316,267,066.00**	**-**	**316,267,066.00**	**201,280,834.00**

RECEIPT & PAYMENT ACCOUNTS FOR THE YEAR 2022-23

Amount in Rs.

General Provident Fund

RECEIPT					PAYMENT				
Particulars	**Plan**	**Non Plan**	**Total**	**Previous Year**	**Particulars**	**Plan**	**Non Plan**	**Total**	**Previous Year**
	Amount in Rs.		**Amount in Rs.**	**Amount in Rs.**	**Expenses**	**Amount in Rs.**		**Amount in Rs.**	**Amount in Rs.**
To Opening Bal (Bank)	5,766,203.00	-	5,766,203.00	1,432,237.00	By Final Payment	32,608,039.00	-	32,608,039.00	16,607,622.00
To Autosweep Bank Bal.	3,500,000.00	-	3,500,000.00	7,000,000.00	By Advance/withdrawl	21,176,524.00	-	21,176,524.00	6,999,966.00
To GP Fund Contribution	19,795,292.00	-	19,795,292.00	24,177,879.00	By Investment of FDR	-	-	-	-
To Encashment of FDR	26,499,586.00	-	26,499,586.00	-	By Auto Sweep Investment	3,500,000.00	-	3,500,000.00	3,500,000.00
To Int. on saving a/c	213,888.00	-	213,888.00	263,675.00					
To Int. on FDR	1,997,548.00	-	1,997,548.00	-					
To Int.Accured	4,955,526.00	-	4,955,526.00	-					
					By Closing Balance (Bank)	5,443,480.00		5,443,480.00	5,766,203.00
B' Total	**62,728,043.00**		**62,728,043.00**	**32,873,791.00**	**F' Total**	**62,728,043.00**		**62,728,043.00**	**32,873,791.00**

RECEIPT & PAYMENT ACCOUNTS FOR THE YEAR 2022-23

Amount in Rs.

Pension Fund

RECEIPT					PAYMENT				
Particulars	**Plan**	**Non Plan**	**Total**	**Previous Year**	**Particulars**	**Plan**	**Non Plan**	**Total**	**Previous Year**
	Amount in Rs.		**Amount in Rs.**	**Amount in Rs.**	**Expenses**	**Amount in Rs.**		**Amount in Rs.**	**Amount in Rs.**
To Opening Balance									
To Cash in Bank	6,188,212.00	-	6,188,212.00	1,109,484.00	By Investment in FDR	533,050,647.00	-	533,050,647.00	135,000,000.00
To Encashment of FDR	202,816,939.00	-	202,816,939.00	189,658,656.00	By Commuted Value of Pension	19,316,170.00	-	19,316,170.00	34,885,535.00
To Interest (Pension A/c)	2,647,434.00	-	2,647,434.00	5,737,251.00	By Pension/ Family Pension	46,006,388.00	-	46,006,388.00	37,207,024.00
To WII Contribution	289,854,992.00	-	289,854,992.00	7,098,930.00	By Autosweep FD	-	-	-	-
To Interest on FDRs	5,267,214.00	-	5,267,214.00	676,450.00					
To Autosweep FD	-	-	-	9,000,000.00					
To Misc. Receipt	109,710,215.28	-	109,710,215.28	-	Cash in Bank	18,111,801.28	-	18,111,801.28	6,188,212.00
C' Total	**616,485,006.28**	**-**	**616,485,006.28**	**213,280,771.00**	**D' Total**	**616,485,006.28**	**-**	**616,485,006.28**	**213,280,771.00**

RECEIPT & PAYMENT ACCOUNTS FOR THE YEAR 2022-23

Amount in Rs.

Corpus Fund

RECEIPT					PAYMENT				
Particulars	**Plan**	**Non Plan**	**Total**	**Previous Year**	**Particulars**	**Plan**	**Non Plan**	**Total**	**Previous Year**
	Amount in Rs.		**Amount in Rs.**	**Amount in Rs.**	**Expenses**	**Amount in Rs.**		**Amount in Rs.**	**Amount in Rs.**
To Opening Balance	33,147,139.85	-	33,147,139.85	1,656,641.67	By Investment in FDRs	50,500,000.00	-	50,500,000.00	38,000,000.00
To Autosweep Investment	-	-	-	500,000.00	By Misc. Expenses	-	-	-	
To Misc Receipts	3,934,665.00	-	3,934,665.00	21,339,235.18	By Investment in FDRs	-	-	-	-
To Interests on Saving A/c	1,209,461.00	-	1,209,461.00	608,906.00	By Autosweep Investment	-	-	-	-
To Interests on FDR	8,240,023.00	-	8,240,023.00	808,945.00	By Misc. & Cont.	-	-	-	-
To Encashment of FDR	312,887,491.00	-	312,887,491.00	39,255,330.00	By Transfer to Pension fund	303,295,194.00	-	303,295,194.00	-
To Loan A/c No. 57945	22,021,918.00	-	22,021,918.00	6,978,082.00	By TDS for FDR	269,317.00	-	269,317.00	-
					Closing Balance	27,376,186.85		27,376,186.85	33,147,139.85
D' Total	**381,440,697.85**	**-**	**381,440,697.85**	**71,147,139.85**	**F' Total**	**381,440,697.85**		**381,440,697.85**	**71,147,139.85**

(N.S. Chauhan)
Finance Officer

(Virendra R. Tiwari)
Director

RECEIPT & PAYMENT ACCOUNTS FOR THE YEAR 2022-23

Amount in Rs.

Training Account

RECEIPT					PAYMENT				
Particulars	**Plan**	**Non Plan**	**Total**	**Previous Year**	**Particulars**	**Plan**	**Non Plan**	**Total**	**Previous Year**
	Amount in Rs.		**Amount in Rs.**	**Amount in Rs.**	**Expenses**	**Amount in Rs.**		**Amount in Rs.**	**Amount in Rs.**
Opening in Bank	20,626,667.85	-	20,626,667.85	11,708,105.85	By Office Equipment	24,780.00	-	24,780.00	-
To Grant Received	-	-	-	-	By Cont/Misc	559,854.00	-	559,854.00	401,388.00
To Interest Received	441,130.00	-	441,130.00	362,770.00	By Camping Gear	-	-	-	965,411.00
To Other Receipts		-	-	16,632,000.00	By Travelling Expenses	12,933,194.91	-	12,933,194.91	1,685,544.00
To Adv. for Expenses		-	-	15,263.00	By TA/DA & Honorarium	237,500.00	-	237,500.00	274,664.00
To Misc Receipts	3,000,000.00	-	3,000,000.00	-	By POL & Maint of Vehicle	634,889.00	-	634,889.00	252,016.00
To Loan D/WII-54272	-	-	-	-	By Boarding & Lodging	8,830,605.00	-	8,830,605.00	3,024,610.00
To Prepaid Vehicle Insurance	-	-	-	-	By Books & Stationery	500,008.00	-	500,008.00	-
To Training Cost Accrued But Not Received	-	-	-	-	By Salary & Wages	-	-	-	842,060.00
To Course Fees	13,355,000.00	-	13,355,000.00	-	By Other Advance	223,941.00	-	223,941.00	147,632.00
To Other Advances	147,632.00	-	147,632.00	-	By Corpus Funds	2,863,820.00	-	2,863,820.00	-
					By Maint of Vehicle	-	-	-	-
					By Sports Item	27,591.00	-	27,591.00	15,000.00
					By Advances for expenses	755,002.00	-	755,002.00	464,146.00
					By Furniture & Fixture		-	-	19,000.00
					By Field Assistance	134,550.00	-	134,550.00	-
					By Tuition Fees	1,148,000.00	-	1,148,000.00	-
					By Training Material & Allowance	488,195.00	-	488,195.00	-
					By Closing in Bank	8,208,499.94	-	8,208,499.94	20,626,667.85
E' Total	**37,570,429.85**	**-**	**37,570,429.85**	**28,718,138.85**	**C' Total**	**37,570,429.85**	**-**	**37,570,429.85**	**28,718,138.85**

RECEIPT & PAYMENT ACCOUNTS FOR THE YEAR 2022-23

Amount in Rs.

Consultancy Project

RECEIPT					PAYMENT				
Particulars	**Plan**	**Non Plan**	**Total**	**Previous Year**	**Particulars**	**Plan**	**Non Plan**	**Total**	**Previous Year**
	Amount in Rs.		**Amount in Rs.**	**Amount in Rs.**	**Expenses**	**Amount in Rs.**		**Amount in Rs.**	**Amount in Rs.**
To Opening Balance:									
at Bank	47,946,016.34	-	47,946,016.34	55,393,088.44	By Office Equipment	442,218.00	-	442,218.00	2,013,439.00
To Grant Received	10,298,873.00	-	10,298,873.00	22,645,009.00	By Training Course Materials	484,198.00	-	484,198.00	385,189.00
To Interest Saving A/c	1,005,117.00	-	1,005,117.00	1,288,442.00	By Contingenciges/Misc	787,618.80	-	787,618.80	1,003,289.00
To Misc Receipt	35,881,808.00	-	35,881,808.00	-	By Fellowship & Wages	811,094.00	-	811,094.00	2,533,444.00
To Advance for expenses	1,992,800.00	-	1,992,800.00	420,000.00	By Travel Expenses	1,409,348.00	-	1,409,348.00	1,845,753.00
To Loan D/WII-54272	-	-	-	-	By POL & Maint. of veh.	180,250.00	-	180,250.00	421,289.00
		-	-		By Stationery items		-	-	14,500.00
		-	-		By Advance for expenses	220,000.00	-	220,000.00	105,000.00
To Loan D/WII-57180	600,000.00	-	600,000.00		By Boarding & Lodging	3,928,918.00	-	3,928,918.00	5,448,449.10
To Misc.Advance	-	-	-		By TA /DA & Honorarium	719,615.00	-	719,615.00	1,254,000.00
		-	-		By Transf. To Corpus Fund	12,877,871.87	-	12,877,871.87	448,323.00
					By Training course fees	125,000.00	-	125,000.00	-
					By Report writing	306,057.00	-	306,057.00	243,418.00
					By advance of Other	200,000.00	-	200,000.00	1,887,800.00
					By Field Equipment	470,510.00	-	470,510.00	2,073,053.00
					By Refund of Unspend Amt.	84,560.00	-	84,560.00	2,635,429.00
					By Misc Receipt-Payment	-	-	-	9,488,148.00
					Total Expenditure	23,047,258.67		23,047,258.67	31,800,523.10
					By Bank Balance	74,677,355.67	-	74,677,355.67	47,946,016.34
F' Total	**97,724,614.34**	**-**	**97,724,614.34**	**79,746,539.44**	**E' Total**	**97,724,614.34**	**-**	**97,724,614.34**	**79,746,539.44**

RECEIPT & PAYMENT ACCOUNTS FOR THE YEAR 2022-23

Amount in Rs.

Misc Receipts A/c No. 518502010058146

RECEIPT					PAYMENT				
Particulars	**Plan**	**Non Plan**	**Total**	**Previous Year**	**Particulars**	**Plan**	**Non Plan**	**Total**	**Previous Year**
	Amount in Rs.		**Amount in Rs.**	**Amount in Rs.**	**Expenses**	**Amount in Rs.**		**Amount in Rs.**	**Amount in Rs.**
To Opening Balance	31,553,284.57	-	31,553,284.57	-	By Cont./ Misc. Expenses	18,113.00	-	18,113.00	-
To Caution Money	867,000.00	-	867,000.00	-	By EMD	596,000.00	-	596,000.00	
To Misc Receipts	1,153,310.50	-	1,153,310.50	-	By Caution Money	546,000.00	-	546,000.00	-
To Interests on Saving A/c	932,170.00	-	932,170.00	-	By Hospitality & Ent.	16,020.00	-	16,020.00	-
To Admission Fee	537,000.00	-	537,000.00	-	By Land	645,575.00	-	645,575.00	-
To EMD	870,800.00	-	870,800.00	-		-	-	-	-
To Internship Fee	52,000.00	-	52,000.00	-	By Bank A/c No. 58146	34,143,857.07	-	34,143,857.07	-
	35,965,565.07		35,965,565.07		**Closing Balance**	**35,965,565.07**		**35,965,565.07**	

RECEIPT & PAYMENT ACCOUNTS FOR THE YEAR 2022-23

WII Contribution of Gratuity A/c No. 518502010055326

RECEIPT					PAYMENT				
Particulars	**Plan**	**Non Plan**	**Total**	**Previous Year**	**Particulars**	**Plan**	**Non Plan**	**Total**	**Previous Year**
	Amount in Rs.		**Amount in Rs.**	**Amount in Rs.**	**Expenses**	**Amount in Rs.**		**Amount in Rs.**	**Amount in Rs.**
To Opening Balance	5,659,599.47	-	5,659,599.47	-	By Misc. Expenses	76.16	-	76.16	-
WII Project Officals Contribution	1,178,340.00	-	1,178,340.00	-					
To Interests on Saving A/c	176,112.00	-	176,112.00	-					-
		-	-	-					-
		-	-	-					-
		-	-	-					-
		-	-	-	By Bank A/c No. 58146	7,013,981.31	-	7,013,981.31	-
	7,014,051.47		7,014,051.47		**Closing Balance**	**7,014,057.47**		**7,014,057.47**	

FORM OF FINANCIAL STATEMENTS (NON-PROFIT ORGANISATIONS)
WILDLIFE INSTITUTE OF INDIA, CHANDRABANI, DEHRADUN
BALANCE SHEET AS ON 31 MARCH 2023

(Amount in Rs.)

CORPUS /CAPITAL FUND AND LIABILITIES	Schedule	Current Year	Previous Year
CORPUS /CAPITAL FUND	1	(1,191,186,981.51)	546,112,318.42
RESERVES AND SURPLUS	2	-	-
ENDOWMENT/EARMARKED FUND	3	1,004,207,857.43	761,070,712.93
SECURED LOANS AND BORROWINGS	4	-	-
UNSECURED LOANS AND BORROWINGS	5	-	22,320,051.00
DEFERRED CREDIT LIABILITIES	6	2,413.00	9,479.00
CURRENT LIABILITIES AND PROVISION	7	2,187,245,728.59	366,242,942.00
TOTAL (A)		2,000,269,017.51	1,695,755,503.35
ASSETS			
FIXED ASSETS	8	165,970,450.40	150,099,491.38
INVESTMENTS- FROM EARMARKED / ENDOWMENT FUNDS	9	-	-
INVESTMENTS- OTHERS	10	694,442,936.00	619,835,391.00
CURENT ASSETS, LOANS, ADVANCES ETC.	11	1,139,855,631.11	925,820,620.95
MISCELLANEOUS EXPENDITURE (to the extent not written off or adjusted)			
TOTAL (B)		**2,000,269,017.51**	**1,695,755,503.35**
SIGNIFICNT ACCOUNTING POLICIES	24	-	
CONTINGENT LIABILITIES AND NOTES ON ACCOUNTS	25	-	-

FORM OF FINANCIAL STATEMENTS (NON-PROFIT ORGANISATIONS)
WILDLIFE INSTITUTE OF INDIA, CHANDRABANI, DEHRADUN
SCHEDULES FORMING PART OF BALANCE SHEET FOR THE YEAR ENDED 31 MARCH 2023

(Amount in Rs.)

SCHEDULE 1 : CORPUS/CAPITAL FUND		Current Year	Previous Year
Balance as at the Beginning of the year		197,276,138.57	207,396,995.29
Add: Contribution towards Corpus/ Capital fund		31,553,284.57	
Add: Contribution towards Corpus/ Capital fund		35,795,043.00	3,675,413.00
Add/(Deduct) : Balance of net income (expenditure) transferred from		(1,537,200,764.50)	(13,796,269.72)
the Income and Expenditure Account			
TOTAL	**A**	**-1,272,576,298.36**	**197,276,138.57**
Corpus Fund			
Opening Balance		348,836,179.85	305,324,433.67
Received during the year		25,956,583.00	28,317,317.18
Add Accrued Interest		442,264.00	13,776,578.00
Add Interest Earned		1,209,461.00	608,906.00
Intt. On FDR		8,240,023.00	808,945.00
Less: Pension (Actuarial Valuation Report 2023)			-
Less : Paid to Pension Funds		(303,295,194.00)	-
Total	**B**	**81,389,316.85**	**348,836,179.85**
Total A+B (Balance as at the year end)		(1,191,186,981.51)	546,112,318.42

FORM OF FINANCIAL STATEMENTS (NON-PROFIT ORGANISATIONS)
WILDLIFE INSTITUTE OF INDIA, CHANDRABANI, DEHRADUN
SCHEDULES FORMING PART OF BALANCE SHEET FOR THE YEAR ENDED 31 MARCH 2023

(Amount in Rs.)

SCHEDULE 2: RESERVES AND SURPLUS:	Current Year	Previous Year
1. Capital Reserves :		
As per last Account	-	
Addition during the year	-	-
Less : Deductions during the year	-	-
2. Revaluation Reserves :		
As per last Account	-	-
Addition during the year	-	-
Less : Deductions during the year	-	-
3. Special Reserves :		
As per last Account	-	-
Addition during the year	-	-
Less : Deductions during the year	-	-
4. General Reserves :		
As per last Account	-	-
Addition during the year	-	-
Less : Deductions during the year	-	-
TOTAL	**-**	**-**

(N.S. Chauhan)
Finance Officer

(Virendra R. Tiwari)
Director

FORM OF FINANCIAL STATEMENTS (NON-PROFIT ORGANISATIONS)
WILDLIFE INSTITUTE OF INDIA, CHANDRABANI, DEHRADUN
SCHEDULES FORMING PART OF BALANCE SHEET FOR THE YEAR ENDED 31 MARCH 2023

(Amount in Rs.)

SCHEDULE 3: EARMARKED/ ENDOWMENT FUNDS	Current Year	Previous Year
a) Opening Balance of the Funds	761,070,712.93	590,647,739.17
Opening Balance of the Project Funds	2,234,215.53	
b) Addition to the Funds		
i Grants Received	984,863,134.69	700,917,580.08
ii Interest Received	30,800,559.19	17,047,122.00
iii Other for Expenses	36,598,032.47	79,258,516.64
iv Loans	7,364,473.00	4,012,600.00
v Other Income	125,576,014.04	19,972,952.58
vi Enscashment of FDR	30,000,000.00	17,397,278.00
Total	**1,215,202,213.39**	**838,606,049.30**
TOTAL (A+B)	1,978,507,141.85	1,429,253,788.47
Utilisation/ Expenditure towards objectives of funds		
c) i Capital Expenditures (Fixed Assets)		
Camp/Field Equipment	55,721,423.77	76,593,734.72
Office Equipment	21,588,724.00	2,013,439.00
Computer & Accessories	1,875,751.00	-
Furniture & Fixture	313,490.00	-
ii Revenue Expenditure		
Contingencies/Misc.	75,403,016.98	22,232,807.22
Fellowship & Wages	274,130,657.00	195,547,902.73
Travel Expenses	**63,316,801.46**	**38,972,225.93**
POL & Maint. Of Vehicle	22,385,606.25	7,001,101.20
Advance for Expenses (FA)	36,251,372.30	36,853,567.64
Boarding & Lodging	10,830,794.00	7,272,416.10
Misc receipt - Payment (Previous Year)	108,474,490.37	137,061,370.08
Report Writing	169,270.00	278,547.00
Corpus fund	75,704,004.34	9,831,192.56
TA/DA & Honorarium	2,302,528.00	1,704,175.00
Stationery items	-	14,500.00
Training Course Materials	485,737.00	385,189.00
Training Course Fee		
Loan to Director WII Other Project	21,648,000.00	4,318,688.00
Refund of Unspend Amt.	9,998,867.25	16,471,077.00

FORM OF FINANCIAL STATEMENTS (NON-PROFIT ORGANISATIONS)
WILDLIFE INSTITUTE OF INDIA, CHANDRABANI, DEHRADUN
SCHEDULES FORMING PART OF BALANCE SHEET FOR THE YEAR ENDED 31 MARCH 2023

(Amount in Rs.)

SCHEDULE 3: EARMARKED FUNDS	Current Year	Previous Year
Advance for other Firm	62,094,090.00	1,887,800.00
Establishment Expenses	30,302,700.00	11,943,748.00
Operational Expenses	97,849,446.70	96,046,718.76
Printing and Publication	3,452,514.00	1,752,875.60
TOTAL-C	**974,299,284.42**	**668,183,075.54**
NET BALANCE AS AT THE YEAR-END (A+B-C)	1,004,207,857.43	761,070,712.93

FORM OF FINANCIAL STATEMENTS (NON-PROFIT ORGANISATIONS)
WILDLIFE INSTITUTE OF INDIA, CHANDRABANI, DEHRADUN
SCHEDULES FORMING PART OF BALANCE SHEET FOR THE YEAR ENDED 31 MARCH 2023

(Amt. Rs.)

SCHEDULE 4 : SECURED LOANS AND BORROWINGS	Current Year	Previous Year
(1) Central Govt.	-	-
(2) State Govt.(Specify)	-	-
(3) Financial Institutions		
(a) Term Loans	-	-
(b) Interest accured and due	-	-
(4) Banks		
(i) Term Loans		
- Interest accured and due	-	-
(ii) Others Loans (specify)		
- Interest accured and due	-	-
(5) Other Institutions and Agencies	-	-
(6) Debentures and Bonds	-	-
(7) Others (specify)	-	-
TOTAL	**-**	**-**

FORM OF FINANCIAL STATEMENTS (NON-PROFIT ORGANISATIONS)
WILDLIFE INSTITUTE OF INDIA, CHANDRABANI, DEHRADUN
SCHEDULES FORMING PART OF BALANCE SHEET FOR THE YEAR ENDED 31 MARCH 2023

(Amount in Rs.)

SCHEDULE 5 : UNSECURED LOANS AND BORROWINGS	Current Year	Previous Year
(1) Central Govt.	-	-
(2) State Govt.(Specify)	-	-
(3) Financial Institutions	-	-
(4) Banks		
(i) Term Loans	-	-
(ii) Others (specify)	-	-
(5) Other Institutions and Agencies	-	-
(6) Debentures and Bonds	-	-
(7) Fixed Deposits	-	-
(8) Others (Specify)		
Security Deposit	-	-
Internal Loan	-	22320051
Pension Fund	-	-
TOTAL	**-**	**22,320,051.00**

FORM OF FINANCIAL STATEMENTS (NON-PROFIT ORGANISATIONS)
WILDLIFE INSTITUTE OF INDIA, CHANDRABANI, DEHRADUN
SCHEDULES FORMING PART OF BALANCE SHEET FOR THE YEAR ENDED 31 MARCH 2023

(Amount in Rs.)

SCHEDULE 6 : DEFERRED CREDIT LIABILITIES:	Current Year	Previous Year
(A) Acceptances secured by hypothecation of capital equipment and other assets	-	-
(B) Others	2,413.00	9,479.00
TOTAL	**2,413.00**	**9,479.00**

FORM OF FINANCIAL STATEMENTS (NON-PROFIT ORGANISATIONS)
WILDLIFE INSTITUTE OF INDIA, CHANDRABANI, DEHRADUN
SCHEDULES FORMING PART OF BALANCE SHEET FOR THE YEAR ENDED 31 MARCH 2023

(Amount in Rs.)

SCHEDULE 7 : CURRENT LIABILITIES AND PROVISION	Current Year	Previous Year
(A) CURRENT LIABILITIES		
(1) Acceptances	-	
(2) Sundry Creditors		
(1) For Goods	-	
(2) For Others	-	
Other Payments outstanding (Grant in Aid) (2020-21)	-	183,207.00
Other Payments outstanding (Grant in Aid) 2017-18)	-	121,355.00
Other Payments outstanding (Grant in Aid) (2022-23)	3,847,518.00	
(3) Advances Received		
Hostel Caution Money (GIA A/c 22000+Misc. A/c 324000	343,000.00	22,000.00
Security Refund with Interest (High Court)	19,648,610.00	
(4) Interest accrued but not due on		
(1) Secured Loans/Borrowings	-	-
(2) Unsecured Loans/Borrowings	-	-
(5) Statuary Liabilities		
(1) Overdue	-	
(2) Others (Specify)	-	
Pension Fund	536,581,361.28	190,463,946.00
GP Fund	134,505,722.00	161,328,031.00
WII-Contribution of Gratuity	19,113,981.31	
(6) Others (Specify)		
EMD Misc. Receipts A/c No. 58146	274,800.00	-
Caution Money Misc. Receipts A/c No. 58146	-	
Loan:- D/WII A/c No. 57180	-	
Loan:- D/WII A/c No. 57945	46,625.00	46,625.00
Welfare Fund	-	-
TOTAL (A)	**714,361,617.59**	**352,165,164.00**

FORM OF FINANCIAL STATEMENTS (NON-PROFIT ORGANISATIONS)
WILDLIFE INSTITUTE OF INDIA, CHANDRABANI, DEHRADUN
SCHEDULES FORMING PART OF BALANCE SHEET FOR THE YEAR ENDED 31 MARCH 2023

(Amount in Rs.)

SCHEDULE 7 : CURRENT LIABILITIES AND PROVISIONS	Current Year	Previous Year
(B) PROVISIONS		
((1) For Taxation		
TDS- Grant in Aid	616.00	
GST-Grant in Aid	11,688.00	12,860.00
(2) Gratuity	-	
(3) Superannuation/ Pension	-	-
(4) Accumulated Leave Encashment	-	-
(a) Retirement Benefited (Commutation, Gratuity)	59,214,990.00	
(b) Retirement Benefited (Leave Encashment)	54,667,510.00	
(c) Retirement Benefited (Pension)	1,342,668,118.00	
(5) Trade Warranties/ Claims	-	-
(6) Others (Specify)		
TDS refund paid to GPF, Pension & Corpus	-	-
CGEGIS 5,539.00	-	
GPF-CDL 2,900.00	2,900.00	
Sub. of ECPF	-	-
Salary Payable (Medical 608085+Salary 14916674)	15,524,759.00	13,478,293.00
Other Payable	787,991.00	583,725.00
Payment to Income Tax	-	-
Payment made to Sh Rajkishore Mohanto (Res. Projecdt)	-	-
Fellowship (Arrear)	-	-
TOTAL (B)	1,472,884,111.00	14,077,778.00
TOTAL (A+ B)	2,187,245,728.59	366,242,942.00

(N.S. Chauhan)
Finance Officer

(Virendra R. Tiwari)
Director

FORM OF FINANCIAL STATEMENTS (NON-PROFIT ORGANISATIONS)
WILDLIFE INSTITUTE OF INDIA, DEHRADUN
SCHEDULES FORMING PART OF BALANCE SHEET FOR THE YEAR ENDED 2020-23
SCHEDULE 8 : FIXED ASSETS

(Amount in Rs.)

Partuculars	Gross Block										Net Block	
		Addition during the year										
	Cost as at the beginning of the year	Upto 30 Sep.	After 30 Sep.	Deduction during the year	Adjustment for previous year	Cost as at the end of the year	As at the beginning of the year	For the year	Deduction during the 2018-21	At the end of the year	As at the current year-end	As at the Previous year-end
LAND												
BLOCK: 0%												
Land	6,607,214.58	9,645,575.00	-	-	-	16,252,789.58	-	-	-	-	16,252,789.58	6,607,214.58
TOTAL	6,607,214.58	9,645,575.00	-	-	-	16,252,789.58	-	-	-	-	16,252,789.58	6,607,214.58
BUILDINGS												
BLOCK: 10%												
Arch. & Sprvson Fee	1,089,688.41	-	-	-	-	1,089,688.41	121,077.00	108,969.00	-	108,969.00	980,719.41	1,089,688.41
Auditorium	1,631,776.47	-	-	-	-	1,631,776.47	181,308.00	163,178.00	-	163,178.00	1,468,598.47	1,631,776.47
Boundary Fencing	99,441.23	-	-	-	-	99,441.23	11,049.00	9,944.00	-	9,944.00	89,497.23	99,441.23
Boundary Wall	175,824.79	-	-	-	-	175,824.79	19,536.00	17,582.00	-	17,582.00	158,242.79	175,824.79
Boundary Wall-Capital	3,420,000.00	-	837,729.00	-	-	4,257,729.00	380,000.00	383,886.00	-	383,886.00	3,873,843.00	3,420,000.00
Building Complex	49,505,227.86	11,331,377.00	-	-	4,521,128.00	65,357,732.86	5,500,581.00	6,083,660.00	4,521,128.00	10,604,788.00	54,752,944.86	49,505,227.86
Campus Develop	40,248,787.70	1,984,928.00	-	-	460,890.00	42,694,605.70	4,472,088.00	4,223,372.00	460,890.00	4,684,262.00	38,010,343.70	40,248,787.70
Campus Develop Capital	-		1,696,857.00	-	-	1,696,857.00	-	84,843.00	-	84,843.00	1,612,014.00	-
Tennis Court	64,538.51	-	-	-	-	64,538.51	7,171.00	6,454.00	-	6,454.00	58,084.51	64,538.51
Sports Complex	89,109.46	-	-	-	-	89,109.46	9,901.00	8,911.00	-	8,911.00	80,198.46	89,109.46
Road & Culvert	195,273.48	1,391,099.00	-	-	617,563.00	2,203,935.48	21,697.00	158,637.00	617,563.00	776,200.00	1,427,735.48	195,273.48
TOTAL	96,519,667.91	14,707,404.00	2,534,586.00	-	5,599,581.00	119,361,238.91	10,724,408.00	11,249,436.00	5,599,581.00	16,849,017.00	102,512,221.91	96,519,667.91
BLOCK: 5%												
Staff Quarters	4,368,421.71	1,252,388.00	-	-	285,215.00	5,906,024.71	229,917.00	281,040.00	285,215.00	566,255.00	5,339,769.71	4,368,421.71
TOTAL	**4,368,421.71**	**1,252,388.00**	**-**	**-**	**285,215.00**	**5,906,024.71**	**229,917.00**	**281,040.00**	**285,215.00**	**566,255.00**	**5,339,769.71**	**4,368,421.71**

FORM OF FINANCIAL STATEMENTS (NON-PROFIT ORGANISATIONS)
WILDLIFE INSTITUTE OF INDIA, DEHRADUN
SCHEDULES FORMING PART OF BALANCE SHEET FOR THE YEAR ENDED 2020-23
SCHEDULE 8 : FIXED ASSETS

(Amount in Rs.)

Partuculars	Gross Block						Net Block					
		Addition during the year										
	Cost as at the beginning of the year	Upto 30 Sep.	After 30 Sep.	Deduction during the year	Adjustment for previous year	Cost as at the end of the year	As at the beginning of the year	For the year	Deduction during the 2018-21	At the end of the year	As at the current year-end	As at the Previous year-end
PLANT MACHINERY & EQPT												
BLOCK: 15%												
Vehicle	4,338,622.10	-	-	-	-	4,338,622.10	765,639.00	650,793.00	-	650,793.00	3,687,829.10	4,338,622.10
Elect Equipment `	2,034,830.00	991,735.00	-	-	380,908.00	3,407,473.00	359,088.00	453,985.00	380,908.00	834,893.00	2,572,580.00	2,034,830.00
Foerensic Laboratory	9,734,751.66	-	-	-	-	9,734,751.66	1,714,541.00	1,460,213.00	-	1,460,213.00	8,274,538.66	9,734,751.66
Training Equipment	836,199.80	-	-	-	-	836,199.80	147,565.00	125,430.00	-	125,430.00	710,769.80	836,199.80
Camp Equipment (Project)	63,278.80	-	-	-	-	63,278.80	11,167.00	9,492.00	-	9,492.00	53,786.80	63,278.80
DG Set	2,895,878.39	2,581,884.00	-	-	1,963,160.00	7,440,922.39	511,037.00	821,664.00	1,963,160.00	2,784,824.00	4,656,098.39	2,895,878.39
EPABX	27,317.86	-	-	-	-	27,317.86	4,821.00	4,098.00	-	4,098.00	23,219.86	27,317.86
Lab Equipment	1,413,226.98	-	-	-	-	1,413,226.98	249,393.00	211,984.00	-	211,984.00	1,201,242.98	1,413,226.98
Office Equipment	3,252,402.07	-	-	-	-	3,252,402.07	573,953.00	487,860.00	-	487,860.00	2,764,542.07	3,252,402.07
Trg Equipment (Trg A/c)	826,160.01	-	-	-	-	826,160.01	145,793.00	123,924.00	-	123,924.00	702,236.01	826,160.01
Office Equipment (Trg A/c)	1,480,362.99	-	24,780.00	-	-	1,505,142.99	261,241.00	223,913.00	-	223,913.00	1,281,229.99	1,480,362.99
Office Equipment (Project)	3,089.97	-	-	-	-	3,089.97	545.00	463.00	-	463.00	2,626.97	3,089.97
Office Equipment (R/Proj)	1,828,902.62	-	-	-	-	1,828,902.62	322,747.00	274,335.00	-	274,335.00	1,554,567.62	1,828,902.62
Gas Fire Suppressions Systems	-	3,316,812.00	-	-	1,044,658.00	4,361,470.00	-	497,522.00	1,044,658.00	1,542,180.00	2,819,290.00	-
Camp Equipment (R/Proj)	3,539,121.85	-	-	-	-	3,539,121.85	624,551.00	530,868.00	-	530,868.00	3,008,253.85	3,539,121.85
TOTAL	**32,274,145.10**	**6,890,431.00**	**24,780.00**	**-**	**3,388,726.00**	**42,578,082.10**	**5,692,081.00**	**5,876,544.00**	**3,388,726.00**	**9,265,270.00**	**33,312,812.10**	**32,274,145.10**

FORM OF FINANCIAL STATEMENTS (NON-PROFIT ORGANISATIONS)
WILDLIFE INSTITUTE OF INDIA, DEHRADUN
SCHEDULES FORMING PART OF BALANCE SHEET FOR THE YEAR ENDED 2020-23
SCHEDULE 8 : FIXED ASSETS

(Amount in Rs.)

Partuculars	Gross Block											Net Block
		Addition during the year										
	Cost as at the beginning of the year	Upto 30 Sep.	After 30 Sep.	Deduction during the year	Adjustment for previous year	Cost as at the end of the year	As at the beginning of the year	For the year	Deduction during the 2018-21	At the end of the year	As at the current year-end	As at the Previous year-end
AC Plant : BLOCK : 10%												
AC Plant	327,981.46	-	-	-	-	327,981.46	36,442.00	32,798.00	-	32,798.00	295,183.46	327,981.46
TOTAL	327,981.46	-	-	-	-	327,981.46	36,442.00	32,798.00	-	32,798.00	295,183.46	327,981.46
FURNITURE, FIXTURES : BLOCK : 10%												
Furinitures & Fixtures-GIA	5,023,719.73	-	28,968.00	-	-	5,052,687.73	558,191.00	503,820.00	-	503,820.00	4,548,867.73	5,023,719.73
Furinitures & Fixtures-Capital A/c	436,714.00	-	-	-	-	436,714.00	48,524.00	43,671.00	-	43,671.00	393,043.00	436,714.00
Furniture & Fixture (Trg)	244,863.59	-	-	-	-	244,863.59	26,152.00	24,486.00	-	24,486.00	220,377.59	244,863.59
TOTAL	5,705,297.32	-	28,968.00	-	-	5,734,265.32	632,867.00	571,977.00	-	571,977.00	5,162,288.32	5,705,297.32
COMPUTER/PERIPHERALS : BLOCK : 40%												
Comp. and Periphrals	489,870.73	121,486.00	-	-	76,704.00	688,060.73	225,572.00	244,543.00	76,704.00	321,247.00	366,813.73	489,870.73
Comp. & Accessories	2,354,620.71	135,520.00	174,511.00	-	-	2,664,651.71	1,361,216.00	1,030,958.00	-	1,030,958.00	1,633,693.71	2,354,620.71
E Governance	81.42	-	-	-	-	81.42	54.00	33.00	-	33.00	48.42	81.42
TOTAL	2,844,572.86	257,006.00	174,511.00	-	76,704.00	3,352,793.86	1,586,842.00	1,275,534.00	76,704.00	1,352,238.00	2,000,555.86	2,844,572.86
BOOKS : BLOCK : 40%												
Journals & Periodicals	1,290,255.26	-	-	-	-	1,290,255.26	860,171.00	516,102.00	-	516,102.00	774,153.26	1,290,255.26
LIBRARY BOOK:-BLOCK : 40%												
Library Books	161,935.19	-	279,394.00	-	-	441,329.19	106,834.00	120,653.00	-	120,653.00	320,676.19	161,935.19
TOTAL	**1,452,190.45**	**-**	**279,394.00**	**-**	**-**	**1,731,584.45**	**967,005.00**	**636,755.00**	**-**	**636,755.00**	**1,094,829.45**	**1,452,190.45**
GRAND TOTAL	**150,099,491.38**	**32,752,804.00**	**3,042,239.00**	**-**	**9,350,226.00**	**195,244,760.39**	**19,869,562.00**	**19,924,084.00**	**9,350,226.00**	**29,274,310.00**	**165,970,450.38**	**150,099,491.38**

FORM OF FINANCIAL STATEMENTS (NON-PROFIT ORGANISATIONS)
WILDLIFE INSTITUTE OF INDIA, CHANDRABANI, DEHRADUN
SCHEDULES FORMING PART OF BALANCE SHEET FOR THE YEAR ENDED 31 MARCH 2023

(Amount in Rs.)

SCHEDULE : 9 INVESTMENTs FROM EARMARKED/ENDOWMENT FUNDS		Current Year	Previous Year
1.	In the Govt. Securities	-	-
2.	Other approved Securities	-	-
3.	Shares	-	-
4.	Debentures and Bonds	-	-
5.	Subsidiaries and Joint Ventures	-	-
6-	Others (Specify)	-	-
TOTAL		**-**	**-**

FORM OF FINANCIAL STATEMENTS (NON-PROFIT ORGANISATIONS)
WILDLIFE INSTITUTE OF INDIA, CHANDRABANI, DEHRADUN
SCHEDULES FORMING PART OF BALANCE SHEET FOR THE YEAR ENDED 31 MARCH 2023

(Amount in Rs.)

SCHEDULE : 10 INVESTMENT - OTHERS	Current Year	Previous Year
(1) In the Govt. Securities	-	-
(2) Other approved Securities	-	-
(3) Shares	-	-
(4) Debentures and Bonds		
Investment in RBI Bond (Corpus Fund)	42,000,000.00	42,000,000.00
(5) Subsidiaries and Joint Ventures	-	-
(6) Others (Specify)		
Investment in FDR (GPF)	118,328,959.00	141,593,368.00
Autosweep FDR-GPF	3,500,000.00	3,500,000.00
Investment in FDR (Pension Fund)	510,119,655.00	175,736,788.00
FDR Corpus Fund	8,394,322.00	257,005,235.00
FDR (WII-Contribution of Gratuity)	12,100,000.00	
Autosweep FDR Corpus fund	-	-
Autosweep FDR-Pension Fund	-	-
TOTAL	**694,442,936.00**	**619,835,391.00**

FORM OF FINANCIAL STATEMENTS(NON-PROFIT ORGANISATIONS)
WILDLIFE INSTITUTE OF INDIA, CHANDRABANI, DEHRADUN
SCHEDULES FORMING PART OF BALANCE SHEET FOR THE YEAR ENDED 31 MARCH 2023

		(Amount in Rs.)
SCHEDULE : 11 CURRENT ASSETS, LOANS, ADVANCES ETC.	**Current Year**	**Previous Year**
(A) CURRENT ASSETS		
(1) Inventories		
Closing Stock of Steel & Cement	-	-
Closing Balance of (Grant in Aid)	6,414.56	-
Closing Balance of WII Publication	298,412.00	298,412.00
(2) Sundry Debtors		
(1) Debts Outstanding for a period exceeding six months	-	-
(2) Others (Specify)	-	-
(3) Cash balances in hand (including cheques/drafts and imprest)		
Grant-in-Aid A/c	-	-
Training A/c	-	-
Pension Fund A/c	-	-
GPF A/c	-	-
Corpus Fund	-	-
(4) Bank Balances		
(1) With Scheduled Banks		
Grant-in-Aid A/c	316,406.67	802.32
Training A/c	8,208,499.94	20,626,667.85
Pension Fund A/c	18,111,801.28	6,188,212.00
GPF A/c	5,443,480.00	5,766,203.00
Corpus fund No 4032	27,376,186.85	33,147,139.85
Endowment Funds	1,004,207,857.43	761,070,712.93
WII- Contribution of Gratuity A/c No. 518502010055326	7,013,981.31	-
MISC. RECEIPTS A/C NO. 518502010058146	34,143,857.07	-
TOTAL (A)	**1,105,126,897.11**	**827,098,149.95**
(B) LOANS, ADVANCES AND OTHER ASSETS	**Current Year**	**Previous Year**
(1) Loans		
(1) Staff FA(MSc) TA(MSc) FA TA LTC Med Adv)		
Advance for expenses (Staff)	221,276.00	17,276.00
Advance for expenses (Research Projects) (FA-158517+TA-22196)	180,713.00	180,713.00
Land Acquisition Charges (Deposited in Hon'ble High Court)	-	18,000,000.00
Advance for expenses (Training Account)	880,000.00	-
Advance for IIT Kanpur	1,239,000.00	1,239,000.00
Advance for Capital A/c	-	-
Advance for Vehicle Insurance	74,091.00	105,665.00
(2) Other entities engaged in activities /objectives similar to		
(3) Others (Specify)		
Adv for civil work to CPWD	4,975,303.00	17,830,008.00
Adv for civil work to CPWD- Capital Account	-	6,113,268.00
Loan for World Environment Day (MoEF)	280,984.00	280,984.00
Loan for WCF workshop	-	30,253.00
Loan:- D/WII A/c No. 54189	-	-
Loan:- D/WII A/c No. 58146	1,318,436.00	1,343,436.00
Loan:- D/WII A/c No. 01	-	46,625.00

New Salary Account	-	
Advance payment to CCU	-	15,271,531.00
Advance Payment-Training Account	563,089.00	611,778.00
Medical Health Insurance- Claim	-	-
CED-II CCU, New Delhi	966,778.00	-
Ex. Eng. Civil-II CPWD, Dehradun	2,823,487.00	-
(2) Advances and other amounts recoverable in cash or in kind or		
(B) LOANS, ADVANCES AND OTHER ASSETS	Current Year	Previous Year
(1) On Capital Accounts		
(2) Prepayments		
(3) Others (Specify)		
Security Deposit for Electricity Connection	981,968.00	981,968.00
TDS to be refunded by the ITO (Pension Fund)	4,389,787.00	4,389,787.00
TDS to be refunded by the ITO (GPF)	2,277,757.00	2,277,757.00
TDS to be refunded by the ITO (Corpus fund)	3,176,544.00	2,907,227.00
(3) Income Accrued		
(1) On Investments from Earmarked / Endowment Funds		
(2) On Invesments -Others		
Interest Accrued on FDR (GIA)		
Interest Accrued on FDR (GPF)	4,955,526.00	8,190,703.00
Interest Accrued on FDR (Pension Fund)	3,960,118.00	4,149,159.00
Interest Accrued on FDR (Corpus Fund)	442,264.00	13,776,578.00
(3) On Loans and Advances		
(4) Others (Specify)		
Training Cost Accrued But not Received	-	660,000.00
(4) Expenses payable towards capital/fixed Assets		
(3) Leave Encashment & Gratuity (Provision 2023-28)	-	-
(4) Expenses Payable Capitalised (2022-23)	732,599.00	
(5) Expenses Payable (2022-23)	283,374.00	
(6) Grant in Aid (2017-18)	-	121,355.00
(7) Grant in Aid (2020-21)	5,640.00	197,400.00
TOTAL (B)	**34,728,734.00**	**98,722,471.00**
TOTAL (A+B)	**1,139,855,631.11**	**925,820,620.95**

FORM OF FINANCIAL STATEMENTS (NON-PROFIT ORGANISATIONS)
WILDLIFE INSTITUTE OF INDIA, CHANDRABANI, DEHRADUN
INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 2022-23

(Amount in Rs.)

INCOME	Schedule	Current Year	Previous Year
Income from Sales/Services	12	-	-
Grants/Subsidies	13	270,204,957.00	251,429,587.00
Fees/Subscriptions	14	13,944,000.00	16,632,000.00
Income from Investments (from earmarked/endowment Funds Transferred to funds)	15	-	-
Income from Royalty, Publication etc	16	1,228,856.00	1,368,859.00
Interest Earned	17	1,373,300.00	369,551.00
Other Income	18	4,153,310.50	-
Increase/decrease) in stock of Finished goods and works-in-progress	19	-	-
TOTAL (A)		**290,904,423.50**	**269,799,997.00**
EXPENDITURE			
Establishment Expenses (Plan & Non Plan)	20	1,685,040,123.00	203,643,929.00
Other Administrative Expenses (Plan & Non Plan)	21	105,066,229.00	79,952,337.72
Expenditure on Grants, Subsidies etc.	22	_	
Expenditure on Grants, Subsidies etc.	23	-	-
Significant account Polices (notes on Accounts)	24	-	-
CONTINGENT LIABILITIES AND NOTES ON ACCOUNTS (Illustrative)	25	-	-
Total (B)		**1,790,106,352.00**	**283,596,266.72**
Balance being excess of Income over Expenditure (A-B)		(1,499,201,928.50)	(13,796,269.72)
Prior period items (Depreciation & High Court Security Refund with Intt.) (28648610+9350226)		-37,998,836.00	
BALANCE BEING SURPLUS (DEFICIT) CARRIED TO CORPUS/CAPITAL FUND		(1,537,200,764.50)	(13,796,269.72)

FORM OF FINANCIAL STATEMENTS (NON-PROFIT ORGANISATIONS)
WILDLIFE INSTITUTE OF INDIA, CHANDRABANI, DEHRADUN
INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 2022-23

(Amount in Rs.)

SCHEDULE : 12 INCOME FROM SALES/SERVICES	Current Year	Previous Year
1. Income from Sales		
(a) Sale of Finished Goods	-	-
(b) Sale of Raw Material	-	-
(c) Sale of Scraps	-	-
2. Income from Services		
(a) Labour and Processing Charges	-	-
(b) Professional/Consultancy Services	-	-
(c) Agency Commission and Brokerage	-	-
(d) Maintenance Services (Equipment/Property)	-	-
(e) Other (Specify)	-	-
TOTAL	**-**	**-**

FORM OF FINANCIAL STATEMENTS (NON-PROFIT ORGANISATIONS)
WILDLIFE INSTITUTE OF INDIA, CHANDRABANI, DEHRADUN
INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 2022-23

(Amount in Rs.)

SCHEDULE : 13 GRANTS/SUBSIDIES	Current Year	Previous Year
(1) Central Government		
Grant -in- Aid from MoEF	306,000,000.00	255,105,000.00
Amount Capitalized(-)	35,795,043.00	3,675,413.00
Total	270,204,957.00	251,429,587.00
(2) State Governments (s)	-	-
(3) Government Agencies	-	-
(4) Institutions/Welfare Bodies	-	-
(5) International Organisations	-	-
(6) Others (Specify)		-
WII Contribution (Pension A/c)	-	-
TOTAL	**270,204,957.00**	**251,429,587.00**

FORM OF FINANCIAL STATEMENTS (NON-PROFIT ORGANISATIONS)
WILDLIFE INSTITUTE OF INDIA, CHANDRABANI, DEHRADUN
INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 2022-23

(Amount in Rs.)

SCHEDULE : 14 FEES/ SUBSCRIPTIONS	Current Year	Previous Year
(1) Entrance Fees		
M.Sc.Course Fee	-	-
(2) Annual Fees/ Subscriptions	-	
(3) Seminar/ Program Fees		
Seminar/ Workshop Fees	-	
(4) Consultancy Fees		
Consultancy refund	-	
(5) Others (Specify)		
Other Receipt (Training)	13,355,000.00	16,632,000.00
Receipt for Training Courses	-	
Other Project Grant	-	
Pre-receipted bill issued but not received	-	
Internship Fees	52,000.00	-
Admission Fee	537,000.00	
TOTAL	**13,944,000.00**	**16,632,000.00**

FORM OF FINANCIAL STATEMENTS(NON-PROFIT ORGANISATIONS)
WILDLIFE INSTITUTE OF INDIA, CHANDRABANI, DEHRADUN
INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 2022-23

(Amount in Rs.)

SCHEDULE : 15 INCOME FROM INVESTMENTS	Investment from Earmarked fund		Investment-Other	
(income on Investment from Earmarked/Endowment funds transferred to Funds)	Current Year	Previous Year	Current Year	Previous Year
1. Interest				
(a) On Govt Securities	-	-	-	-
(b) Other Bonds/Debentures	-	-	-	-
2. Dividends:				
(a) On Shares	-	-	-	-
(b) On Mutual Fund Securities	-	-	-	-
3. Rents	-	-	-	-
4. Others (Specify)	-	-	-	-
TOTAL	**-**	**-**	**-**	**-**

FORM OF FINANCIAL STATEMENTS(NON-PROFIT ORGANISATIONS)
WILDLIFE INSTITUTE OF INDIA, CHANDRABANI, DEHRADUN
INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 2022-23

(Amount in Rs.)

SCHEDULE : 16 INCOME FROM ROYALTY, PUBLICATION ETC.	Current Year	Previous Year
(1) Income from Royalty	-	-
(2) Income from Publications	-	-
(3) Others (Specify)	-	-
Genetic lab	-	-
Misc. Receipts	-	15,020.00
UBI Building Rent	-	-
Misc Income from Lib	-	-
WII Products	-	-
House Licence Fee	611,864.00	504,634.00
Bus Charges	97,250.00	82,541.00
Electricity & Water Charges	519,742.00	766,664.00
Telephone	-	-
TOTAL	**1,228,856.00**	**1,368,859.00**

FORM OF FINANCIAL STATEMENTS(NON-PROFIT ORGANISATIONS)
WILDLIFE INSTITUTE OF INDIA, CHANDRABANI, DEHRADUN
INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 2022-23

(Amount in Rs.)

SCHEDULE : 17 INTEREST EARNED	Current Year	Previous Year
(1) (1) With Scheduled Banks		
Int. on Bank Deposit	-	-
Interest on FDR	-	-
Interest on Investment	-	-
(2) With Non-Scheduled Banks	-	-
(3) With Institutions	-	-
(4) Others (Specify)	-	-
Int. on Investment(Training)	-	-
Interest (Training)	441,130.00	362,770.00
Interest on HBA	-	6,781.00
(2) On Savings Account	-	
(1) With Scheduled Banks	-	
Int. on Savings Account	932,170.00	-
Interest on FDR A/c	-	-
Interest on Saving A/c (Training A/c)	-	-
(2) With Non-Scheduled Banks	-	-
(3) Post Office Savings Account	-	-
(4) Others (Specify)		-
-		
(3) On Loans	-	
(1) Interest on Loan & Advance	-	-
(2) Others	-	-
(4) Interest on Debtors and Other Receivables	-	-
TOTAL	**1,373,300.00**	**369,551.00**

FORM OF FINANCIAL STATEMENTS(NON-PROFIT ORGANISATIONS)
WILDLIFE INSTITUTE OF INDIA, CHANDRABANI, DEHRADUN
INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 2022-23

(Amount in Rs.)

SCHEDULE : 18 OTHER INCOME	Current Year	Previous Year
1. Profit on Sale/Disposal of Assets		
1) Owned Assets	-	-
2) Assets acquired out of grants, or received free of cost	-	-
2. Export Incentives realized	-	-
3. Fees for Misc. Services	-	-
4. Others (Specify)		
Misc. Receipts	4,153,310.50	-
EMD Forfeited	-	-
Receipt for Project	-	-
Total	**4,153,310.50**	**-**

FORM OF FINANCIAL STATEMENTS(NON-PROFIT ORGANISATIONS)
WILDLIFE INSTITUTE OF INDIA, CHANDRABANI, DEHRADUN
INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 2022-23

(Amount in Rs.)

SCHEDULE : 19 INCREASE/DECREASE IN STOCK OF FINISHED GOODS	Current Year	Previous Year
1. Closing Stock		
1) Finished Goods		
Closing Stock of WII Publication	-	-
2) Work-in-progress	-	-
2. Less : Opening Stock		
1) Finished Goods	-	-
2) Work-in-progress	-	-
TOTAL	**-**	**-**

FORM OF FINANCIAL STATEMENTS(NON-PROFIT ORGANISATIONS)
WILDLIFE INSTITUTE OF INDIA, CHANDRABANI, DEHRADUN
INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 2022-23

(Amount in Rs.)

SCHEDULE : 20 ESTABLISHMENT EXPENSES	Current Year		Previous Year	
	Plan	Non Plan	Plan	Non Plan
(1) Salaries and Wages	217,672,276.00	-	192,575,954.00	-
Salary & Wages (Training A/c)	-	-	842,060.00	-
Honorarium	149,343.00	-	123,500.00	-
Medical	7,702,974.00	-	8,590,880.00	-
Fellowship - Forensic Cell	-	-	-	-
Salaries & Allowances	-	-	240,000.00	-
Stipend	-	-	-	-
Fellowship & Wages	25,000.00	-	909,019.00	-
HRA	-	-	-	-
(2) Allowances and Bonus	-	-	-	-
Bonus	-	-	-	-
OTA	-	-	-	-
LTC	2,774,942.00	-	362,516.00	-
Corps Fund (Training)	-	-	-	-
Transferred to Corpus Fund	-	-	-	-
Honorarium (Training A/c)	-	-	-	-
(3) Others (Specify)				
Miscellenous Expenses	-	-	-	-
(4) Contribution to Other Fund (Specify)				
(5) Staff Welfare Expenses				
Uniforms	-	-	-	-
(6) Expenses on Employees Retirement and Terminal Benefits				
Leave Encashment & Gratuity	164,970.00	-	-	-
Leave Encashment	54,667,510.00	-	-	-
Gratuity	59,214,990.00	-	-	-
Pension	1,342,668,118.00	-	-	-
(7) Others (Specify)	-	-	-	-
Camp Expenses (Research Project)	-	-	-	-
TOTAL	**1,685,040,123.00**		**203,643,929.00**	**-**

FORM OF FINANCIAL STATEMENTS(NON-PROFIT ORGANISATIONS)
WILDLIFE INSTITUTE OF INDIA, CHANDRABANI, DEHRADUN
INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 2022-23

(Amount in Rs.)

SCHEDULE : 21 OTHER ADMINISTRATIVE EXPENSES	R&P	Committed	Current Year		Previous Year	
			Plan	Non Plan	Plan	Non Plan
AMC of Computers	-	-	995,331.00	-	1,021,132.00	-
Purchases -		-	-	-	-	
Annual Research Seminar	-	-	-	-	-	-
Contingencies/Misc. (Research Project)	-	-	-	-	-	-
Cont./Misc. -	-	578,505.00	-	1,641,463.00	-	
Expenses for Library	-	-	513,825.00	-	368,652.00	-
Electricity and Water Charges	72,593.00	-	8,551,689.00	-	9,263,821.00	-
Maint. Of WII Campus	-	-	6,947.00	-	759,190.00	-
Estate Security	1,747,908.00	-	33,434,667.00	-	33,351,152.00	-
Lab Expenses (Research lab)	-	-	-	-	-	-
Lab Expenses (Forensic Lab)	-	-	22,539.00	-	249,733.00	-
Lab Expenses (Harbarium)	-	-	-	-	-	-
Lab Expenses (Genetic Lab)	-	-	-	-	-	-
Legal Expenses	162,477.00	-	798,390.00	-	660,879.00	-
M.Sc. Course Expenditure	-	-	24,900.00	-	1,249,428.00	-
Operational Expenses	431,538.00	-	4,900,025.65	-	1,517,625.72	-
Corpus Fund Transfer (Training Account)	2,863,820.00	-	-	-		
POL & Maintenance of Vehicle (Research Project)	-		-	-	-	-
POL & Maintenance of Vehicle (Training Account)	-		634,889.00	-	252,016.00	-
POL for Vehicles	40,039.00		403,415.00	-	609,739.00	-
Postage & Telegrams	-		91,206.00	-	207,681.00	-
Printing & Binding	-		63,896.00	-	448,418.00	-
Borading & Lodging (Training Account)	-		8,830,605.00	-	3,024,610.00	-
Repair & Maintenance of Vehicles	-		290,837.00	-	298,756.00	-
Vehicle insurance	-		247,704.00	-	277,525.00	-
Repair of Vehicle (Training Account)	-		-	-	-	-
Repair & Maintenance furniture & Fixture	-		-	-	100,302.00	-
Sports -		79,030.00	-	16,350.00	-	
Hospitality/entertainment	64,275.00		517,865.00	-	244,759.00	-
Sport Goods (Training Account)	-		27,591.00	-	15,000.00	-
Stationery -		48,267.44	-	454,649.00	-	
Training Allowance	-		488,195.00	-	-	-
Telephone & TC	131,969.00		1,079,525.00	-	499,938.00	-
Stationery (Training Account)	-		167,455.00	-	-	-
Training Cost Expenditure	-		-	-	-	-
Travel Exp. (Grant in Aid)	25,106.00		1,002,638.00	-	438,349.00	-
Travel Exp. (Research Project)	-		79,995.00	-	9,299.00	-
Travelling Expenses (Training Account)	-		12,933,194.91	-	1,685,544.00	-
Maintinancae of civil work (GIA658068+Capital 2294527)	150,000.00		2,952,595.00	-	872,781.00	-
TA/DA & Honorarium (Training Account)	-		237,500.00	-	-	-
Books (Training Account)	-		332,553.00	-	-	-
Field Assistance (Training Account)	-		134,550.00	-	-	-
Software Renewal / Maint.	-	-	-	-	501,095.00	-
Misc. Receipt Previous Year	-		-	-	42,889.00	-
Wages -		-	-	-	-	
Prior Period	-		-	-	-	-
Tution Fee (Training Account)	-		1,148,000.00	-	-	-
Refund of Unspend Amt	-		-	-	-	-
Opening Bal. Grant transfer for Next Financial Year 2017-18	-	-	-	-	-	-
Funds Transfer of Misc. Recipt to Corpus A/c	-		-	-	-	-
Written off of PY Income (Training Account)	-		660,000.00	-	-	-
Depriciation during the year	-		19,924,084.00	-	19,869,562.00	-
TOTAL	**2,825,905.00**	**-**	**105,066,229.00**	**-**	**79,952,337.72**	**-**

FORM OF FINANCIAL STATEMENTS(NON-PROFIT ORGANISATIONS)
WILDLIFE INSTITUTE OF INDIA, CHANDRABANI, DEHRADUN
INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 2022-23

(Amount in Rs.)

SCHEDULE : 22 EXPENDITURE ON GRANTS, SUBSIDIES ETC...	Current Year		Previous Year	
	Plan	Non Plan	Plan	Non Plan
(a) Grants given to Institutions/Organisation	-	-	-	-
(b) Subsidies given to Institution?Organisations	-	-	-	-
TOTAL	**-**	**-**	**-**	**-**

FORM OF FINANCIAL STATEMENTS(NON-PROFIT ORGANISATIONS)
WILDLIFE INSTITUTE OF INDIA, CHANDRABANI, DEHRADUN
INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 2022-22

(Amount in Rs.)

SCHEDULE : 23 - INTEREST	Current Year		Previous Year	
	Plan	Non Plan	Plan	Non Plan
(a) On Fixed Loans	-	-	-	-
(b) On other Loans (including Bank Chargs)	-	-	-	-
(c) Other (Specify)	-	-	-	-
TOTAL -	**-**	**-**	**-**	**-**

FORM OF FINANCIAL STATEMENTS(NON-PROFIT ORGANISATIONS)
WILDLIFE INSTITUTE OF INDIA, CHANDRABANI, DEHRADUN
INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 2022-23

1 ACCOUNTING CONVENTION

The financial statement are prepared on the basis of historical cost convention, unless otherwise stated and on the accrual method of accounting.

2 INVENTORY VALUATION

2.1 Stores and spares (including machinery spares) are valued at cost.

2.2 Nil

3 INVESTMENTS

3.1 Investments classified as Long term investments are carried at cost. Provision for decline, other than temporary, is made on carrying cost of such investments.

3.2 Investments classified as current are carried at lower of coast and fair value. Provision for shortfall In the value of such investments is made for each investment considered individually and not on a global basis.

3.3 Cost includes acquisition expenses like brokerage, transfer stamps.

4 EXCISE DUTY

Nil

5 FIXED ASSETS

5.1 Fixed assets are stated at cost of acquisition inclusive of inward freight, duties and taxes and incidental and direct expenses related to acquisition. In respect of projects involving construction, related pre-operational expenses (including interest on loan for specific project prior to its completion), form part of the value of the assets.capitalized

5.2 Fixed assets received by way of non-monetary grants, (other than towards the Corpus Fund), are capitalized at values stated by corresponding credit to capital Reserve.

6 DEPRECIATION

6.1 Depreciation is provided on "Written Down Value method" as per specified in the Income-tax, 1961 except depreciation on cost adjustments arising on account of conversion of foreign currency, liabilities for acquisition of fixed assets, which is amortized over the residual life of the respective assets.

6.2 In respect of additions to/deductions from fixed assets during the year, depreciation is considered on pro-rata basis.

6.3 Nil

SIGNIFICANT ACCOUNTING POLICIES -SCHEDULE – 24 (Notes on Accounts)

7 MISCELLANEOUS EXPENDITURE

Nil

8 ACCOUNTING FOR SALES

Nil

9 GOVERNMENT GRANT/SUBSIDIES

9.1 Government grants of the natures of contribution towards capital cost of setting up projects are treated as Capital Reserve

9.2 Government grants in respect of specific assets acquired are shown as a deduction from the cost of the releated assets.

9.3 Government grants /subsidy are accounted on realization basis.

10 FOREIGN CURRENCY TRANSACTION

10.1 Transaction denominated in foreign currency are accounted at the exchange rate prevailing at the date of the transaction.

10.2 Current assets, foreign currency loans and current liabilities are converted at the exchange rate prevailing as at the year end and the resultant gain/loss is adjustment to cost of fixed assets, if the foreign currency liability related to fixed assets, and in other cases is considered to revenue

11 LEASE

Lease rentals are expensed with reference to lease terms.

12 RETIREMENT BENEFITS

The pension scheme followed in the institute is based on CCS Pention Rules, for the employees appointed prior to 01 Jan 2004. The New Pension Scheme(NPS) is in operation for the employees recruited on or after 01 Jan 2004

(a) The Institute maintains a separate Bank Account for contribution / subscription (Employer & Employee's) towards, General Provident Fund, Pension Scheme.
Accordingly, separate financial statement showing the total fund balance of GPF, Fixed Deposits/ Investments/Bank Balance made out of G.P.F. A/c, representing the same fund balance have separately been added with the Institute's Balance Sheet as at 31 st March 2023.

(b) Gratuity: Liability towards Gratuity is accounted for on accrual basis as per the provisions of "Accounting Standard-15.

(c) Pension: Liability towards pension is accounted for on accrual basis as per the provisions of "Accounting Standard-15.

(d) Leave Encashment: Liability towards leave encashment is accounted for on accrual basis as per the provisions of "Accounting Standard-15.

(e) As per the provisions of "Accounting Standard-15 obligation for the employee's post-employment benefits is recognized in the financial statements on accrual basis based on actuarial techniques.
Liability for the current year charge has been debited to the Corpus Fund.
Account as per the provisions of "Accounting Standard-15".

13 PRIOR PERIOD ITEMS

13.1 Prior period items, Extra ordinary items and changes in Accounting Polices are accounted in accordance with Accounting Standard-5. Land Acquisition Charges (Deposit in Hon'ble High Court) A/c No. 01 for Rs. 2.86 Crore. The amount of 2.86 Crores was received in A/c no. 58146 on 08-02-2021 during the financial year 2020-21. In compliance of audit para D (1) (5) of Separate Audit (SAR) for the period 2021-22 pertaining ot static balance of 2.86 (Sch-11), rectifiction has been made.

13.2 Prior period items, Extra ordinary items and changes in Accounting Polices are accounted in accordance with Accounting Standard-5. Prior Period Income Includes , Rs.2,69,317/- being the TDS Deducted on the Interest on the Fixed Deposits.

13.3 Prior period items, Extra ordinary items and changes in Accounting Polices are accounted in accordance with Accounting Standard-5. Prior Period Deprecation, Rs.93,50,226/- Fixed Assets.

FORM OF FINANCIAL STATEMENTS(NON-PROFIT ORGANISATIONS)
WILDLIFE INSTITUTE OF INDIA, CHANDRABANI, DEHRADUN
INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 2022-23

(Amt. Rs.)

SCHEDULE :25 - CONTINGENT LIABILITIES AND NOTES ON ACCOUNTS :	Plan	Non Plan	Plan	Non Plan
1 CONTINGENT LIABILITIES				
1.1 Claims against the Entity not acknowledged as debts	-		-	-
1.2 In respect of :				
Bank guarantees given by/on behalf of the entity	-		-	-
Letters of Credit opened by Bank on behalf of the Entity	-		-	-
Bills discounted with banks	-		-	-
1.3 Disputed demands in respect of :				
Income Tax	-		-	-
Sales-Tax	-		-	-

SCHEDULE :25 - CONTINGENT LIABILITIES AND NOTES ON ACCOUNTS				
	Municipal Taxes	-	-	-
1.4	In respect of claims from parties for non-execution of orders, but contested by the Entity	-	-	-
2	**CAPITAL COMMITMENTS**			
	Estimated value of contracts remaining to be executed on capital account and not provided for (net of advance)	-	-	-
3	**LEASE OBLIGATIONS**			
	Future obligations for rentals under finance lease arrangements for Plant and Machinery amount to	-	-	-
4	**CURRRENT ASSESTS, LOANS AND ADVANCES**			
	In the opinion of the Management, the current assets, loans and advances have a value on realization in the ordinary course of business, equal at least to the aggregate amount shown in the Balance Sheet.	-	-	-
5	**TAXATION**			
	In view of there being no taxable income under Income-tax Act 1961, no provison for income tax has been considered necessary.	-	-	-
6	**FOREIGN CURRENCY TRANSACTIONS**			
6.1	Value of Imports calculated on C.I.F. Basis :			
	Purchase of finished Goods	-	-	-
	Raw Materials & Components (including in transit)	-	-	-
	Capital Goods	-	-	-
	Stores, Spares and Consumables	-	-	-
6.2	Expenditure in foreign currency:			
	a) Travel	-	-	-
	b) Remittances and Interest payment to Financial Institutions/ Banks in Foreign Currency	-	-	-
	c) Other expenditure:			
	Commission on Sales	-	-	-
	Legal and Professional Expenses	-	-	-
	Miscellaneous Expenses	-	-	-
6.3	Earnings:			
	Value of Exports on FOB basis	-	-	-
6.4	Remuneration to auditors			
	As auditors			
	Taxation Matters	-	-	-
	For Management Services	-	-	-
	For certification	-	-	-
	other	-	-	-
7	Corresponding figures for the previous year have been regrouped/rearranged, wherever necessary	-	-	-
8	Schedules 1 to 25 are annexed to and form an integral part of the Balance Sheets as at 31 Mar 2023 and the Income and Expenditure Account for the year ended on that date.	-	-	-
	TOTAL	**-**	**-**	**-**

GENERAL PROVIDENT FUND ACCOUNT NO. 518502010001297
WILDLIFE INSTITUTE OF INDIA, CHANDRABANI, DEHRADUN
INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 2022-23

(Amount in Rs.)

Income		**Expenditure**	
Particulars	**Amount**	**Particulars**	**Amount**
Opening Balance	5,766,203.00	Final payment of GPF	32,608,039.00
Interest Received on Saving Account	213,888.00	Advance/Withdrawal paid	21,176,524.00
GPF Contribution	19,795,292.00	Autosweep Bank Bal.	3,500,000.00
Encashment of FDR	26,499,586.00		
Interest on FDR	1,997,548.00		
Interest Accured	4,955,526.00		
Autosweep Bank Bal.	3,500,000.00	Bank Balance	5,443,480.00
Total	**62,728,043.00**	**Total**	**62,728,043.00**

PENSION FUND ACCOUNT NO. 518502010000018
WILDLIFE INSTITUTE OF INDIA, CHANDRABANI, DEHRADUN
INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 2022-23

(Amount in Rs.)

Income		**Expenditure**	
Particulars	**Amount**	**Particulars**	**Amount**
Opening Balance	6,188,212.00	Investment in FDR	533,050,647.00
Interest Received on Saving Account	2,647,434.00	Commuted Value of Pension	19,316,170.00
Interest Earned on FDR	5,267,214.00	Family Pension/ Pension	46,006,388.00
WII Contribution	289,854,992.00		
Encashment of FDR	202,816,939.00		
Misc. Receipt	109,710,215.28		
		Bank Balance	18,111,801.28
Total	**616,485,006.28**	**Total**	**616,485,006.28**

WII CONTRIBUTION OF GRATUITY ACCOUNT NO. 518502010055326
WILDLIFE INSTITUTE OF INDIA, CHANDRABANI, DEHRADUN
INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 2022-23

(Amount in Rs.)

Income		**Expenditure**	
Particulars	**Amount**	**Particulars**	**Amount**
Opening Balance	5,659,599.47	Misc. Expenses	70.16
Interest Received on Saving Account	176,112.00		-
WII Officials Contribution	1,178,340.00		-
		Bank Balance	7,013,981.31
Total	**7,014,051.47**	**Total**	**7,014,051.47**

FORM OF FINANCIAL STATEMENTS (NON-PROFIT ORGANISATIONS)

ANNEXURE - 1

Wildlife Institute of India, Dehradun

Fixed Assets Purchased from Funds reflected in Schedule-3

ACCOUNT FOR THE YEAR ENDED 2022-23

(Amount in Rs.)

Particulars	Gross Block					Description					Net Block
	Cost as at the beginning	Addition during the year		Deduction during the Year	Cost as at the end of the year	As at the beginning of the year	For the year	Deduction during the year	At the end of the year	As ast the current year-end	As at the previous year-enf
		Upto 30-Sep.	After 30-Sep.								
PLANT MACHINERY & EQPT											
BLOCK: 15%											
Office Equipment	5,947,493.00	7,466,405.00	14,122,319.00	-	27,536,217.00	-	3,071,258.63	-	3,071,258.63	24,464,958.38	5,947,493.00
Camp Equipment	3,725,606.90	24,751,157.62	30,970,266.15	-	59,447,030.67	-	6,594,284.64	-	6,594,284.64	52,852,746.03	3,725,606.90
TOTAL	9,673,099.90	32,217,562.62	45,092,585.15	-	86,983,247.67	-	9,665,543.26	-	9,665,543.26	77,317,704.41	9,673,099.90
Furinitures & Fixtures											
BLOCK : 10%											
Furinitures & Fixtures	130,207.81	302,790.00	10,700.00	-	443,697.81	-	43,834.78	-	43,834.78	399,863.03	130,207.81
TOTAL	130,207.81	302,790.00	10,700.00	-	443,697.81	-	43,834.78	-	43,834.78	399,863.03	130,207.81
BOOKS : BLOCK : 40%											
Books	961.28	-	-	-	961.28	-	384.51	-	384.51	576.77	961.28
TOTAL	961.28	-	-	-	961.28	-	384.51	-	384.51	576.77	961.28
COMPUTER/PERIPHERALS : BLOCK : 40%											
Comp. & Accessories	-		1,875,751.00	-	1,875,751.00	-	375,150.20	-	375,150.20	1,500,600.80	1,875,751.00
GRAND TOTAL	**9,804,268.99**	**32,520,352.62**	**46,979,036.15**	**-**	**89,303,657.76**	**-**	**10,084,912.76**	**-**	**10,084,912.76**	**79,218,745.00**	**11,680,019.99**

(N.S. Chauhan)
Finance Officer

(Virendra R. Tiwari)
Director

भारतीय वन्यजीव संस्थान
Wildlife Institute of India
P.O. Box # 18, Chandrabani
Dehradun - 248001, Uttarakhand
Tel.: 0135 - 2640114-115, Fax: 0135 - 2640117
Website: www.wii.gov.in, Email: wii@wii.gov.in

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